



April 19, 2011

Dana Hornkohl, PE, CFM
City of Durham
Department of Public Works
Stormwater Services Division
101 City Hall Plaza
Durham, North Carolina 27701

REF: University Drive Culvert Replacement – Additional Services

Dear Mr. Hornkohl

HDR Engineering is pleased to present this letter proposal for performing additional services to perform the geotechnical investigation, survey services, culvert structural design, environmental permitting and construction administration services for University Drive Culvert Replacement.

Understanding the Project

The City of Durham Stormwater Services Division is planning to construct 350 feet of a double 5-ft x 5-ft box culvert to convey stormwater around an existing building and underneath University Drive near the intersection of US 15/501 and University Drive. The North Carolina Department of Transportation (NCDOT) has agreed to assist in the funding of the project because it will replace existing deteriorating culverts under University Drive.

Under the existing professional services contract, HDR performed the initial design of the culvert replacement with the assumption that a precast box culvert would be acceptable. NCDOT has since notified the City that precast bends or vertical grade changes will not be allowed within the right of way (ROW). In addition, NCDOT has required the submittal of a geotechnical investigation. Given these conditions, the City has decided to perform a geotechnical investigation for the entire culvert that can be used by the Contractor to design the temporary shoring and for a consultant to perform the structural design for a cast-in-place culvert within the NCDOT ROW and then transitioning to a precast outside of the ROW.

The City also desires the assistance in the preparation of easement plats and administering the construction contract in the areas of construction management services, technical support, construction observation services, and material testing to ensure compliance with the City and NCDOT requirements.

Based on our understanding of the project, review of the draft NCDOT agreement and our understanding of the current Construction Drawings and Project Manual, below is our recommended scope of services, fee and schedule for these services.

Scope of Services

Geotechnical Investigation.

1. Geotechnical Investigation

- 1.1. HDR will coordinate with their subcontractor, NFE Technologies to perform the geotechnical investigation necessary to design the culvert. NFE will sub-contract to HDR through our master subconsultant agreement. The scope of services for this work is summarized in Attachment A. In addition the geotechnical investigation will provide a recommendation for soil suitability and potential borrow requirements.

2. Surveying Services

- 2.1. HDR will coordinate with their subcontractor CH Engineering and the City to prepare the necessary permanent drainage and temporary construction easement plats and exhibits.
- 2.2. For purposes of this proposal it is assumed permanent easement plats will be required on the Howell and Bauer properties and additional boundary surveying is required on the Bauer property along with an update to features on the Howell property.
- 2.3. For purposes of this proposal it is assumed temporary construction easement exhibits will be required on the Howell, Bauer and Rockwood Center LLC properties. Temporary easement exhibits will not require boundary surveys and can be drawn from available property boundary information.
- 2.4. HDR will coordinate the as-built survey of the final improvements. The as-built survey will include the location of the culvert, sanitary and storm sewer pipes and structures including inverts that were affected by the improvements. The as-built survey will not include final grading elevations or other appurtenances.

3. Structural Design, Drawings and Document Reviews

- 3.1. HDR will perform the structural design based on the geotechnical investigation. For purposes of this proposal, it is assumed the culvert will be cast-in-place within the NCDOT ROW and then will transition to a precast culvert outside of the NCDOT ROW.
- 3.2. HDR will modify the site plan to minimize the number of varying bend angles to simplify the design and construction of the cast-in-place sections
- 3.3. HDR will prepare construction drawings for the culvert and incorporate these into the overall construction drawing package. The drawings will include specifying of rebar necessary to construct the culvert. The contractor will be required to generate the rebar fabrication schedule.
- 3.4. HDR will produce technical specifications for the concrete culvert. These specifications will follow the City's format and will reference NCDOT specifications and pay items when appropriate.

- 3.5. HDR will prepare and submit the packages including the necessary applications, fees and supporting information necessary to receive approval to advertise for construction bids. HDR will revise the culvert design, layout and construction documents to respond the review comments assuming the revisions do not require substantial design modifications. The following approval packages will be submitted.
- 3.5.1. NCDOT Encroachment Agreement. The drawings and specifications will be prepared per HDR and City of Durham standards.
 - 3.5.2. City-County Planning Department Simplified Small Site Plan application.
 - 3.5.3. City Public Works Department - Construction Plan Approval.

4. Construction Management Services

- 4.1. HDR will provide support to the City during bidding to include attending the pre-bid conference and the preparation and issuance of 1 addendum to registered bidders and plan holders.
- 4.2. HDR will review the bids and provide the City with any observations of bid irregularity or opinions of bidder's qualifications.
- 4.3. HDR will attend the preconstruction conference and up to 3 progress meetings and issue meeting notes to all participants within 7 working days. One progress meeting will be held during each of the 3 phases of work. These project meetings will be held at the City of Durham Stormwater Services Division Office and include the Contractor, Onsite Construction Observer and City of Durham staff.
- 4.4. HDR will receive contractor pay requests, review for recommendation of payment, and submit to the City for approval and payment. HDR will communicate with the contractor on any observed discrepancies or disagreements in the pay request.
- 4.5. HDR will coordinate material testing services as identified in Item 8 below.

5. Technical Support during Construction

- 5.1. HDR will use the City provided web accessed Primavera Contract Management Software to document the activities of each construction task. HDR shall coordinate with the Contractor and shall update the schedule on a weekly basis through the completion of the project.
- 5.2. HDR will review shop drawings for compliance with the Construction Drawings and Project Manual. Shop drawings shall be reviewed and transmitted within the time limits identified in the Project Manual.
- 5.3. The Contractor will be required to provide the temporary shoring design calculations for review and approval by NCDOT. HDR will coordinate with NCDOT and the Contractor to obtain NCDOT approval.
- 5.4. Questions may arise during construction that requires the contractor to issue a request for information (RFI). HDR will respond to these RFIs and copy the City on the response

within 3 business days of receipt of the RFI. It is assumed that there will be up to 2 RFIs in need of a formal response.

- 5.5. HDR will prepare field orders for any plan changes requiring an issue of a new drawing that does not change the contract time or price. Preparation of one field order is budgeted in the estimate.
- 5.6. Upon verification by the contractor that substantial completion for a particular phase of construction is reached, HDR will perform a final inspection in support of developing a final “punch list” of outstanding items necessary to complete prior to moving forward with the next phase or receiving final payment.

6. Construction Observation Services

- 6.1. HDR will provide personnel qualified in the field of engineering and/or construction observation to perform the duties of a construction observer. This person will visit the project site periodically (on average of two days per week) and during critical stages of construction, to observe on the progress of the work, and report on compliance with the general intent of the contract documents. The HDR Construction Observer will perform the following duties:
 - 6.1.1. Attend meetings between the contractor and the owner, including progress meetings
 - 6.1.2. Coordinate with contractor on payment measurement and pay request submittal
 - 6.1.3. Prepare weekly field reports, to be submitted by the end of the following week to the City Project Manager.
 - 6.1.4. Communicate with the City Project Manager, Contractor’s Superintendent, and the general public in support of expediting the project
 - 6.1.5. Perform substantial completion walk-through for each phase of the work and prepare the initial “punch list” to be reviewed by the HDR engineer.
 - 6.1.6. Report any work that is observed to be in non-compliance with the contract documents. HDR personnel will not be responsible for means and methods of the construction activity, nor will they be responsible for project or contractor safety.
 - 6.1.7. Communicate to the City and coordinate material acceptance testing activities.

7. Environmental Permitting Services

- 7.1. HDR will provide environmental services on a cost plus basis. For purposes of this proposal it is assumed that a coordination site meeting will be required along with preparation on submission of a notice to construct. These services will be performed using the standard hourly rates and expenses provided in Appendix D.

8. Materials Testing Services

8.1. HDR will coordinate with NFE to perform the necessary material testing. NFE will subcontract to HDR through a master subconsultant agreement. The amount of material testing and geotechnical observations will be dependent on the site conditions encountered and the schedule and performance of the contractor. For purposes of this proposal the estimated material testing scope of services is provided in Attachment B and the unit rates for performing the material testing is provided in Attachment C. These services will be performed at these unit rates plus our standard 10% subcontractor fee.

9. Fee Estimate

HDR proposes to perform Items 1, 2, 3, 4 and 5 for a Lump Sum Fee as follows

Task – Description	Fee
1. Geotechnical Investigation	\$22,900.00
2. Surveying Services	\$14,725.00
2. Structural Design and Drawings	\$46,700.00
3. Construction Management	\$6,950.00
4. Technical Support	\$10,900.00
5. Construction Observation	\$13,600.00
TOTAL LUMP SUM FEE	\$115,775.00

HDR proposes to perform Items No. 7 on a cost plus expenses basis using our standard hourly rate schedule provided in Appendix D and Item No. 8 on a cost plus 10% basis using the cost rates provided in Appendix C.

For budgetary purposes it is estimated that the total cost for Item No. 7 will be \$1,800 and for Item No. 8 will be \$29,000.00 for a total estimated fee amount of \$146, 575.00.

10. Schedule

HDR proposed to perform Items 1, 2 and 3 within 90 days of the notice to proceed. The schedule of the remaining items will be dictated by the City and Contractor.



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Please feel free to contact me at (919) 232.6651 or e-mail at kenneth.trefzger@hdrinc.com with any questions regarding the above scope of services, fee, or additional services.

Sincerely,
HDR Engineering Inc of the Carolinas

A handwritten signature in black ink that reads 'Kenneth E. Trefzger'.

Kenneth E. Trefzger, PE, CFM
Senior Project Manager

Attachment A

NFE Project Understanding for Geotechnical Work on Durham Culvert Project

SCOPE OF WORK:

NFE Technologies, Inc (“NFE”) will be working as sub-consultants to HDR Engineering, Inc. (“Client”) performing the following work:

1. Client / City will provide NFE with any design, loading, and construction data available on the existing and proposed culvert for their evaluation and determining the bearing capacity of soil.
2. NFE will locate all the borings at site using the layout provided by the Client.
3. NFE will thereafter contact ULOCO to mark all underground utilities. Client’s and Owner’s assistance will be needed to ensure all utilities are duly marked and identified.
4. Six hollow stem auger borings will be drilled using a truck-mounted drill rig. SPT samples will be obtained at every 5-foot interval. One boring each at the end of the box culvert and four along the culvert line are planned. Each boring to go 20-foot in the soil or up to auger refusal. All borings will be cored through rock for five (5) feet each, to ascertain whether the rock is solid enough to support the structure.
5. Coring through asphalt roadway and any concrete underneath (total six).
6. Three bag samples will be obtained to perform CBR test.
7. Traffic control:
 - a) University Drive borings may require one lane closure. Cost estimate includes: 2-flagmen, 2 signs (1-Lane road ahead), 2 signs (Be Prepared to Stop), 2 signs (symbolic flagger), 2- Stop/Slow Pedals, and 15 orange cones for two days.
8. Soil samples for culvert borings will be tested for moisture, gradation, pH, soil resistivity, and Atterberg limits.
9. Rock coring included as noted above. All cored holes will be grouted back using cement based grout.
10. Selective rock core samples will be measured for Quality(RQD), Percentage recovery, and Unconfined compression.
11. Asphalt pavement will be cored at six locations. Asphalt will be tested for thickness and density of existing pavement and CBR test will be performed on the soil underneath to design new pavement improvements. Client will provide loading data for calculations.
12. Holes will be backfilled with the drill cuttings from the holes, except grouted in rock cored depths.
13. All asphalt holes will be cold patched.
14. Based on the field and laboratory data obtained, NFE will provide a geotechnical recommendation for the new culvert foundation and asphalt re-pavement.
15. All drilled samples will be saved in NFE laboratories for up to 60 days from the date of procurement and then disposed offsite.

AE ASSUMPTIONS & EXCLUSIONS:

1. Client will provide the survey and location of all borings before and after the drilling. Client will provide NFE with a boring location plan and boring elevations to be included in the report.
2. Client and the City will provide NFE with any available data on the design, loading, and construction of the culvert and pavement.
3. No site clearance required for NFE’s drill rigs and all borings are easily accessible for a truck mounted drill rig.
4. NFE will not remove, replace, or protect the fence shown on the plan.
5. Client will obtain all permits and approvals from appropriate authorities.
6. Client will provide access permission for the drill rig to drill holes at the site. If any borings are to be drilled on or through private properties or NCDOT or other Right-of-Ways, client will obtain such permission to access and drill.

7. To obtain pavement cores and borings on the University Drive, Client will assist NFE in getting Lane closures and traffic control.
8. Client and City will assist NFE in identifying and locating all underground utilities including but not limited to electric and gas lines on drill sites. NFE will call the one-call center for utility clearance.
9. Some of the borings may need to be adjusted or relocated due to site constraints.
10. A minimum 2-week notice is required to contact ULOCO, mark boring locations and to schedule drilling operation.

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Attachment B

NFE Project Understanding on Durham Culvert Project at University Drive

CONSTRUCTION MATERIAL TESTING:

NFE as sub-consultants to HDR Engineering (Client) will be limited to performing the following work:

Soils:

1. Evaluation of subgrade conditions prior to placement of box culverts. We intend to use Dynamic Cone Penetrometer (DCP) to check the bearing of soils in those areas and evaluate any soft spots or unsuitable soils to be removed. It is anticipated to spend one day for each phase thereby total of three visits.
2. Performing materials testing of backfill materials around the culvert using NCDOT modified Proctor compaction test and soil classification. This material may be on-site material, if found suitable or borrow fill. The material will be backfilled in approved lifts. Field density testing of compaction will be done using the drive tube or sand cone or nuclear density gauge method. It is anticipated to spend 3 days for backfill underneath University Drive and assume 3 days for backfill outside of University Drive Right-of-way (Total six visits).
3. We have added one visit per phase for contingency purposes to account for any unsuitable soils to be replaced or to address any other site issues.
4. Borrow pit sampling may be required, with testing for gradation and Atterberg limits, as per AASHTO standards. Moisture Density testing will also be required as per NCDOT Standard 1018. We have assumed only two Borrow pit samples, expected to be within 15 mile radius of the site and three on-site samples (1 per phase) for engineered fill.
5. Density testing will be performed on ABC and structural fill as per NCDOT Standards 235, 500 and 520
 - o Embankment soil testing one per 5000 CY or fraction, with compaction to 95% of proctor value, as per AASHTO standards.
 - o Sub Grades to be tested every 1000 linear feet, with compaction to 100% of proctor value, as per AASHTO standards.

Concrete

- Concrete will be tested for slump and air content on site, and cast cylinders will be tested for compressive strength. Depending upon the size of the aggregate in the concrete, either 4" or 6" diameter cylinders will be made. We have assumed 4 visits per phase and 4 cylinders per 50 cubic yard of concrete. Total assumed concrete quantity 260 cubic yard. Total visits: 12 visits and 50 cylinders.
- Concrete mix design will be verified by HDR for applicability unless it is certified to meet NCDOT standards.

Asphalt Testing:

1. Asphalt Plant will provide mix design and required data on the Asphalt such as: gradation, maximum dry density, optimum moisture, specific gravity, etc.
2. Proof roll inspection on the pavement areas to be repaved. Assume 2 visits.
3. Density testing on ABC stone based on maximum density provided by the rock quarry. Testing will be done using nuclear gauge. Total assumed time: 2 visits.
4. Thickness, Temperature, and Density testing on asphalt based on the mix design and maximum density provided by the Asphalt plant. Density testing will be done using nuclear gauge. Total assumed time: 2 visits.

Assumptions:

1. NFE Technologies, Inc will be performing on-site and laboratory materials testing and will not be responsible for any construction management, construction engineering supervision, reviews, attending progress meetings, or other documentation.
2. A 48 hour notice is required for each on-call site visit.
3. Scope did not include any post construction concrete or asphalt coring or samples extraction.
4. Any failed test, if retested, will be done at contractor's expense and is not accounted for in our cost proposal.

Attachment C

NFE TECHNOLOGIES, INC.

SCHEDULE OF FEES FOR CONSTRUCTION MATERIALS TESTING SERVICES					
PROJECT: University Drive Culvert in Durham.					
CLIENT: HDR ENGINEERING			OWNER:		CITY OF DURHAM
Item No	Description of Item	Qty	Unit	Rate	
A. FIELD WORK					
1	Soils Technician / Engineer / Geologist for soils inspections, soils testing for evaluation of subgrade prior to placement of box culvert. Bearing capacity checking using DCP.	3	visit	\$550.00	\$ 1,650.00
2	Performing materials testing for backfill compactions. Backfill testing may be done using Drive tube or Sand cone or Nuclear Density Gauge.	6	visit	\$600.00	\$ 3,600.00
3	Soils Testing: Contingency visits to account for any unsuitable soils or other site condition issues.	3	visit	\$550.00	\$ 1,650.00
4	Borrow pit sampling and testing for Gradation and Proctor values.	2	visit	\$400.00	\$ 800.00
5	Concrete Testing for slump and air and Sampling of concrete for compression testing (making 4 cylinders per 50 CY or part thereof).	12	visit	\$ 600.00	\$ 7,200.00
6	Pavement Testing: Proof roll inspection of subgrade soils materials	2	visit	\$500.00	\$ 1,000.00
7	Pavement Testing: ABC Stone - Density testing using Nuclear Density Gauge.	2	visit	\$600.00	\$ 1,200.00
8	Pavement Testing: Asphalt testing for thickness, temperature, and density testing using Nuclear Density Gauge.	2	visit	\$600.00	\$ 1,200.00
9	Over Time Multiplier			1.35	
10	Trip charges (Mileage expense) for field personnel	30	trips	\$ 30.00	\$ 900.00
B LABORATORY WORK					
1	Provide cylinder molds, curing, and Concrete compression test on cylinders	50	ea.	\$ 10.00	\$ 500.00
2	Proctor Test on soil sample as per AASHTO specifications for compaction	3	ea.	\$ 110.00	\$ 330.00
3	Soil classification test (NCDOT standards)	2	ea.	\$ 120.00	\$ 240.00
4	Bulk Specific gravity/Density test on Asphalt samples	5	ea.	\$ 80.00	\$ 400.00
5	Nuclear Density Gauge, as required	4	days	\$ 150.00	\$ 600.00
C ADMINISTRATIVE WORK:					
1	Staff Engineer for preparing reports and other works.	30	hour	\$75.00	\$ 2,250.00
2	Registered Engineer's Time for project coordination and review project reports	15	hour	\$ 150.00	\$ 2,250.00
3	Administrative time for project coordination	15	hour	\$50.00	\$ 750.00
TOTAL ESTIMATE					\$ 26,520.00
ADD CONTINGENCIES: 10%					

	NOTES:				
1	Proposl is based on the scope defined by us in the attached document.				
2	Any additional item not listed above can be quoted separately.				
3	All field services rates include travel time portal to portal and suggested tests.				
4	Above scope does not include any Post-construction core samples extraction of asphalt or concrete.				
5	All quantities shown above are for estimate and budget purposes.				
6	All work shall be done during regular business hours. No overtime included in the proposal.				
7	Overtime is defined as time worked outside the normal eight hours Monday thru Friday between 8 AM and 5 PM, excluding holidays.				
8	Contractor shall provide necessary facilities, equipment and access on site to perform any test.				
9	This proposal expires in SIXTY days from this date unless signed into a contract.				
10	All work done by NFE remains NFE's property until paid in full.				
11	All invoices shall be paid by the Client within 30 days of invoice or a finance charge @ 1.5% per month will accrue on outstanding balance.				
12	Two working days notice required for all on-call inspections and testings.				

ATTACHMENT D

HDR Engineering Inc. of the Carolinas

FEE Schedule

Employee Classification	Standard Hourly Rate
Project Principal	\$195
Principal Project Manager	\$185
Senior Project Manager	\$175
Senior Structural Engineer	\$175
Structural Engineer	\$150
Senior Water Resource Engineer	\$150
Water Resource Engineer	\$135
Senior Environmental Scientist	\$110
Environmental Scientist	\$90
GIS Analyst	\$110
Senior Technician	\$90
Technician	\$80
Administrative Support	\$60

EXPENSE	COST/ UNIT
<u>Reproduction:</u>	
8.5" x 11" B&W Copies	\$0.10 ea. sheet
24" x 36" Bond (B&W)	\$1.00 ea. sheet
24" x 36" Vellum (B&W)	\$5.00 ea. sheet
Reproducible Mylar Copies, 24" x 36"	\$6.00 ea. sheet
Color Copies, 8.5" x 11"	\$0.75 ea. sheet
Color Copies, 11" x 17'	\$2.00 ea. sheet
Color Plots, 24" x 36"	\$10.00 ea. sheet
Color Plots, 30" x 42"	\$12.00 ea. sheet.
Foam-mounted Boards	Actual Cost + 15%
<u>Communication:</u>	
Facsimile	\$1.00/page
Postage	Actual Cost + 15%
<u>Travel Expenses:</u>	
Mileage, per mile	\$0.50/Mile
Meals & Lodging, (Actual Cost + %)	Actual Cost + 15%
<u>Permit Fees</u>	
404/401 PCN	Actual Cost

Rates and Costs are valid through December 2011