EARTHWORK SPECIFICATIONS

GENERAL

1. Earthwork associated with this project consists, in part, of excavating unsuitable soils beneath future and/or existing pavements and floor slabs (undercut), shallow excavations for structural footings and retaining walls, and trench excavations for subsurface pipework.

2. The work also consists or placing compacted soil and/or CABC stone (as shown on the Construction Plans) for foundation support beneath pavements and slabs, backfill of trenches beneath structural elements, backfill beneath and behind structural walls, and general fill for slopes and temporary erosion control berms.

3. All work shall be performed to the standards set forth in these specifications and in accordance with the Construction Quality Assurance (CQA) plan, presented as a supplemental document.

4. The Owner will provide third-party CQA testing and inspection, as set forth in the CQA plan. The Project Engineer and/or his designate will review the test results and will have final authority on the acceptability of the work.

5. The Owner and Contractor are expected to coordinate activities to maintain transfer station operations throughout the construction period.

PART 1 – EXCAVATION

OVERVIEW

1. The Contractor shall furnish all labor, material, and equipment required to complete Excavation of the existing floor area, new pavement and slab foundations, and related structures in accordance with the Project Drawings and these Specifications.

2. The Contractor shall provide adequate safety equipment and use appropriate precautions for the health and safety of the workers – both those employed by the Contractor and the Owner's staff working on the premises – during all stages of the work, including (but not limited to) the excavation of leachate contaminated soils from beneath the existing transfer station floor slab.

3. Due to the need to maintain adequate support existing structures while performing the required excavations, the Contractor is referred to the Structural Plans and Specifications for key precautions that must be observed.

4. Portions of the floor slab excavation area contain water pipes that must be reconnected. The Owner will make reasonable attempts to identify and locate these pipes prior to implementation of the work; however the existing piping is considered sacrificial and may be removed – with the provision that temporary water service must be maintained to the transfer station. Refer to the plumbing notes contained in these specifications.

5. The materials to be excavated from beneath the existing transfer station floor slab are expected to be unsuitable for reuse, due to soft and wet conditions resulting from leachate saturation. These materials shall be loaded onto transport trucks and removed from the facility – it is assumed that these soils will be disposed at a lined landfill facility at cost to the Contractor. Documentation of soil disposal will be required.

6. Other soils excavated from the premises may be suitable for reuse, subject to approval by the Engineer.

7. It is not anticipated that rock will be encountered in the excavations; if rock-like materials are encountered, the Engineer will decide if these materials must be removed to provide adequate foundation support.

8. All excavations for foundation subgrades are subject to inspection and approval by the Engineer or his designate, including (but not limited to) visual inspection, field and laboratory testing by the third party, proof rolling, or other means deemed appropriate by the Engineer.

9. The Contractor shall extend all excavations to sufficient depths to provide adequate foundation support and backfill the excavations with approved materials using appropriate compaction techniques.

SUBMITTALS

Prior to implementation, the Contractor shall submit the following to the Engineer before approval is given to proceed:

A. Plans for open cuts showing side slopes and limits of the excavation at grade.

B. List of disposal site(s) for waste and unsuitable materials.

C. Descriptive information on Excavation equipment to be used.

CONSTRUCTION

1. The Contractor shall conduct Excavation activities in such a manner that erosion of disturbed areas and off site sedimentation is absolutely minimized as outlined in the Erosion and Sedimentation Control notes.

2. The Contractor shall excavate to the lines and grades shown on the Project Drawings and stockpile all suitable excavated materials. As the excavation is made, the materials will be examined and identified by the Engineer. The Contractor will perform all surveys necessary to establish and verify lines and grades for all Excavation, including pipe excavations, soil over excavation, and anchor trenches.

3. The Contractor shall stockpile the materials in appropriate stockpiles as approved by the Engineer. The Contractor shall use equipment and methods as necessary to maintain the moisture content of soils stockpiled (excluding topsoil) at or near their optimum moisture content. Stockpiles shall be properly sloped and the surfaces sealed by the Contractor at the end of each working day, or during the day in the event of heavy rain, to the satisfaction of the Engineer.

4. The Contractor shall protect all existing facilities and structures including, but not limited to, existing utilities, monitoring wells, signs, grade stakes, etc. during the grading and stockpiling operations.

5. All excavations shall be made in the dry and in such a manner and to such widths as will give ample room for properly constructing and inspecting the structures and/or piping they are to contain and for such sheeting, timbering, pumping, and drainage as may be required.

6. Excavation slopes shall be flat enough to avoid sloughs and slides that will cause disturbance of the subgrade or damage of adjacent areas. Slides and overbreaks which occur due to negligence, carelessness, or improper construction techniques on the part of the Contractor shall be removed and disposed of by the Contractor as directed by the Engineer at no additional cost to the Owner.

7. The intersection of slopes with natural ground surfaces, including the beginning and ending of cut slopes, shall be uniformly rounded. All protruding roots and other vegetation shall be removed from slopes.

8. The bottom of all excavations for structures and pipes shall be examined by the Engineer for bearing value and the presence of unsuitable material. If, in the opinion of the Engineer, additional Excavation is required due to the low bearing value of the subgrade material, or if the in-place materials are soft, yielding, pumping and wet, the Contractor shall remove such material to the required width and depth and replace it with thoroughly compacted structural fill, or material directed by the Engineer. No payment will be made for subgrade disturbance caused by inadequate Dewatering or improper construction methods.

9. Any areas excavated below design subgrade elevations by the Contractor, unless directed by the Engineer, shall be brought back to design elevations at no cost to the Owner. The Contractor shall place and compact such material in accordance with Part 2 – Embankment, of these Specifications.

10. The Contractor shall dispose of excess or unsuitable excavation materials on-site at location(s) approved by the Owner.

11. The Contractor shall properly level-off bottoms of all excavations. Proof-rolling shall be conducted with appropriate equipment.

12. Upon reaching subgrade elevations shown in excavation areas, the Contractor shall scarify subgrade soils to a minimum depth of 6" and obtain the Engineer's approval of quality. If unsuitable materials are encountered at the subgrade elevation, perform additional excavations as approved by the Engineer to remove unsuitable materials.

13. Where subgrade materials are determined to be unsuitable, such materials shall be removed by the Contractor to the lengths, widths and depths approved by the Engineer and backfilled with suitable material unless further excavation or earthwork is required. No additional payment will be made for such excavation and backfill 1 foot or less than the finished subgrade. Unsuitable material excavation greater than 1 foot beneath the finished subgrade shall be made on a unit price basis for excavation and backfill, only as approved by the Engineer and Engineer prior to the work. Unit price for over excavation and backfill greater than 1 foot in depth shall include disposal of unsuitable materials.

14. All cuts shall be brought to the grade and cross section shown on the Project Drawings, or established by the Engineer, prior to final inspection.

15. The Contractor shall protect finished lines and grades of completed excavation against excessive erosion, damage from trafficking, or other causes and shall repair any damage at no additional cost to the Owner.

16. Trench Excavation:

A) All pipe Excavation and trenching shall be done in strict accordance with these Specifications, all applicable parts of the OSHA Regulations, 29 CFR 1926, Subpart P, and other applicable regulations. In the event of any conflicts in this information, safe working conditions as established by the appropriate OSHA guidelines shall govern.

B) The minimum trench widths shall be as indicated on the Project Drawings. Enlargements of the trench shall be made as needed to give ample space for operations at pipe joints. The width of the trench shall be limited to the maximum dimensions shown on the Project Drawings, except where a wider trench is needed for the installation of and work within sheeting and bracing.

C) Except where otherwise specified, excavation slopes shall be flat enough to avoid slides which will cause disturbance of the subgrade, damage to adjacent areas, or endanger the lives or safety of persons in the vicinity.

D) Hand excavation shall be employed wherever, in the opinion of the Engineer, it is necessary for the protection of existing utilities, poles, trees, pavements, obstructions, or structures.

E) No greater length of trench in any location shall be left open, in advance of laying pipe, than shall be authorized or directed by the Engineer and, in general, such length shall be limited to approximately one hundred (100) feet.

F) Pipe Bedding: All pipe bedding shall be as shown on the Project Drawings, unless otherwise specified herein.

17. Sheeting and Bracing:

A) The Contractor shall furnish, place, and maintain such sheeting and bracing which may be required to support sides of Excavation or to protect pipes and structures from possible damage and to provide safe working conditions in accordance with current OSHA requirements. If the Engineer is of the opinion that at any point sufficient or proper supports have not been provided, he may order additional supports put in at the sole expense of the Contractor. The Contractor shall be responsible for the adequacy of all sheeting and bracing used and for all damage resulting from sheeting and bracing failure or from placing, maintaining, and removing it.

B) The Contractor shall exercise caution in the installation and removal of sheeting to insure that excessive or unusual loadings are not transmitted to any new or existing structure. The Contractor shall promptly repair at his expense any and all damage that can be reasonably attributed to sheeting installation or removal.

C) All sheeting and bracing shall be removed upon completion of the work.

18. If grading operations are suspended for any reason whatsoever, partially completed cut and fill slopes shall be brought to the required slope and the work of seeding and mulching or other required erosion and sedimentation control operations shall be performed at the Contractor's sole expense.

PART 2 – EMBANKMENT

OVERVIEW

1. The Contractor shall furnish all labor, material, and equipment to complete Embankment including borrowing, hauling, screening, discing, drying, compaction, control of surface and subsurface water, final grading, sealing, and all necessary and incidental items as detailed or required to complete the Embankment, all in accordance with the Project Drawings and these Specifications.

2. All embankment work on this project, whether located under a floor slab or foundation, behind a retaining wall, under pavement, or containment berm for a sediment control device, will be considered as "structural fill."

3. Two types of borrow are associated with this project:

A) Borrow: shall consist of approved on-site material required for the construction of embankments/fills or for other portions of the work – this includes excavated materials as deemed suitable by the Engineer. The source of on-site soil must be coordinated with the Owner, whereas soil resources are designated for other uses.

B) Select Borrow: shall consist of approved off-site material required for the construction of slab foundations embankments/fills, roadway subgrade, backfilling, or for other portions of the work as shown on Project Drawings or in these Specifications. The Contractor shall make his own arrangements for obtaining select borrow and pay all costs involved.

MATERIALS

1. Embankment materials shall consist of clean well-graded natural soil classified as SM, SP, SC, ML, MH, CL-ML, CL or CH (ASTM D 2488) containing no topsoil or other deleterious material.

2. Stones or rock fragments shall not exceed one half the maximum lift thickness as compacted in any dimension.

3. Structural fill beneath the floor slab shall consist of compacted stone aggregate, such as CABC or an equivalent gradation acceptable to the Engineer.

SUBMITTALS

The Contractor shall submit the following to the Engineer before approval is given to proceed:

A) Descriptive information on compaction equipment to be used for construction of Embankment and appurtenant structures.

B) Descriptive information on the location and source of off-site borrow material to be used for Embankment, where applicable. Information shall include Standard Proctor curves (ASTM D698) for each soil borrow. For stone aggregate borrow a modified Proctor (ASTM D1557) may be submitted.

CONSTRUCTION

1. The Contractor shall conduct Embankment activities in such a manner that erosion of disturbed areas and off-site sedimentation is absolutely minimized as outlined in the Erosion and Sedimentation Control plan, of these Specifications.

2. All placement and compaction of Embankment shall be performed only when the Engineer is informed by the Contractor of intent to perform such work.

3. Embankment shall be placed and compacted to the lines and grades shown on the Project Drawings. Placement of Embankment outside the construction limits shall occur only as directed and approved by the Engineer.

4. The Contractor will perform all surveys necessary to establish and verify lines and grades for all Embankment work.

5. The Contractor shall identify (with input from the Owner and Engineer) and protect all existing facilities including, but not limited to, buildings, utilities and monitoring wells.

6. Subgrade Preparation:

A) The Engineer shall inspect the exposed subgrade prior to placement of Embankment to assure that all rocks, topsoil, vegetation, roots, debris, or other deleterious materials have been removed.

B) Prior to placement of Embankment, the exposed subgrade shall be proof rolled using a static smooth-drum roller, loaded tandem axle dump truck, or other suitable equipment in the presence of the Engineer. Any soft or unsuitable materials revealed before or during the in-place compaction shall be removed as directed by the Engineer and replaced with suitable Embankment.

6. Surfaces on which Embankment is to be placed, shall be scarified or stepped in a manner which will permit bonding of the Embankment with the existing surface.

7. The Contractor shall be responsible for preparing the materials for the Embankment, including but not limited to, in-place drying or wetting of the soil necessary to achieve the compaction criteria of these Specifications.

8. Embankment materials shall be placed in a manner permitting drainage and in continuous, approximately horizontal layers.

9. Compaction Requirements:

A) The Contractor shall compact Embankment in accordance with the requirements shown in Table 1 of this section. If Embankment does not meet the specified requirements, the Contractor shall rework the material, as may be necessary and continue compaction to achieve these requirements, or remove and replace the material to achieve the specified requirements, at Contractor's expense.

B) Each lift shall be compacted prior to placement of succeeding lifts. In confined areas, mechanical equipment, suitable for small areas and capable of achieving the density requirements, shall be required.

C) Lift compaction shall be performed with an appropriately heavy, properly ballasted, penetrating-foot or smooth-drum vibratory compactor depending on soil type. Compaction equipment shall be subject to approval by the Engineer.

10. Embankment that becomes excessively eroded, soft, or otherwise unsuitable shall be removed or repaired by the Contractor as directed by the Engineer, at no cost to the Owner.

11. The exposed surface of Embankment shall be rolled with a smooth-drum roller at the end of each work day to protect from adverse weather conditions.

12. Where Embankment is to be placed and compacted on slopes that are steeper than 3:1, the subgrade shall be benched to a minimum depth of 6 inches (no more than 12 inches without prior approval by the Engineer), and the Embankment shall be placed in horizontal lifts.

13. Backfilling for Structures and Piping:

A) All structures, including manholes and pipes shall be backfilled with Embankment as shown in the Project Drawings and as described in these Specifications.

B) The Contractor shall meet the compaction requirements shown in Table 1 of this section on all soil placement, unless otherwise directed by the Engineer.

C) Where sheeting is used, the Contractor shall take all reasonable measures to prevent loss of support beneath and adjacent to pipes and existing structures when sheeting is removed. If significant volumes of soil cannot be prevented from clinging to the extracted sheets, the voids shall be continuously backfilled as rapidly as possible. The Contractor shall thereafter limit the depth below subgrade that sheeting will be driven in similar soil conditions or employ other appropriate means to prevent loss of support.

D) When backfilling around structures, do not backfill until concrete has sufficiently cured (as determined by the Engineer) and is properly supported. Place backfill in a manner to avoid displacement or damage of structures.

TABLE 1 TESTING PROGRAM FOR STRUCTURAL FILL

CONTROL TESTS:			
PROPERTY	**ACCEPTANCE CRITERIA**	**TEST METHOD**	**MINIMUM TEST FREQUENCY**
Visual Classification	Free of organic debris, particles >3" diam., solid waste	Visual or ASTM D2488	Each load
Moisture-Density Relationship	NA[1]	ASTM D 698 or ASTM D 1557	500 CY per Each Soil

RECORD TESTS:			
PROPERTY	**ACCEPTANCE CRITERIA**	**TEST METHOD**	**MINIMUM TEST FREQUENCY**
Lift Thickness	Minimum 12"	Direct measure	Each Lift[4]
Sand Cone In-Place Density and Moisture	95% MDD (std) or 90% MDD (mod), ±5% opt. moisture	ASTM D-1556 ASTM D-2216	One per lift, or one per 500 LF/lift of soil berms
Nuclear Density Gauge and Moisture	95% MDD (std) or 90% MDD (mod), ±5% opt. moisture	ASTM D 2922[2] ASTM D 3017[3]	Four per lift – NOT SPECIFIED FOR THIS PROJECT

Notes:

1. WITHIN THE UPPER 12 INCHES BENEATH PAVEMENTS AND FLOOR SLAB AREAS, THE MINIMUM DENSITY REQUIREMENT IS 98% MDD (STANDARD) OR 95% MDD MODIFIED, WITH MOISTURE WITHIN 5% OF OPTIMUM

2. Materials must meet visual acceptance criteria and be neither too wet or too dry and generally free of large clods and rocks to be considered suitable.

3. Optionally use ASTM D 1556, ASTM D 2167, or ASTM D 2937. For every 10 nuclear density tests perform at least 1 density test by ASTM D 1556, ASTM D 2167, or ASTM D 2937 as a verification of the accuracy of the nuclear testing device.

FOR REVIEW AND BIDDING
NOT FOR CONSTRUCTION

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SEAL
NORTH CAROLINA LICENSED GEOTECHNICAL ENGINEER DAVID G. GARRETT 7-18-2012

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PROJECT TITLE:
RUTHERFORD COUNTY, N.C.
CDNTRAL MSW FACILITY
TRANSFER STATION UPGRADE
PERMIT #81-04T

DRAWING TITLE:
GENERAL CIVIL SPECIFICATIONS
SHEET 2 OF 3

DESIGNED BY: G.D.G.	DRAWN BY: A.W.H.
CHECKED BY: G.D.G.	PROJECT NO.: RUTH-2
SCALE: AS SHOWN	DATE: JUN 2012
FILE NAME: RUTH-D0116_Transfer Station	
SHEET NO. 8	DRAWING NO. C2