

2. AMENDMENT/MODIFICATION NO. 0002	3. EFFECTIVE DATE 28 MAY 98	4. REQUISITION/PURCHASE REQ. NO.	5. PROJECT NO. <i>(If applicable)</i>
6. ISSUED BY Department of the Army Corps of Engineers Fort Worth District		7. ADMINISTERED BY <i>(If other than Item 6)</i>	

8. NAME AND ADDRESS OF CONTRACTOR <i>(No., street, county, State and ZIP Code)</i>	(√)	9A. AMENDMENT OF SOLICITATION NO. DACA63-98-B-0027
	(X)	9B. DATED <i>(SEE ITEM 11)</i> 1 MAY 1998
		10A. MODIFICATION OF CONTRACTS/ORDER NO.
		10B. DATED <i>(SEE ITEM 13)</i>
CODE	FACILITY CODE	

11. THIS ITEM ONLY APPLIES TO AMENDMENTS OF SOLICITATIONS

The above numbered solicitation is amended as set forth in Item 14. The hour and date specified for receipt of Offers is extended, is not extended.

Offers must acknowledge receipt of this amendment prior to the hour and date specified in the solicitation or as amended, by one of the following methods:

(a) By completing Items 8 and 15, and returning 1 copies of the amendment; (b) By acknowledging receipt of this amendment on each copy of the offer submitted; or (c) By separate letter or telegram which includes a reference to the solicitation and amendment numbers. FAILURE OF YOUR ACKNOWLEDGMENT TO BE RECEIVED AT THE PLACE DESIGNATED FOR THE RECEIPT OF OFFERS PRIOR TO THE HOUR AND DATE SPECIFIED MAY RESULT IN REJECTION OF YOUR OFFER. If by virtue of this amendment you desire to change an offer already submitted, such change may be made by telegram or letter, provided each telegram or letter makes reference to the solicitation and this amendment, and is received prior to the opening hour and date specified.

12. ACCOUNTING AND APPROPRIATION DATA *(If required)*

13. THIS ITEM APPLIES ONLY TO MODIFICATIONS OF CONTRACTS/ORDERS, IT MODIFIES THE CONTRACT/ORDER NO. AS DESCRIBED IN ITEM 14.

(√)	A. THIS CHANGE ORDER IS ISSUED PURSUANT TO: <i>(Specify authority)</i> THE CHANGES SET FORTH IN ITEM 14 ARE MADE IN THE CONTRACT ORDER NO. IN ITEM 10A.
	B. THE ABOVE NUMBERED CONTRACT/ORDER IS MODIFIED TO REFLECT THE ADMINISTRATIVE CHANGES <i>(such as changes in paying office, appropriation date, etc.)</i> SET FORTH IN ITEM 14, PURSUANT TO THE AUTHORITY OF FAR 43.103(b).
	C. THIS SUPPLEMENTAL AGREEMENT IS ENTERED INTO PURSUANT TO AUTHORITY OF:
	D. OTHER <i>(Specify type of modification and authority)</i>

E. IMPORTANT: Contractor is not, is required to sign this document and return _____ copies to the issuing office.

14. DESCRIPTION OF AMENDMENT/MODIFICATION *(Organized by UCF section headings, including solicitation/contract subject matter where feasible.)*

The Solicitation and Specifications for ADDITION TO AUTO SKILLS SHOP, LACKLAND AIR FORCE BASE, SAN ANTONIO, TEXAS, is amended as follows:

a. Standard Form 1442, First Page, Item 13.A.- In the second line, change the bid opening date from "2 June 1998" to "9 June 1998". Bid opening time will be 2 pm, local time.

b. Specifications, Section 02232.- After this section, add the accompanying new SECTION 02240 - LIME-STABILIZED SUBGRADE, bearing the notation "ACCOMPANYING AMENDMENT NO. 0002 TO SOLICITATION NO. DACA63-98-B-0027," and add to the Table of Contents.

Except as provided herein, all terms and conditions of the document referenced in Item 9A or 10A, as heretofore changed, remains unchanged and in full force and effect.

15A. NAME AND TITLE OF SIGNER <i>(Type or print)</i>	16A. NAME AND TITLE OF CONTRACTING OFFICER <i>(Type or print)</i>		
15B. CONTRACTOR/OFFEROR _____ <i>(Signature of person authorized to sign)</i>	15C. DATE SIGNED	16B. UNITED STATES OF AMERICA BY _____ <i>(Signature of Contracting Officer)</i>	16C. DATE SIGNED

SECTION 02240 - LIME-STABILIZED SUBGRADE

PART

1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM C 25	(1992) Chemical Analysis of Limestone, Quicklime, and Hydrated Lime
ASTM C 50	(1986; R 1991) Sampling, Inspection, Packing, and Marking of Lime and Limestone Products
ASTM C 136	(1992) Sieve Analysis of Fine and Coarse Aggregates
ASTM D 75	(1987; R 1992) Sampling Aggregates
ASTM D 422	(1963; R 1990) Particle-Size Analysis of Soils
ASTM D 559	(1989) Wetting and Drying Compacted Soil-Cement Mixtures
ASTM D 560	(1989) Freezing and Thawing Compacted Soil-Cement Mixtures
ASTM D 977	(1991) Emulsified Asphalt
ASTM D 1250	(1980; R 1990) Petroleum Measurement Tables
ASTM D 1556	(1990) Density and Unit Weight of Soil in Place by the Sand-Cone Method
ASTM D 1557	(1991) Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/cu. ft. (2,700 kN-m/cu.m.))
ASTM D 1632	(1987) Making and Curing Soil-Cement Compression and Flexure Test Specimens in the Laboratory
ASTM D 1633	(1984; R 1990) Compressive Strength of Molded Soil-Cement Cylinders
ASTM D 2027	(1976; R 1992) Cutback Asphalt (Medium-Curing Type)
ASTM D 2028	(1976; R 1992) Cutback Asphalt (Rapid-Curing Type)
ASTM D 2167	(1984; R 1990) Density and Unit Weight of Soil in Place by the Rubber Balloon Method

ASTM D 2922	(1991) Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth)
ASTM D 3017	(1988) Water Content of Soil and Rock in Place By Nuclear Methods (Shallow Depth)
ASTM D 4318	(1984) Liquid Limit, Plastic Limit, and Plasticity Index of Soils
ASTM E 11	(1987) Wire-Cloth Sieves for Testing Purposes

1.2 NOT USED

1.3 NOT USED

1.4 NOT USED

1.5 DEFINITIONS

1.5.1 Lime-Stabilized Subgrade

Lime-stabilized course, as used herein, is a mixture of lime and in-place or select borrow material uniformly blended, wetted, and thoroughly compacted to produce a pavement course which meets all criteria as set forth in the plans and this specification.

1.5.2 Degree of Compaction

Degree of compaction required is expressed as a percentage of the maximum density obtained by the test procedure presented in ASTM D 1557 abbreviated hereinafter as percent laboratory maximum density.

1.6 GENERAL

The work specified herein consists of the construction of a lime-stabilized subgrade course. The work shall be performed in accordance with this specification and shall conform to the lines, grades, notes, and typical sections shown in the plans. Sources of all materials shall be selected well in advance of the time when materials will be required in the work.

1.7 SUBMITTALS

Government approval is required for submittals with a "GA" designation; submittals having an "FIO" designation are for information only. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-01 Data\

Plant, Equipment, Machines, and Tools\; *FIO*\.

Mix Design\; *FIO*\.

List of proposed equipment to be used in performance of construction work including descriptive data. Mix design at least 30 days before it is to be used.

SD-09 Reports\

Sampling and Testing\; *FIO*\.

Field Density\; *FIO*\.

Calibration curves and related test results prior to using the device or equipment being calibrated. Copies of field test results within 24 hours after the tests are performed. Certified copies of test results of materials and sources not less than 30 days before material is required for the work.

1.8 NOT USED

1.9 PLANT, EQUIPMENT, MACHINES, AND TOOLS

1.9.1 General Requirements

Plant, equipment, machines, and tools used in the work shall be subject to approval and shall be maintained in satisfactory working condition at all times. Other compacting equipment may be used in lieu of that specified, where it can be demonstrated that the results are equivalent. The equipment shall be adequate and have the capability of producing the results specified in Protective equipment, apparel, and barriers shall be provided to protect the eyes, respiratory system, and the skin of workers exposed to contact with lime slurry.

1.9.2 Steel-Wheeled Rollers

Steel-wheeled rollers shall be the self-propelled type weighing not less than 9 metric, with a minimum weight of 135 kilograms per millimeter width of rear wheel. Wheels of the rollers shall be equipped with adjustable scrapers. The use of vibratory rollers is optional.

1.9.3 Pneumatic-Tired Rollers

Pneumatic-tired rollers shall have four or more tires, each loaded to a minimum of 13.6 metric tons and inflated to a minimum pressure of 1.035 MPa. The loading shall be equally distributed to all wheels, and the tires shall be uniformly inflated. Towing equipment shall also be pneumatic-tired.

1.9.4 Mechanical Spreader

Mechanical spreader shall be self-propelled or attached to a propelling unit capable of moving the spreader and material truck. The device shall be steerable and shall have variable speeds forward and reverse. The spreader and propelling unit shall be carried on tracks, rubber tires, or drum-type steel rollers that will not disturb the underlying material. The spreader shall contain a hopper, an adjustable screed, and outboard bumper rolls and be designed to have a uniform, steady flow of material from the hopper. The spreader shall be capable of laying material without segregation across the full width of the lane to a uniform thickness and to a uniform loose density so that when compacted, the layer or layers shall conform to thickness and grade requirements indicated. The Contracting Officer may require a demonstration of the spreader prior to approving use in performance of the work.

1.9.5 Sprinkling Equipment

Sprinkling equipment shall consist of tank trucks, pressure distributors, or other approved equipment designed to apply controlled quantities of water uniformly over variable widths of surface.

1.9.6 Tampers

Tampers shall be of an approved mechanical type, operated by either pneumatic pressure or internal combustion, and shall have sufficient weight and striking power to produce the compaction required.

1.9.7 Straightedge

The Contractor shall furnish and maintain at the site, in good condition, one 3.05 meter straightedge for each bituminous paver, for use in the testing of the finished surface. Straightedge shall be made available for Government use. Straightedges shall be constructed of aluminum or other lightweight metal and shall have blades of box or box-girder cross section with flat bottom reinforced to insure rigidity and accuracy. Straightedges shall have handles to facilitate movement on pavement.

1.10 WEATHER LIMITATIONS

Lime stabilization shall not be performed during freezing temperatures. When the temperature is below 5 degrees c, the lime treated areas shall be protected against freezing by a sufficient covering of straw, or by other approved methods, until the course has dried out. Any areas of completed course that are damaged by freezing, rainfall, or other weather conditions shall be brought to a satisfactory condition in conformance with this specification without additional cost to the Government. Lime shall not be applied when the atmospheric temperature is less than 5 degrees c. No lime shall be applied to soils that are frozen or contain frost, or when the underlying material is frozen. If the temperature falls below 2 degrees c, completed lime-treated areas shall be protected against any detrimental effects of freezing.

PART 2 - PRODUCTS

2.1 MATERIALS

2.1.1 Lime

Lime shall be a standard brand of hydrated lime conforming to the following physical and chemical requirements:

- a. Lime shall be of such gradation that 99-1/2 percent passes a 0.850 mm sieve and a minimum of 85 percent passes a 0.150 mm sieve.
- b. Combined calcium oxide and magnesium oxide shall be not less than 70 percent.

2.1.2 Bituminous Material

Material shall conform to one of the following:

2.1.2.1 Cutback Asphalt

ASTM D 2027, Grade MC-30.

2.1.2.2 Emulsified Asphalt

ASTM D 977, Type SS-1 or MS-1.

2.1.3 Material to be Stabilized

Material to be stabilized shall consist of in-place material in the area, approved select material or a combination of in-place material and approved select material. Select material shall be free of deleterious substances such as sticks, debris, organic matter, and stones greater than 76.2 mm in any dimension. At least 10 percent of the material shall pass the 0.425 mm sieve. Plasticity index shall be greater than 12.

2.1.4 Water

Water shall be clean, fresh, and free from injurious amounts of oil, acid, salt, alkali, organic matter, and other substances deleterious to the lime or soil-lime mixture, and shall be subject to approval.

PART 3 - EXECUTION

3.1 GENERAL REQUIREMENTS

3.2 PREPARATION OF AREA TO BE STABILIZED

The area shall be cleaned of debris. The area will be inspected for adequate compaction and shall be capable of withstanding without displacement the compaction specified for the soil-lime mixture. Debris and removed unsatisfactory in-place material shall be disposed of as specified.

END OF SECTION

3.2.1 In-Place Material to be Stabilized

The entire area shall be graded to conform to the lines, grades, and cross sections shown in the plans prior to being processed. Soft or yielding subgrade areas shall be made stable before construction is begun.

3.2.2 In-Place Material to Receive Stabilized Course

Soft, yielding areas and ruts or other irregularities in the surface shall be corrected. The material in the affected areas shall be loosened and unsatisfactory material removed. Approved select material shall be added where directed. The area shall then be shaped to line, grade, and cross section, and shall be compacted to the specified density. Subgrade shall conform to Section 02225 EARTHWORK.

3.2.3 Select Material

Sufficient select material shall be utilized to provide the required thickness of the soil-lime layer after compaction. Where in-place mixing is to be accomplished, the soil shall be graded and shaped to the approximate section and grade shown before lime stabilization is undertaken. Select Material shall be obtained from grading and excavation operations and from approved private sources.

3.2.4 Grade Control

Underlying material shall be excavated to sufficient depth for the required stabilized-course thickness so that the finished stabilized course with the subsequent surface course will meet the fixed grade. Finished and completed stabilized area shall conform to the lines, grades, cross section, and dimensions indicated.

3.3 INSTALLATION

3.3.1 Mixed In-Place Method

3.3.1.1 Scarifying and Pulverizing of Soil

Prior to application of lime, the soil shall be scarified and pulverized to the depth shown. Scarification shall be carefully controlled so that the layer beneath the layer to be treated is not disturbed. Depth of pulverizing shall not exceed the depth of scarification.

3.3.1.2 Application of Lime

Pulverized material shall be shaped to approximately the cross section indicated. Lime shall be applied so that when uniformly mixed with the soil, the specified lime content is obtained, and a sufficient quantity of lime-treated soil is produced to construct a compacted lime-treated course conforming to the lines, grades, and cross section indicated. Lime shall be applied in a slurry. If lime is spread by hand, the bags shall be spotted accurately on the area being stabilized so that when the bags are opened the lime will be dumped and spread uniformly on the area being processed. No equipment except that used in spreading and mixing shall pass over the freshly applied lime slurry.

3.3.1.3 Initial Mixing

Immediately after the lime has been distributed, the lime and soil shall be mixed. Initial mixing shall be sufficient to alleviate any dusting or wetting of the lime that might occur in the event of wind or rainstorms. This may be accomplished several days in advance of the final application and mixing.

3.3.1.4 Water Application and Moist Mixing

Moisture content of the mixture will be determined in preparation for final mixing. Moisture in the mixture following final mixing shall not be less than the water content determined to be optimum based on dry weight of soil and shall not exceed the optimum water content by more than 2 percentage points. Water may be added in increments as large as the equipment will permit; however, such increment of water shall be partially incorporated in the mix to avoid concentration of water near the surface. After the last increment of water has been added, mixing shall be continued until the water is uniformly distributed throughout the full depth of the mixture. Particular care shall be taken to ensure satisfactory moisture distribution along the edges of the section.

3.3.2 Edges of Stabilized Course

Approved material shall be placed along the edges of the stabilized course in such quantity as will compact to the thickness of the course being constructed, or to the thickness of each layer in a multiple-layer course, allowing at least a 0.3048 m width of the shoulder to be rolled and compacted simultaneously with the rolling and compacting of each layer of the stabilized course.

3.3.5 Layer Thickness

Compacted thickness of the stabilized course shall be as indicated. No layer shall be more than 200 mm or less than 76.2 mm in compacted thickness.

3.3.6 Compaction

Before compaction operations are started and as a continuation of the mixing operation, the mixture shall be thoroughly loosened and pulverized to the full depth. Compaction shall be started immediately after mixing is completed. During final compaction, the surface shall be moistened, if necessary, and shaped to the required lines, grades, and cross section. Density of compacted mixture shall be at least 90 percent of laboratory maximum density. Rolling shall begin at the outside edge of the surface and proceed to the center, overlapping on successive trips at least one-half the width of the roller. Alternate trips of the roller shall be slightly different lengths. The speed of the roller at all times shall be such that displacement of the mixture does not occur. Areas inaccessible to the rollers shall be compacted with mechanical tampers, and shall be shaped and finished by hand methods.

3.3.7 Finishing

The surface of the top layer shall be finished to the grade and cross section shown. The surface shall be of uniform texture. Light blading during rolling may be necessary for the finished surface to conform to the lines, grades, and cross sections. Should the surface for any reason become rough, corrugated, uneven in texture, or traffic-marked prior to completion, such unsatisfactory portions shall be scarified, reworked,

relaid, or replaced as directed. Should any portion of the course, when laid, become watersoaked for any reason, that portion shall be removed immediately, and the mix placed in a windrow and aerated until a moisture content within the limits specified is obtained, and then spread, shaped, and rolled as specified above.

3.3.8 Construction Joints

At the end of each phase of construction, a straight transverse construction joint shall be formed by cutting back into the completed work to form a true vertical face free of loose or shattered material. Material along construction joints not properly compacted shall be removed and replaced with soil-lime mixture that is mixed, moistened, and compacted as specified.

3.3.9 Curing and Protection

Immediately after the soil-lime area has been finished as specified above, the surface shall be protected against rapid drying for 7 days by one of the methods specified below.

3.3.9.1 Moist Curing

The area shall be moistened by sprinkling and shall be kept moist for the 7-day curing period.

3.3.9.2 Bituminous Material

Bituminous material shall be uniformly applied by means of a bituminous distributor within a temperature range of 60 degrees F 120 degrees F. Bituminous material shall be applied in quantities of not less than 0.45 liters per square meter nor more than 1.13 liters per square meter. Areas inaccessible to or missed by the distributor shall be properly treated using the manually operated hose attachment. Bituminous material shall be applied only to the top layer. At the time the bituminous material is applied, the surface of the area shall be free of loose or foreign matter and shall contain sufficient moisture to prevent excessive penetration of the bituminous material. When necessary, the area shall be sprinkled immediately before the bituminous material is applied. Treated surface shall be sanded or dusted to prevent the bituminous material from being picked up by traffic.

3.4 SAMPLING AND TESTING

3.4.1 General Requirements

Sampling and testing shall be performed by an approved commercial testing laboratory or by facilities furnished by the Contractor. No work requiring testing will be permitted until the facilities have been inspected and approved. The first inspection shall be at the expense of the Government. Cost incurred for any subsequent inspection required because of failure of the facilities to pass the first inspection will be charged to the Contractor. Tests shall be performed in sufficient numbers and at the locations and times directed to insure that materials and compaction meet specified requirements. Certified copies of the test results shall be furnished to the Contracting Officer.

3.4.2 Results

Results shall verify that the material complies with the specification. When the source of materials is changed or deficiencies are found, the initial analysis shall be repeated and the material already placed shall be retested to determine the extent of unacceptable material. All in-place unacceptable material shall be replaced.

3.4.3 Sampling

All aggregate samples for laboratory testing shall be taken in accordance with ASTM D 75. Samples of lime shall be taken in accordance with ASTM C 50.

3.4.4 Sieve Analysis

Before starting work, one sample of material to be stabilized shall be tested in accordance with ASTM C 136 and ASTM D 422 on sieves conforming to ASTM E 11. After the initial test, a minimum of one analysis shall be performed for each 1000 metric tons of material placed, with a minimum of three analyses for each day's run until the course is completed.

3.4.4.1 Gradation test of loosened and pulverized soil-lime mixture before compaction: Not less than three tests per eight-hour shift.

3.4.5 Liquid Limit and Plasticity Index

One liquid limit and plasticity index shall be performed for each sieve analysis. Liquid limit and plasticity index shall be in accordance with ASTM D 4318.

3.4.6 Chemical Analysis

Lime shall be tested for the specified chemical requirements in accordance with ASTM C 25. Three tests shall be conducted for each delivery of lime.

3.4.7 Testing

3.4.7.1 Laboratory Maximum Density

Tests shall establish the dry weight of non-treated soil at optimum moisture content and shall also provide a moisture-density relationship for the lime-soil mixture. Tests shall be conducted in accordance with the test procedure specified in Paragraph: Degree of Compaction. At least one test shall be required on each type of soil prior to construction, and at least one test on each type of soil after field-mixing of lime.

3.5 FIELD QUALITY CONTROL

3.5.1 General

Tests shall provide a moisture-density relationship for the lime-soil mixture. Results of field quality control testing shall verify that materials comply with this specification. When a material source is changed, the new material shall be tested for compliance. When deficiencies are found, the initial analysis shall be repeated and the material already placed shall be retested to determine the extent of unacceptable material. All in-place unacceptable material shall be replaced or repaired, as directed by the Contracting Officer, at no additional cost to the Government.

3.5.2 Thickness Control

Completed thicknesses of the stabilized course shall be within 12.7 mm of the thickness indicated. Where the measured thickness of the stabilized course is more than 12.7 mm deficient, such areas shall be corrected by scarifying, adding mixture of proper gradation, reblading, and recompacting as directed. Where the measured thickness of the stabilized course is more than 12.7 mm thicker than indicated, it shall be considered as conforming to the specified thickness requirement. Average job thickness shall be the average of all thickness measurements taken for the job, but shall be within 6.9 mm of the thickness indicated. Thickness of the stabilized course shall be measured at intervals in such a manner as to ensure one measurement for each 400 square meters of stabilized course. Measurements shall be made in 76.2 mm diameter test holes penetrating the stabilized course.

3.5.3 Field Density

Field in-place density shall be determined in accordance with ASTM D 1556 or ASTM D 2922. When ASTM D 2922 is used, the calibration curves shall be checked, and adjusted if necessary, using the sand cone method as described in paragraph Calibration of the ASTM publication. ASTM D 2922 results in a wet unit weight of soil and when using this method, ASTM D 3017 shall be used to determine the moisture content of the soil. The calibration curves furnished with the moisture gauges shall be checked along with density calibration checks as described in ASTM D 3017. If ASTM D 2922 is used, in-place densities shall be checked by ASTM D 1556 at least once per lift for each 1000 square meters of stabilized material. Calibration curves and calibration tests results shall be furnished to the Contracting Officer within 24 hours of conclusion of the tests. At least one field density test shall be performed for each 250 square meters of each layer of base material.

3.6 TRAFFIC

Completed portions of the lime-treated soil area may be opened immediately to light traffic provided the curing is not impaired. After the curing period has elapsed, completed areas may be opened to all traffic, provided the stabilized course has hardened sufficiently to prevent marring or distorting of the surface by equipment or traffic. Heavy equipment shall not be permitted on the area during the curing period. Lime and water may be hauled over the completed area with pneumatic-tired equipment if approved. Finished portions of lime-stabilized soil that are traveled on by equipment used in constructing an adjoining section shall be protected in a manner to prevent equipment from marring or damaging completed work.

3.7 MAINTENANCE

Stabilized area shall be maintained in a satisfactory condition until the completed work is accepted. Maintenance shall include immediate repairs of any defects and shall be repeated as often as necessary to keep the area intact. Defects shall be corrected as specified herein.

3.8 DISPOSAL OF UNSATISFACTORY MATERIALS

Removed in-place materials that are unsuitable for stabilization, material that is removed for the required correction of defective areas, waste material, and debris shall be disposed of as directed.

ACCOMPANYING AMENDMENT NO. 0002 TO SOLICITATION NO. DACA63-98-B-0027

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