



STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

MICHAEL F. EASLEY
GOVERNOR

LYNDO TIPPETT
SECRETARY

October 22, 2004

Addendum No. 1

RE: TIP U-3101C & D
Contract ID: C200912
WBS # 34897.3.4
Federal Aid No.: STPNHF-0001 (106)
Wake County
Cary-US I-64/SR 1009 (Tryon Road) Interchange to South of I-40

November 18, 2004 Letting

To Whom It May Concern:

Reference is made to the Request for Proposal recently furnished to you on the above project. The following revisions have been made to the Request for Proposal:

After Page No. 82, Construction Inspection Scope of Work, the Project Special Provision entitled *Cement and Lime Stabilization of Sub-Grade Soils* has been added. Please staple Page Nos. 82a through 82d thereto.

On page 463, the Project Special Provision entitled *General Requirements for Portland Cement Concrete Paving* has been revised. Please void Page 463 in your proposal and staple the revised Page Nos. 463, through 463c thereto.

On page 464, *Portland Cement Concrete for Concrete Pavement* has been revised. Please void Page No. 464 in your proposal and staple the revised Page No. 464 thereto.

The Table of Contents has been revised to reflect the above changes. Please void the Table of Contents in your proposal and staple the revised Pages thereto.

Sincerely,

A handwritten signature in black ink, appearing to read "R.A. Garris".

R.A. Garris, P.E.
Contract Officer

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Ms. Michelle Long, PE (w/attachment)
Town of Cary (Attn: Kyle Hubert) (w/attachment)
Technical Review Committee Members (w/attachment)
File (w/attachment)

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PROPOSAL FORM ITEM SHEET, ETC.

- Item Sheet
- Award Limits
- Signature

CEMENT AND LIME STABILIZATION OF SUB-GRADE SOILS

General

The scope of work consist of the following:

1. Sampling Sub-grade soils
2. Conducting Laboratory tests to determine:
 - a. Soil classifications
 - b. Moisture-density Characteristics
 - c. Quantity of lime or cement required to achieve specified strengths
3. Designating areas to be stabilized by either lime or cement and the required rates of application.
4. Conducting field tests to determine unconfined compressive strength

Sampling

Take soil samples, after project has been graded to within 2 inches ± (50 mm ±) of final sub-grade elevation. Sample top 8 inches (200 mm) at a minimum frequency of one sample per 985 feet (300 linear meters) for classification tests and one sample per 3280 feet (1000 linear meters) for moisture density tests and lime or cement mix design tests in each lane. Additional samples may be taken to ensure that all the predominant soil types, limits of distribution of these soils and different site conditions have been represented.

Classification Tests

Perform the following tests to determine AASHTO classifications of different soils in accordance with AASHTO specifications as modified by NCDOT. Copies of these modified procedures can be obtained from Materials and Test Unit’s Soil Sub-unit.

TABLE 1

<u>TEST</u>	<u>AASHTO DESIGNATION</u>
Dry Preparation of Disturbed Soils	T-87
Particle Size Analysis of Soils	T-88
Determining the Liquid Limit of Soils	T-89
Determining the Plastic Limit and Plasticity Index of Soils	T-90

Moisture Density Test

Based on the criteria set in Table 2, below, perform the Moisture Density Tests, using either lime or cement. Use 10% cement by weight in soil cement, 4% lime by weight, in soil-lime mixtures. Conduct the tests in accordance to AASHTO T-99, and T-134 for soil-lime and soil-cement mixtures respectively. In each case determine the maximum dry density and optimum moisture content.

TABLE 2

<u>CRITERIA FOR SELECTING LIME OR CEMENT</u>		
PROPERTY	A	B
Percent passing #200 Sieve	35 Max	36 Min
Liquid Limit	40 Max	41 Min
Plasticity Index	10 Max	25 Min

Use cement for all soils meeting criteria in Column “A”

Use Lime for all soils meeting criteria in Column “B”

Designer can choose either lime or cement for all soils not meeting all criteria in either column A or B.

Determining The Application Rates For Soil-Cement And Soil Lime Mixtures

Soil Cement

Make specimens at optimum moisture content using a quantity of cement in the range of 5 to 12 percent by weight. Compact the specimens to a minimum density of 95% of maximum Dry Density obtained using AASHTO T 134. Make a minimum of 2 specimens for each selected cement rate. Cure the specimens for 7 days in a moist room maintained at a temperature of 73 +/-2.7° F (23 +/-1.5° C) and a humidity of 100%. At the end of curing period, immerse the specimens in water for 4 hours, after immersion test the specimens using the unconfined Compressive Strength test (AASHTO T 208 Section 7). Report the maximum strength obtained and the percent strain corresponding to it. Select the rate of cement that provides a minimum unconfined Compressive Strength of 200 PSI (1400 KPA) and a maximum of 350 PSI (2400 KPA).

Soil Lime Mixtures

The procedure for soil lime mixtures is similar to soil cement with the following exceptions:

1. The quantity of lime required is in the range of 3.5 to 6.5 percent by weight.
2. Compact specimens to a minimum density of 95% of maximum dry density obtained by AASHTO T99.
3. Do not immerse the specimens in water at the end of the curing period.
4. Select the rate of lime that provides a minimum unconfined compressive strength of 58 PSI (400 KPA).

Submittals For Review And Approval Prior To Construction

1. Submit all laboratory test results for review.
2. Submit a sketch in plan view showing areas of the project to be stabilized by either lime or cement and application rates for each stabilizer.
3. Submit any other documentation that would support recommendations made in 2 above.

Construction Of Lime Treated Subgrade

Construct the lime treated sub-grade as specified in Section 501 of the North Carolina Department of Transportation Standard Specifications for Roads and Structures with the following exceptions:

Subsection 501-4 Equipment

Contractor's equipment will not require engineer's approval.

Subsection 501-8 (A) General

Paragraph #1 is not applicable to this project.

Subsection 501-9 (B) Preliminary Curing

Amend as follows: Allow a minimum of 2 days and a maximum of 4 days for preliminary curing.

Subsection 501-10 Compacting, Shaping, and Finishing

Last paragraph is not applicable.

Subsection 501-11 Thickness

Last two paragraphs are not applicable.

Subsection 501-15 Method of Measurement

The entire sub-sections are not applicable.

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Subsection 501-16 Basis of Payment

The entire sub-section is not applicable.

Construction Of Cement Treated Subgrade

Construct the soil cement sub-grade as specified in section 542 of the North Carolina Department of Transportation Standard Specifications for Roads and Structures, with the following exceptions:

Subsection 542-4 Equipment

Contractor's equipment will not require Engineer's approval.

Subsection 542-7 Application of Cement

First paragraph is not applicable.

Subsection 542-11 Thickness

Paragraphs 2 and 3 are not applicable.

Subsection 542-16 Method of Measurement

This entire sub-section is not applicable.

Subsection 542-17 Basis of Payment

This entire sub-section is not applicable.

Unconfined Compressive Strength

Allow a minimum of seven days curing before testing for strength. Test lime stabilized sub-grades using Dynamic Cone Penetrometer. Sketch of the design of this equipment and testing procedures can be obtained from NCDOT Geotechnical Unit. Required unconfined compressive strength for lime is 58 PSI (400 KPA). For Cement stabilized sub-grades, make field specimens, cure them for seven days and test them in the laboratory. Required unconfined compressive strength for soil cement is 200 PSI (1400 KPA). In both cases one test will be required for every 443 ft (135 meters) per 12.5 ft (3.8 meters) lane, at random locations selected using random number tables.

Submittals For Review During Construction

Submit unconfined compressive strength test results for review.

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CONCRETE PAVEMENT

Revise the 2002 Standard Specifications as follows:

COMPOSITION OF CONCRETE

Page 7-9, Article 710-3

Add the following:

In addition to Section 1000 of the Standard Specifications, design all concrete pavement mixes in accordance with the Shilstone Design method.

Finishing

Page 7-9, Article 710-6

Delete the first paragraph, including 1., 2., and 3., and the third, fourth and fifth paragraphs of this Article and substitute the following:

Produce the final surface finish on the pavement surface that is true to grade and uniform in appearance and free of irregular, rough, or porous areas.

Following the finishing of the pavement by screeding, floating, and checking with straightedges, further finish the surface to provide a uniform texture utilizing an Astroturf drag. Operate the Astroturf drag in a longitudinal direction.

Provide a textured surface with an average texture depth of 0.8 mm as tested in accordance with ASTM E 965 (*Test Method for Measuring Pavement Macrottexture Depth Using a Sand Volumetric Technique*) with no single test having a texture depth of 0.5mm or less. Perform four randomly located tests in accordance with ASTM E 965 within the initial pavement lot of each mobilization and provide test results to the Engineer.. A lot is defined in Article 710-4. If the average of the four tests does not meet the above criteria, make appropriate changes to the surface texture operations and test the next lot as detailed above. Once the surface texture process is established to meet minimum texture requirements, maintain consistency within the operation to provide the above minimum texture depth. Perform additional sand patch tests in accordance with ASTM E 965 when directed.

Should the surface texture become damaged or reduced by rain, grinding or any other action, reestablish or restore surface texture by an approved method.

After final finishing, hand finishing may be required on the edges of pavement and/or joints whenever irregularities in surface texture or alignment occur. Care should be taken in hand finishing pavement edges in order to avoid ridges or high places that will prevent water from draining off of the textured surface.

Final Surface Testing

Page 7-10, Article 710-7

Delete the first two paragraphs of this Article and substitute the following:

Perform acceptance testing of the longitudinal profile of the final grooved pavement surface in the presence of the Engineer. Furnish and operate a Rainhart Profilograph (Model No. 860) to determine and record the longitudinal profile on a continuous graph (profilogram) for acceptance testing of the pavement. Other types of profilographs that produce compatible results may be used if approved by the NCDOT's Pavement Construction Section.

Operate the profilograph over the pavement at a speed not exceeding 2 miles per hour (3.2 kph). If a propulsion vehicle is used, it must be approved, and the gross vehicle weight must not exceed 1,000 pounds (453.6 kg). Take profiles with the recording wheel parallel to and approximately 3.5 feet (1.1 m) inside the two outer edges of the travel lanes. Take profiles over the entire length of through lane and ramp pavement exclusive of structures and approach slabs. Take additional profiles only to define the limits of an out-of-tolerance surface variation. Upon completion of each day's testing, submit the profilograms to the Engineer for analysis. The Engineer will retain the profilograms.

A ProScan electronic scanner with motorized paper transport will be used to evaluate the profilogram. Other types of automated trace reduction equipment may be used if approved by the Department's Pavement Construction Section.

Furnish the profilogram to the Engineer within two working days after diamond grinding of the pavement and again within two working days after any corrections are made.

Construct the concrete pavement so that the completed concrete pavement surface has a profile index (PI) along any line tested not exceeding 20 inches per mile (315 mm per km), as determined with a zero blanking band, over any 600 foot (182.9 m) section of pavement. Individual deviations must not exceed 0.3 inches (7.6 mm) over any 25 foot (7.6 m) length of the line tested. Correct areas found to exceed this tolerance by grinding and texturing or using other approved corrective measures that produce smooth and skid resistant surfaces.

In the event the Contractor does not produce a final pavement surface that meets the requirements of this special provision, the Engineer may suspend the Contractor's operations until such time as the Contractor satisfies the Engineer, by making necessary adjustments to equipment, methods, or personnel, that he can produce a pavement surface that will meet these surface requirements.

DIAMOND GRINDING CONCRETE PAVEMENT**10//19/04****Description.**

Perform the work covered by this provision including but not limited to diamond grinding and regrinding concrete pavement to meet final surface testing requirements, evaluating existing concrete pavement and aggregate properties, selecting diamond tipped saw blades and configuration of cutting head; continual removal of residual slurry from pavement and disposal off-site; providing necessary traffic control; furnishing all labor, materials, supplies, tools, equipment and incidentals as necessary.

Equipment.

Use equipment with diamond tipped saw blades gang mounted on a power driven self-propelled machine with a minimum wheel base length of 15 feet (4.6 meter) that is specifically designed to smooth and texture portland cement concrete pavement. Utilize equipment that does not cause ravels; aggregate fracture; spalls or disturbance to the longitudinal or transverse joints; or damage and/or strain to the underlying surface of the pavement. Should any of the above problems occur immediately suspend operations.

Provide a minimum 3 feet (1 meter) wide grinding head with 50 (164) to 60 (200) evenly spaced grooves per foot (meter). Prior to designing the grinding head, evaluate the aggregate hardness of the concrete pavement and select the appropriate diamond size, diamond concentration and bond hardness for the individual saw blades.

Provide vacuuming equipment to continuously remove slurry residue and excess water from the pavement as part of the grinding operation. Transport slurry material off-site and dispose of this material appropriately. Do not allow the slurry material to flow into a travel lane occupied by traffic or into any drainage facility.

Construction.

Grind the pavement surface to a uniform appearance with a high skid resistant longitudinal corduroy type texture. Provide grooves between 0.09 (2.28mm) and 0.15 (3.81mm) inches wide with the land area between the grooves between 0.06 (1.52mm) and 0.13 (3.30mm) inches wide. Ensure a ridge peak of approximately 0.0625 inches (1.59mm) higher than the bottom of the grooves.

Begin and end diamond grinding at lines normal to the pavement centerline. Grind only in the longitudinal direction. All grooves and adjacent passes shall be parallel to each other with no variation. Completely lap adjacent passes with no unground surface remaining between passes and no overlap of more than 1 1/2 inches (35 mm). Adjacent passes shall be within 1/8 inch (10mm) of the same height as measured with a 3 foot (0.914 meter) straightedge. Maintain positive cross-slope drainage for the duration of the grinding operation.

Grind all travel lanes to include auxiliary lanes, ramps and loops with not less than 98 percent of the specified surface being textured by grinding. Grinding of the bridge decks and concrete

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shoulders will not be required. Remove a minimum 0.0625 inches at all locations except dips. Extra grinding to eliminate minor depressions is not required. There shall be no ridge between lanes. In a separate operation, transition the grinding of any remaining ridges greater than 1/8 inch (10 mm) in height on the outside edge next to the shoulder or at a tie to an existing facility to the satisfaction of the Engineer.

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CONCRETE SHOULDERS

Revise the 2002 Standard Specifications as follows:

JOINTS

Page 7-15, Article 720-8

Delete the first paragraph and substitute the following:

Construct all joints in accordance with Articles 700-11 and 700-12 as revised above.

PORTLAND CEMENT CONCRETE PRODUCTION AND DELIVERY

Revise the 2002 Standard Specifications as follows:

PORTLAND CEMENT CONCRETE FOR CONCRETE PAVEMENT

Page 10-2, Article 1000-3

Add the following:

Establish and submit for approval process controls for the aggregate stockpiles and the plant operations to ensure the concrete is consistently produced in accordance with the approved Shilstone mix designs.

JOINT MATERIALS

Revise the 2002 Standard Specifications as follows:

RUBBER ASPHALT JOINT SEALER

Page 10-53, Article 1028-2

Delete this Article and substitute the following:

Provide a hot-poured rubber asphalt joint sealer conforming to ASTM 6690, Type II. Furnish a Type 3 Manufacturer's Certification for each lot of the joint sealer material furnished to each project.

SPI