NOTICE:

Bids to be opened at 2:00 P.M.
19 JUL 1983 at the office of
Officer in Charge of Construction
Jacksonville, North Carolina Area
Building 1005, Marine Corps Base
Camp Lejeune, North Carolina 28542

CONTRACT N62470-82-B-2161

NAVFAC SPECIFICATION
NO. 05-82-2161

LIME STORAGE/HANDLING EQUIPMENT AT NEW RIVER WATER TREATMENT PLANT AS-110

at the

MARINE CORPS AIR STATION (HELICOPTER), NEW RIVER
JACKSONVILLE, NORTH CAROLINA

DESIGN BY:
Atlantic Division
Naval Facilities Engineering Command
Norfolk, Virginia
and
Public Works Division
Marine Corps Base
Camp Lejeune, North Carolina

SPECIFICATION PREPARED BY:
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Design Branch, Public Works Division
Marine Corps Base, Camp Lejeune, North Carolina

SPECIFICATION APPROVED BY:

E. L. Rouse, P.E., Director, Design Branch

R. E. Carlson, Commander, CEC, U. S. Navy
for Commander, Naval Facilities Engineering Command

CONTENTS

SECTION 00101
BIDDING INFORMATION

1. CONTENTS: This Invitation for Bids, IFB NO.N62470-82-B-2161, consists of the following documents:

(a) Bid Instruction Documents
  (i) Invitation for Bids (Standard Form 20, January 1961 Ed.)
  (ii) Bidding Information
  (iii) Instructions to Bidders, dated March 1979
(b) Bid Submittal Documents
  (i) Bid Form (Standard Form 21, December 1965 Ed.)
  (ii) Representations and Certifications, Standard Form 19-B, June 1976 Ed. (REV 1980 AUG), including Appendix "A", dated August 1980
  (iii) Bid Guaranty (Standard Form 24, June 1964 Ed.) (See Instructions to Bidders)
(c) Contract Documents
  (i) Construction Contract (Standard Form 23, Jan 1961 Ed.)
  (ii) Performance Bond (Standard Form 25, June 1967 Ed.)
  (iii) Payment Bond (Standard Form 25A, June 1964 Ed.)
  (iv) Labor Standards Provisions, dated November 1979)
  (v) General Provisions dated March 1981 (Rev 12/81)
    a. Clause 43. ACCIDENT PREVENTION (1977 Jun): Change the date of the Corps of Engineers Manual, EM 385-1-1, from "1 June 1977" to "1 April 1981"
    b. Clause 97, AFFIRMATIVE ACTION COMPLIANCE REQUIREMENTS FOR CONSTRUCTION (1978 SEP): Change the date of this clause to "(1982 FEB)". The remainder of the clause is correct as printed. Only the date is changed.
  (vi) NAVFAC Specification No. 05-82-2161
  (vii) Drawings identified in Section 01011 of the specification
  (viii) Wage Determination Decision NC81-1201 for Building Construction

2. BIDS:

2.1 Instructions to Bidders: Instructions to Bidders and Invitation for Bids, Standard Form 20, January 1961 edition, shall be observed in the preparation of bids. Bidders shall affix their names and return addresses in the upper left corner of bid envelope. Envelopes containing bids must be sealed.

2.2 Bid Guaranty: A bid guaranty will be required as stipulated in the Instructions to Bidders.

2.3 Items of Bids: Bids shall be submitted in duplicate on Standard Form 21, Bid Form, and shall be accompanied by Standard Form 19B, Representations and Certifications, with Appendix "A" and by Bid Guaranty, all in accordance with the Bid Instruction Documents listed in paragraph 1(a) hereinbefore upon the following item:

BASE BID: Price for the entire work, complete in accordance with the drawings and specifications.

2.4 TELEGRAPHIC MODIFICATIONS OF BIDS in accordance with the instructions to bidders may be made. Two signed copies of the telegram in a sealed envelope marked "Copies of telegraphic modification of bid for LIME STORAGE/HANDLING EQUIPMENT AT NMEW RIVER WATER TREATMENT PLANT AS-110, Specification No. 05-82-2161" should be forwarded immediately to the office to which written bids were submitted.

2.5 TELEGRAPHIC MODIFICATIONS OR WITHDRAWAL OF BIDS will be considered as specified herein. TELEPHONIC RECEIPT OF TELEGRAPHIC MODIFICATIONS OR WITHDRAWAL OF BIDS WILL NOT QUALIFY THE TELEGRAM AS TIMELY. The telegram must be received at the place specified for receipt of bids prior to the exact time set for receipt of bids.

2.6 HAND DELIVERED BIDS: All hand delivered bids must be deposited with personnel in the Contract Branch, Room No. 26, Building 1005, Marine Corps Base, Camp Lejeune, North Carolina 28542, prior to the time and date set for bid opening. Any bids submitted by hand after the time set for receipt will not be accepted.

3. PRE-BID SITE VISITATION: To inspect the site of the work prior to bid opening, prior appointment must be made with the Officer in Charge of Construction, Jacksonville, North Carolina Area, telephone 919-451-2581. Bidders are urged and expected to inspect the site where the services are to be performed and to satisfy themselves as to all general and local conditions that may affect the cost of performance of the contract to the extent such information is reasonably obtainable. In no event will a failure to inspect the site constitute grounds for withdrawal of a bid after opening or for a claim after award of the contract.

4. CONTROLLED MATERIALS DATA: The Contracting Officer will issue a DO-C2 priority rating for procurement of critical materials. See General Provision entitled "PRIORITIES, ALLOCATIONS AND ALLOTMENTS".

5. INQUIRIES:

5.1 Plans and Specifications: Questions regarding the plans and specifications occurring prior to bid opening shall be presented to the Public Works Design Division, Building 1005, Marine Corps Base, Camp Lejeune, North Carolina 28542, telephone 919-451-5507. Questions requiring interpretation of drawings and specifications must be submitted at least ten days before bid opening. Interpretations or modifications to specifications made as a result of questions will be made by amendment only, and unless so done, all bidders should base their bids on the plans and specifications as issued.

5.2 Bidding Procedures: All questions concerning the bidding procedures shall be presented to OICC-ROICC Contract Branch, Room 26, Building 1005, Marine Corps Base, Camp Lejeune, North Carolina, telephone 919-451-2581.

6. AVAILABILITY OF SPECIFICATIONS, STANDARDS AND DESCRIPTIONS (1977 JUN): Specifications, standards and descriptions cited in this solicitation are available as indicated below:

a. Unclassified Federal, Military and Other Specifications and Standards (Excluding Commercial), and Data Item Descriptions: Submit request on DD Form 1425 (Specifications and Standards Requisition) to:

Commanding Officer
U. S. Naval Publications and Forms Center
5801 Tabor Avenue, Philadelphia, Pennsylvania 19120

The Acquisition Management Systems and Data Requirements Control List: DOD Directive 5000.19L, Volume II, may be ordered on the DD Form 1425. The Department of Defense Index of Specifications and Standards (DODISS) may be purchased from the Superintendent of Documents, U. S. Government Printing Office, Washington, D. C. 20402. When requesting a specification or standard, the request shall indicate the title, number, date and any applicable amendment thereto by number and date. When requesting a data item description, the request shall cite the solicitation. When DD Form 1425 is not available, the request may be submitted in letter form, giving the same information as listed above, and the solicitation or contract number involved. Such request may also be made to the activity by TELEX No. 834295, Western Union No. 710-670-1685, or telephone 215-697-3321 in case of urgency.

b. Commercial Specifications, Standards and Descriptions: These specifications, standards and descriptions are not available from Government sources. They may be obtained from the publishers.

c. Availability for Examination of Specifications, Standards, Plans, Drawings, and other Pertinent Documents: The specifications, standards, plans, drawings, and other pertinent documents cited in this solicitation may be examined at the following location:

Public Works Division
Specifications and Estimates Section
Building 1005, Marine Corps Base
Camp Lejeune, North Carolina

7. RECOVERED MATERIAL: The Contractor certifies by signing this bid/proposal/quotation that recovered materials as defined in DAR 1-2500.4 will be used as required by the applicable publications.

8. REFERENCE TO AMENDMENTS: Each bidder shall refer in his bid to all amendments to this specification; failure to do so may consititute an informality in the bid.

9. CERTIFICATE OF CURRENT COST OR PRICING DATA: (This paragraph applies to negotiated contracts of $100,000 or more, except where the price is based on adequate competition, and to change orders of $100,000 or more, to any contract.) The Contractor shall submit to the Contracting Officer a certificate in the form set forth below as soon as practicable after agreement is reached on the contract price:

This is to certify that, to the best of my knowledge and belief, cost or pricing data defined in DAR 3-807.1(a)(1) submitted, either actually or by specific identification in writing (see DAR 3-807.3(a)) to the Contracting Officer or his representative in support of _____*
are accurate, complete, and current as of _____**
day month year

This certification includes the cost or pricing data supporting any advance agreement(s) and forward pricing rate agreements between the offeror and the Government which are part of the proposal.

Firm _____
Name _____
Title _____

_____***
Date of Execution

*Describe the proposal, quotation, request for price adjustment or other submission involved, giving appropriate identifying number (e.g. RFP No. _____).***

**The effective date shall be the date when price negotiations were concluded and the contract price was agreed to. The responsibility of the Contractor is not limited by the personal knowledge of the Contractor's negotiator if the Contractor had information reasonably available at the time of agreement, showing that the negotiated price is not based on accurate, complete and current data.

***This date should be as close as practicable to the date when the price negotiations were concluded and the contract price was agreed to.

END OF SECTION

SECTION 01011
GENERAL PARAGRAPHS

1. GENERAL INTENTION: It is the declared and acknowledged intention and meaning to provide and secure Lime Storage/Handling Equipment at New River Water Treatment Plant AS-110, complete and ready for use. This is a fixed-price contract awarded on a lump sum basis.

2. GENERAL DESCRIPTION: The work includes the construction of a new steel silo and hopper for lime storage, lime handling equipment, partial demolition of an existing building for placement of the lime hopper, and incidental related work.

3. LOCATION: The work shall be located at the Marine Corps Air Station (Helicopter), New River, approximately as shown. The exact location will be indicated by the Contracting Officer. "Contracting Officer" and "Officer in Charge of Construction (OICC)" are used interchangeably in this specification and have the same meaning.

4. COMMENCEMENT, PROSECUTION AND COMPLETION OF WORK: The Contractor will be required to commence work under the contract 15 calendar days after the date of receipt of Notice of Award, to prosecute said work diligently, and to complete the entire work ready for use within 300 calendar days. The time stated for completion shall include final cleanup of the premises. The contract completion date will be computed starting 15 calendar days after the date of Notice of Award. This 15-day period is to allow for mailing of the notice of Award and the Contractor's submission of required bonds.

5. LIQUIDATED DAMAGES: In case of failure on the part of the Contractor to complete the work within the time fixed in the contract or any extensions thereof, the Contractor shall pay to the Government as liquidated damages pursuant to General Provisions clauses entitled "Termination for Default - Damages for Delay - Time Extensions', and "Damages for Delay - Defense Materials System and Priorities" the sum of $35 for each day of delay.

6. DRAWINGS ACCOMPANYING SPECIFICATIONS: The following drawings accompany this specification and are a part thereof. Drawings are the property of the Government and shall not be used for any purpose other than that contemplated by the specification.

NAVFAC DWG. NO.	TITLE
4079796	Title Sheet
4079797	Plans and Boring Log
4079798	Plan, Sections and Piping Diagrams
4079799	Miscellaneous Details
4079800	Silo Foundation, Plans, Sections and Details
4079801	Existing Conditions Building AS-110
4079802	Building Sections and Details - New Hopper
4079803	Site Plan, Legend, Notes and Schematics
4079804	Partial Floor Plan, Details, Schedules, Diagrams

7. NORTH CAROLINA SALES AND USE TAX IS REQUIRED. See section entitled "Additional General Paragraphs".

8. SCHEDULING THE WORK:

8.1 General Scheduling Requirements: Notwithstanding the requirements of clause entitled "Progress Charts and Requirements for Overtime Work" of the General Provisions, immediately after award the Contractor shall meet with the Contracting Officer and present a schedule of work, prepared in accordance with said clause, for review by the Contracting Officer. The schedule will be reviewed at this meeting and will be retained by the Contracting Officer for final review and approval.

8.2 Work Outside Regular Hours: If the Contractor desires to carry on work outside regular hours or on Saturdays, Sundays, or holidays, he shall submit application to the Contracting Officer, but shall allow ample time to enable the Government to make satisfactory arrangements for inspecting the work in progress. At night he shall light the different parts of the work in an approved manner. Regular working hours are 7:45 A.M. to 4:15 P.M., Monday through Friday, excluding holidays.

8.3 The Water Treatment Plant will remain in operation during the entire construction period and the Contractor shall conduct his operations so as to cause the least possible interference with the normal operations of the activity.

8.4 The existing building and its contents shall be kept secure at all times and the Contractor shall provide all temporary closures as required to maintain security as directed by the Contracting Officer. The Contractor shall remove all debris from all spaces being used by the activity at the end of each shift or more frequently if required to keep the space useable. Dust covers or protective enclosures shall be provided to protect existing work to remain and Government material located in the building during the construction period.

8.5 Permission to interrupt any utility service shall be requested in writing at least fifteen days in advance and approval of the Contracting Officer shall be received before any service is interrupted. All utility cutovers shall be made after normal working hours or on weekends. Anticipated costs shall be included in the bid.

9. SAFETY PROGRAM: The Contractor shall implement a safety program conforming to the requirements of Federal, State and local laws, rules and regulations. The program shall include, but is not limited to, the following:

a. "Occupational Safety and Health Standards" which can be examined at the office of the Contracting Officer or be ordered from the Superintendent of Documents, U. S. Government Printing Office, Washington, DC 20402.

b. Department of the Army, Corps of Engineers "General Safety Requirements" which may be examined at the office where bids are being received or may be purchased from the Superintendent of Documents, U. S. Government Printing Office.

c. General Provisions clause entitled "Accident Prevention".

d. NFPA 241-1975, Safeguarding Building Construction and Demolition Operations, which may be examined in the Design Branch, Public Works Division, Building 1005, Marine Corps Base, Camp Lejeune, or may be purchased from the National Fire Protection Association, 470 Atlantic Avenue, Boston, MA 02210

e. Work in Confined or Enclosed Spaces: In addition to the requirements in Section XXVII of the Corps of Engineers Safety Manual, EM 385-1-1, "Work in Confined or Enclosed Spaces", the following provisions apply:

(1) Definitions

(a) Confined Space - Refers to a space which by design has limited openings for entry and exit; unfavorable natural ventilation which could contain or produce dangerous air contaminants, and which is not intended for continuous employee occupancy. Confined spaces include but are not limited to storage tanks, compartments of ships, process vessels, pits, silos, vats, degreasers, reaction vessels, boilers, ventilation and exhaust ducts, sewers, tunnels, underground utility vaults, and pipelines.

(b) Qualified Person - A person designated by the Contractor, in writing, as capable (by education or specialized training) of anticipating, recognizing, and evaluating employee exposure to hazardous substances or other unsafe conditions in a confined space. This person shall be capable of specifying necessary control and protective action to insure worker safety.

(2) Entry into a confined or enclosed space by personnel for any purpose, including hot work, shall be prohibited until the qualified person has conducted appropriate tests to assure the confined or enclosed space is safe for the work intended.

(3) A permit shall be provided and posted at the work site, by the qualified person, certifying the confined or enclosed space as safe for personnel entry and the work intended. The permit shall also indicate the necessary precautions, protective equipment, and procedures required to maintain a safe operation.

(4) The Contractor shall submit to the Contracting Officer a letter of certification for the qualified person. The letter shall state the qualified person's name and qualifications and delineate his authority to direct work stoppage in the event of hazardous conditions.

10. FACTORY INSPECTION of material and equipment for which tests at the place of manufacture are required in referenced publications will be waived if notarized copies of factory reports are furnished that show compliance with the specification requirements. Factory inspection will be required only where specified herein or in the technical sections of this specification. The Government reserves the right to charge to the Contractor any additional cost of Government inspection and tests when materials and equipment are not ready at the time inspection and tests are required by the Contractor.

11. TRAILER OR STORAGE BUILDINGS will be permitted on the job site, where space is available, subject to the approval of the Contracting Officer. The trailers or buildings shall be suitably painted and kept in a good state of repair. Failure of the Contractor to maintain his trailers or storage buildings in good condition will be considered sufficient reason to require their removal from the job site.

12. BORING LOGS: The Test Boring Logs which accompany this specification are furnished to make available to the Contractor the information obtained by Government investigation. The Government does not guarantee that these borings indicate actual conditions other than at the exact locations and at the time they were made.

13. WRITTEN GUARANTIES AND GUARANTOR'S LOCAL REPRESENTATIVE: Prior to completion of the contract, the Contractor shall obtain and furnish to the Contracting Officer's designated representative, written guarantees for all equipment and/or appliances furnished under the contract. The Contractor shall furnish with each guarantee the name, address and telephone number of the guarantor's representative nearest to the location where the equipment and/or appliances are installed, who, upon request of the using service's representative, will honor the guarantee during the guaranty period and will provide the services prescribed by the terms of the guarantee. At the time of installation, the Contractor shall tag each item of warranted equipment with a durable oil and water resistant tag approved by the Contracting Officer. Leave the date of acceptance and inspector's signature blank until the project is accepted for beneficial occupancy. The tag shall show the following information:

EQUIPMENT WARRANTY TAG

Type of Equipment_____

Accepted Date_____

Warranted Until_____

Under Contract No. N62470-

Inspector's Signature_____

STATION PERSONNEL TO PERFORM ONLY OPERATIONAL MAINTENANCE

14. PROPRIETARY NAMES: Names indicated for models, types, colors, textures and patterns of materials are for the purpose of color, texture and pattern selection only. Other manufactturers materials are acceptable provided they closely approximate models, types, colors, textures and patterns indicated and provided they conform to all other requirements.

END OF SECTION

SECTION 01012. ADDITIONAL GENERAL PARAGRAPHS

1. UTILITIES:

1.1 Government-Furnished Utilities: The Government will furnish water and electricity from the nearest available outlet free of charge for pursuance of work under this contract. If the nearest available outlet cannot be utilized by the Contractor because of improper voltage, insufficient current, improper pressure, incompatible connectors, etc., it shall be the responsibility of the Contractor to provide temporary utilities as required.

1.2 Energy and Utilities Conservation: The Contractor shall carefully conserve utilities furnished without charge. The Contractor, at his own expense and in a manner satisfactory to the Contracting Officer, shall install and maintain all necessary temporary connections and distribution lines and remove the same prior to final acceptance of the construction. (DAR 7-603.30)

1.3 Operation of Station Utilities: The Contractor shall not operate nor disturb the setting of any control devices in the Base utilities system, including water, sewer, electrical and steam services. The Government will operate the control devices as required for normal conduct of the work. The Contractor shall notify the Contracting Officer, giving reasonable advance notice, when such operation is required.

1.4 Location of Underground Utilities: Where existing piping, utilities, and underground obstructions of any type are indicated in locations to be traversed by new piping, ducts, and other work provided hereunder, and are not indicated or specified to be removed, the elevations of the existing utilities and obstructions shall be determined before the new work is laid closer than the nearest manhole or other structure at which an adjustment in grade could be made. For any additional work required by reason of conflict between the new and existing work, an adjustment in contract price will be made in accordance with General Provisions clause entitled "Differing Site Conditions (1968 FEB)." The Base Telephone Officer, telephone 451-2531, will show the Contractor approximate locations of all buried telephone and fire alarm cables after receiving 10 days notice. The locations of underground utilities shown is only approximate and the information is incomplete.

2. CHANGED CONDITIONS: Wherever changed conditions as defined in General Provisions clause entitled "Differing Site Conditions (1968 FEB)" are encountered, and wherever conditions exposed during the course of the work necessitate a change from quantities indicated or specified as either estimated quantities or as a basis for bids, whether or not provisions for a change in price for such variation is specified, the Contracting Officer must be notified in writing and written directions to do so must be obtained before quantities stated in the contract documents are exceeded.

3. SUBCONTRACTORS AND PERSONNEL: Promptly after the award of the contract, the Contractor shall submit to the Contracting Officer, in triplicate, a list of his subcontractors and the work each is to perform. On this form shall appear the names of the key personnel of the Contractor and subcontractors, together with their home addresses and telephone numbers, for use in event of emergency. From time to time as changes occur and additional information becomes available, the Contractor shall amplify, correct, and change the information contained in previous lists.

4. PRINTS FURNISHED TO CONTRACTOR: Six copies of the project specifications, and six sets of the drawings accompanying the specifications, will be furnished the Contractor. Additional sets of the specifications and drawings can be obtained, if required, by application to the Contracting Officer, provided that the need therefor is justified to the satisfaction of the Contracting Officer.

5. SCHEDULE OF PRICES: The original and seven copies of the Schedule of Prices shall be submitted to the Contracting Officer for approval. Payments will not be made until the Schedule of Prices has been submitted and approved.

6. CONTRACTOR'S INVOICE AND CONTRACT PERFORMANCE STATEMENT: Requests for payment in accordance with the terms of the contract shall consist of:

a. Contractor's Invoice on Form NAVFAC 10-7300/30(4/68), which shall show, in summary form, the basis for arriving at the amount of the invoice

b. Contractor's Monthly Estimate for Voucher (5ND GEN 5265/1)

c. Affidavit to Accompany Invoice (5ND LANTDIV 4-4235/4)(Rev 1/68)

Forms will be furnished by the Contracting Officer. Monthly invoices and supporting forms for work performed through the 15th of the month shall be submitted to the Contracting Officer by the 20th of the month in the following quantities:

a. Contractor's Invoice - Original and five copies

b. Contractor's Monthly Estimate for Voucher - Original and two copies

c. Affidavit - Original

7. OPTIONAL REQUIREMENTS: Where a choice of materials or methods is permitted herein, the Contractor will be given the right to exercise the option unless stated specifically otherwise.

8. QUARANTINE FOR IMPORTED FIRE ANT (CLNC 2/82): All of Onslow, Jones and Carteret Counties and portions of Duplin and Craven Counties have been declared a generally infested area by the United States Department of Agriculture for the imported fire ant. Compliance with the quarantine regulations established by this authority as set forth in USDA Quarantine No. 81 dated 9 October 1970, and USDA Publication 301.81-2A of 23 July 1976, is required for operations hereunder

8.1 The quarantine applies to materials originating from Camp Lejeune and the Marine Corps Air Station (Helicopter), New River, which are to be transported outside the Onslow County or adjacent suppression areas.

8.2 Certification is required for the following articles, and they shall not be moved from the reservation to any point outside the Onslow County and adjacent designated areas unless accompanied by a valid inspection certificate issued by an officer of the Plant Protection and Quarantine Program, USDA:

(1) Bulk soil

(2) Used mechanized soil-moving equipment

(3) Any other products, articles, or means of conveyance if it is determined by an inspector that they present a hazard of spread of the imported fire ant and the person in possession thereof has been so notified.

8.3 Authorization for movement of equipment outside the imported fire ant regulated area shall be obtained from USDA, APHIS, PPQ, Rural Route 6, Box 53, Wilmington, NC 28504; telephone (919) 343-4667. Requests for inspection shall be made at least two days in advance of the date of movement to permit arrangements for the services of authorized inspectors. The equipment shall be prepared and assembled so that it may be readily inspected. All soil on or attached to equipment, supplies and materials shall be removed by washing with water and/or such other means as necessary to accomplish complete removal. Resulting spoil shall be wasted as directed.

9. EMERGENCY MEDICAL CARE: Only emergency medical care is available at Camp Lejeune Government facilities for Contractor employees who suffer on-the-job injury or disease. Emergency care will be rendered at the prevailing rates established in BUMEDINST 6320.4 series. Reimbursement shall be made by the Contractor to the Naval Regional Medical Center Collection Agent upon receipt of a monthly statement.

10. PROPRIETARY NAMES: Names indicated for colors, textures and patterns of materials are for the purpose of color, texture and pattern selection only. Other manufacturer's materials are acceptable provided they closely approximate colors, textures and patterns indicated and provided they conform to all other requirements.

11. NORTH CAROLINA STATE AND LOCAL SALES AND USE TAX (1977 JAN):

(a) As used throughout this clause, the term "materials" means building materials, supplies, fixtures and equipment which become a part of or are annexed to any building or structure erected, altered, or repaired under this contract.

(b) If this is a fixed-price contract as defined in the Defense Acquisition Regulation, the contract price includes the North Carolina state and local sales and use taxes to be paid with respect to materials, notwithstanding any other provision of this contract. If this is a cost-reimbursement type contract as defined in such regulation, any North Carolina state and local sales and use taxes paid by the Contractor with respect to materials shall constitute an allowable cost under this contract.

(c) At the time specified in paragraph (d) below:

(i) The Contractor shall furnish the Contracting Officer certified statements setting forth the cost of the materials purchased from each vendor and the amount of North Carolina state and local sales and use taxes paid thereon. In the event the Contractor makes several purchases from the same vendor, such certified statement shall indicate the invoice numbers, the

inclusive dates of the invoices, the total amount of the invoices and the North Carolina state and local sales and use taxes paid thereon by the Contractor. Any local sales or use taxes included in the Contractor's statements must be shown separately fromthe state sales or use tax. The Contractor shall furnish such additional information as the Commissioner of Revenue of the State of North Carolina may require to substantiate a refund claim for sales or use taxes.

(ii) The Contractor shall obtain and furnish to the Contracting Officer similar certified statements by its subcontractors.

(d) If this contract is completed before the next October 1, the certified statements to be furnished pursuant to paragraph (c) above shall be submitted within 60 days after completion. If this contract is not completed before the next October 1, such certified statements shall be submitted on or before the 30th day of November of each year and shall cover taxes paid during the twelve-month period which ended the preceding September 30.

(e) The certified statements to be furnished prusuant to paragraph (c) above shall be in the following form:

I hereby certify that during the period _____ to _____, (name of Contractor or subcontractor) paid North Carolina state and local sales and use taxes aggregating $_____(state) and $_____ (local) with respect to building materials, supplies, fixtures and equipment which have become a part of or annexed to a building or structure erected, altered or repaired by (name of Contractor) for the United States of America, and that the vendors from whom the property was purchased, the dates and numbers of the invoices covering the purchases, the total amount of the invoices of each vendor, the North Carolina state and local sales and use taxes paid thereon, shown separately, and the cost of property withdrawn from warehouse stock and North Carolina state and local sales or use taxes paid thereon are as set forth in the attachments hereto.

12. AS-BUILT DRAWINGS: During the progress of the work, one full-size print of each of the drawings accompanying this specification shall be neatly and clearly marked in red to show all variations between the construction actually provided and that indicated or specified in the contract documents. The as-built drawings shall be kept up-to-date at the work site at all times during the contract, and shall be available for inspection by the Contracting Officer upon request. The Contractor shall also mark the drawings to indicate the exact location of any underground utility lines discovered in the course of the work. Where a choice of materials and/or methods is permitted herein, and where variations in the scope or character of the work indicated or specified are permitted either by award on bidding items specified for that purpose or by subsequent change to the contract, the as-builit drawings shall define the construction actually provided. The representation of such variations shall conform to standard drafting practice and shall include such supplementary notes, legends, and details as may be necessary for legibility and clear portrayal of the as-built construction; the marked prints shall be subject to approval of the Contracting Officer before acceptance. Upon completion of the work, the completed as-built drawings shall be presented to the Contracting Officer.

*** END OF SECTION ***

SECTION 01401. QUALITY CONTROL

1. APPLICABLE PUBLICATION: The following publication of the issue listed below, but referred to thereafter by basic designation only, forms a part of this specification to the extent indicated by the references thereto:

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM):

ASTM E329-77 Standard Recommended Practices for Agencies for Concrete, Steel, and Bituminous Materials as Used in Construction.

2. QUALITY CONTROL of this contract will be administered under the General Provisions Clause entitled "Contractor Inspection System".

3. DEFINITIONS:

3.1 Factory Tests: Tests made on various products and component parts prior to shipment to the job site, including but not limited to such items as transformers, boilers, air conditioning equipment, electrical equipment, and precast concrete.

3.2 Field Tests: Tests or analyses made at, or in the vicinity of, the job site in connection with the actual construction.

3.3 Product: The term "product" includes the plural thereof and means a type or a category of manufactured goods, construction, installations and natural and processed materials or those associated services whose characterization, classification or functional performance determination is specified by standards.

3.4 Person: The term "person" means associations, companies, corporations, educational institutions, firms, government agencies at the Federal, State and Local level, partnerships, and societies, as well as divisions thereof, and individuals.

3.5 Testing Laboratory: The term "testing laboratory" means any "person", as defined above, whose functions include testing, analyzing, or inspecting "products", as defined above, and/or evaluating the designs or specifications of such "products" according to the requirements of applicable standards.

3.6 Certified Test Reports: Reports of tests signed by a qualified professional attesting that the test results reported are accurate and that items tested either meet or fail to meet the stated minimum requirements. These test reports include those performed by Factory Mutual, Underwriters' Laboratories, Inc., and others.

3.7 Certified Inspection Reports: Reports signed by approved inspectors attesting that the items inspected meet the specification requirements other than any exceptions included in the report.

3.8 Manufacturer's Certificate of Conformance or Compliance: A certificate signed by an authorized manufacturer's official attesting that the material or equipment delivered meets the specification requirements.

4. SUBMITTALS shall be prepared in accordance with this specification and the General Provisions and submitted to the Contracting Officer for approval. Each submittal shall be accompanied with a cover letter signed by the Contractor. Each item proposed to be incorporated into the contract shall be clearly marked and identified in the submittals, and shall be cross-referenced to the contract drawings and specifications so as to identify clearly the use for which it is intended. Each sheet of submittal shall be stamped with the Contractor's certification stamp. Data submitted in a bound volume or on one sheet printed on two sides, may be stamped on the front of the first sheet only. The Contractor's certification stamp shall be worded as follows:

"It is hereby certified that the (equipment)(materials) shown and marked in this submittal is that proposed to be incorporated into Contract Number _____, is in compliance with the contract drawings and specifications, can be installed in the allocated spaces, and is submitted for Government approval. Certified by _____ Date _____."

The person signing the certification shall be one designated in writing by the Contractor as having that authority. The signature shall be in original ink. Stamped signatures are not acceptable.

4.1 Submittal Status Logs: The Contractor shall maintain at the job site an up-to-date submittal status log showing the status of all submittals required by the contract. A sample format of an acceptable log is attached at the end of this section. While the use of this sample format is not required, any other format must contain the same information as shown on the sample.

4.2 Samples, shop drawings, manufacturer's data, certifications and data required of the Contractor: Specification MIL-D-1000 shall be used as a guide and its use is encouraged, for all drawings and data submitted by the Contractor. Conformance to the provisions of Specification MIL-D-1000 is not mandatory for maps, sketches, presentation drawings, perspectives, renderings, and all other drawings not requiring Naval Facilities Engineering Command drawing numbers. Before starting the fabrication or installation of any of this work, the Contractor shall submit to the Contracting Officer for, and receive approval of, in accordance with the General Provisions, such drawings as may be required, including all items specified in the applicable paragraphs of the technical sections of this specification. Seven copies of all submittals to be approved by the Contracting Officer shall be forwarded.

4.3 Identification: All catalog cuts, shop drawings, samples and other data submitted for approval shall specifically identify the specification paragraph or contract drawing by number where each item submitted is required to be provided. All submittals shall be clearly marked in

ink to indicate the specific item(s) submitted for approval. Samples shall be clearly labeled with strong tags, firmly affixed, or indelible markings to identify the contract number, contractor, manufacturer, and item name.

4.4 Certified Test Reports: Before delivery of materials and equipment, four certified copies of the reports of all tests listed in the technical sections and referenced publications shall be submitted and approved. The testing shall have been performed in a laboratory meeting the requirements specified herein. The tests shall have been performed within three years of submittal of the reports for approval. Test reports shall be accompanied by certificates from the manufacturer certifying that the material and equipment proposed to be supplied is of the same type, quality, manufacture, and make as that tested.

4.5 Manufacturer's Certificates of Conformance or Compliance: Manufacturer's certification furnished by the Contractor on items of materials and equipment incorporated into the work will be accepted only when this method will assure full compliance with the provisions of the contract, as determined by the Contracting Officer. Preprinted certifications will not be acceptable. All certifications shall be in the original. The original of all manufacturer's certifications shall name the appropriate item of equipment or material, specification, standard, or other document specified as controlling the quality of that item and shall have attached thereto certified copies of test reports upon which the certifications are based. All certificates shall be signed by the manufacturer's official authorized to sign certificates of conformance or compliance.

4.6 Laboratory Reports shall cite the contract requirements, the test or analysis procedures used, the actual test results, and include a statement that the item tested or analyzed conforms or fails to conform to the specification requirements. Each report shall be conspicuously stamped on the cover sheet in large red letters "CONFORMS" or "DOES NOT CONFORM" to the specification requirements as the case may be. All test reports shall be signed by the representative of the testing laboratory authorized to sign certified test reports. The Contractor shall arrange for immediate and direct delivery of the signed original of all reports, certifications, and other documentation to the Contracting Officer.

4.7 Tabulation of Tests: In addition to the General Provisions requiremtns for CQC test reports, prior to final payment the Contractor shall obtain from each laboratory a tabulation of all tests it has performed in connection with the construction contract, including conforming or nonconforming, and repeated test results. The tabulation(s) shall be certified as complete, and signed by the authorized representative of the laboratory, and shall be delivered to the Contracting Officer.

5. QUALITY CONTROL REQUIREMENTS: In accordance with the General Provisions Clause entitled "Contractor Inspection System", the Contractor shall inspect and test all work under the contract and maintain records of the inspections and tests. Approvals, except those required for field

installations, field applications, and field tests, shall be obtained before delivery of materials and equipment to the project site. Surveillance of the inspection system will be performed by the Contracting Officer.

5.1 Factory Tests: Unless otherwise specified, the Contractor will arrange for factory tests when they are required under the contract.

5.2 Factory Inspection: Unless otherwise specified, the Contractor will arrange for factory inspection when required under the contract.

5.3 Field Inspections and Tests by the Contractor: The Contractor shall furnish all equipment, instruments, qualified personnel, and facilities necessary to inspect all work and perform all tests required by the contract. All inspections and tests performed and test results received each day shall be included in the Daily Report to Inspector.

5.5 Approval of Testing Laboratories: All laboratory work under this contract shall be performed by a laboratory approved by the Government, whether the laboratory is employed by the Contractor, or is owned and operated by the Contractor. The basis of approval includes the following:

a. Testing laboratories performing work in connection with concrete, steel, and bituminous materials shall comply with ASTM E329, except that the Contracting Officer will perform the function of paragraphs 3.4 and 3.5 therein in the absence of other Government approval.

b. Testing laboratories performing work not in connection with concrete, steel, or bituminous materials shall comply with sections 3 and 4 of ASTM E329, except that the Contracting Officer will perform the functions of paragraphs 3.4 and 3.5 therein in the absence of other Government approval.

5.6 Repeated Tests and Inspections: The Contractor shall repeat tests and inspections after each correction made to nonconforming materials and workmanship until tests and inspections indicate the materials, equipment, and workmanship conform to the contract requirements. The retesting and reinspections shall be performed at no additional cost to the Government.

5.7 Daily Report to Inspector: The Daily Report to the Inspector Form NAVFAC 4330/34 shall be submitted to the Contracting Officer by 10:00 A.M. on the working day following the day the work was performed.

SUBMITTAL STATUS LOG

"SEE INSTRUCTIONS ON REVERSE BEFORE FILLING IN"

PAGE ______ OF ______

CONTRACT NUMBER		SHORT TITLE										LOCATION						CONTRACTOR
			SUBMITTAL REQUIRES							CONTRACTOR ACTION			ROICC ACTION		DATE			
SUBMITT'L/ TRANSMITT'L NO.	DESCRIPTION OF ITEMS	SPECIFICATION SECTION REQUIRING SUBMITTAL	SHOP DWGS.	CATALOG DATA	SAMPLE	CERTIFICATION	TEST DATA	CONTRACTOR APPV'D	GOV'T APPROVED	INSERT ACTION CODE	DATE OF ACTION	DATE FORWARDED FROM ROICC	INSERT ACTION CODE	DATE OF ACTION	RECEIVED FROM ROICC	MAT'L/EQUIP RECEIVED ON SITE	APPROVED BY CONTRACTOR	REMARKS
(a)	(b)	(c)	(d)					(e)		(f)		(g)	(h)		(i)	(j)	(k)	

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INSTRUCTIONS

1. This form may be used by the Contractor for listing all material submittals that require action by either the Contractor or the Government.

2. Columns (a) through (e) should be completed by the Contractor and must include all submissions that are required by the specifications.

3. As submittals are received and processed, the remaining columns are to be completed by the Contractor.

4. In those instances where the Contractor has approved the submittal under his contract responsibility, there may be a dual Action Code under column (f); e.g., "A/E", indicating approved as submitted and forwarded to the OICC for record purposes.

5. In column (f) for those items requiring OICC action (Action Code "D"), the reason for forwarding to the OICC should be entered in the column (l), the Remarks column; e.g., gov't approval required; waiver requested because of variance, substitution, etc.

6. Where no Government action is required, (for Contractor review/approval items), there need be no entry in columns (h) and (i).

7. Column (j) is completed when material or equipment is delivered to the project. Column (k) is completed only after verification that the delivered item is that represented by the approved submittal.

ACTION CODE: To be used when completing columns (f) and (h)

A - Approved as submitted

B - Approved as noted

C - Disapproved

D - Forwarded to OICC for action

E - Forwarded to OICC for record purposes

END OF SECTION

SECTION 01560
ENVIRONMENTAL PROTECTION

PART 1. GENERAL

1.1 ENVIRONMENTAL PROTECTION PLAN: The Contractor may be responsible for the preparation and submission of an Environmental Protection Plan. After the contract is awarded, but prior to the commencement of the work, the Contractor shall meet with the Contracting Officer, or his representative, and discuss the proposed Environmental Protection Plan. The meeting shall develop mutual understanding relative to details of environmental protection, including required reports and measures to be taken should the Contractor fail to provide adequate protection in an adequate and timely manner. Not more than 14 days after the meeting, the Contractor shall submit for approval his proposed Environmental Protection Plan, if so required.

1.2 GENERAL REQUIREMENTS: The Contractor shall provide and maintain environmental protection during the life of the contract as defined herein. The Contractor's operations shall comply with all Federal, State and Local regulations pertaining to water, air, solid waste, and noise pollution.

2. PRODUCTS

2.1 DEFINITIONS OF POLLUTANTS:

2.1.1 Non-Hazardous Wastes: Solid or liquid substances that are to be discarded by the Contractor and that normally do not constitute a hazard to man or to the environment. This includes, but is not limited to, paper, metal (other than toxic metals such as lead and mercury), masonry, wood, brick, stone, asphaltic concrete, plastics, rubber, rubbish and concrete.

2.1.2 Hazardous Wastes: Solid and liquid substances that are to be discarded by the Contractor and that constitute a significant active or potential hazard to man and/or to the remainder of the environment. This includes, but is not limited to asbestos, glass, lead, mercury, pesticides, herbicides, other toxic chemicals and waste, liquid petroleum products, human excrement, garbage, sediment and radioactive materials.

2.1.3 Protection of Natural Resources: It is intended that the natural resources within the limits of permanent work performed under this contract be preserved in their existing condition or be restored to an equivalent or improved condition upon completion of the work. The Contractor shall confine his construction activities to areas defined by the work schedule, plans, and specifications.

3. EXECUTION

3.1 CONTROL AND DISPOSAL OF HAZARDOUS AND NON-HAZARDOUS WASTES:

3.1.1 Non-hanzardous wastes, except rubble, shall be picked up and disposed of daily or placed in containers which are emptied on a weekly schedule. All handling and disposal shall be so conducted as to prevent contamination of the site and other areas. The Contractor shall transport all such waste off the Base, unless he desires to use the Base Sanitary Landfill or rubble disposal areas.

3.1.2 If transporting any material off Government property, the Contractor shall provide the Contracting Officer a copy of State and/or local permit which reflects the responsible agency's approval of the disposal area and proposed waste disposal methods.

3.1.3 Rubble such as masonry, stone, concrete without reinforcing steel, and brick may be deposited as directed on the Base. Upon completion, the work and disposal area shall be left clean and natural looking. All signs of temporary construction and activities incidental to construction of the required permanent work in place shall be obliterated.

3.1.4 Optional use of Base Landfill shall require compliance with Landfill rules. Such rules do not allow accepting recyclable metals nor reusable wood or lumber over six feet in length.

3.2 HAZARDOUS WASTES:

3.2.1 Garbage Disposal: The Contractor shall transport any garbage to the Base Sanitary Landfill. However, the preparation, cooking and disposing of food are strictly prohibited on the project site.

3.2.2 Liquid wastes shall be stored in corrosion-resistant containers, removed from the project site, and disposed of not less frequently than monthly unless directed otherwise. Disposal of liquid waste shall be in accordance with Federal, State and Local regulations. Fueling and lubricating of equipment and motor vehicles shall be conducted in a manner that affords the maximum protection against spills and evaporation. For oil and hazardous material spills which may be large enough to violate Federal, State and Local regulations, the Contracting Officer shall be notified immediately. The Base Sanitary Landfill will not accept liquid wastes nor empty drums.

3.2.3 Asbestos disposal in the Base Sanitary Landfill will be mandatory when friable asbestos is encountered. If such asbestos is encountered, provisions for handling or disposal shall comply with the applicable section of this specification; if not specified, such requirements shall be as directed.

SECTION 02050

DEMOLITION AND REMOVAL

PART 1 - GENERAL

1.1 SUBMITTALS: Submit proposed demolition and removal procedures to the Contracting Officer for approval before work is started. Procedures shall provide for careful removal and disposition of materials, coordination with other work in progress, a disconnection schedule of utility services, a detailed description of methods and equipment to be used for each operation, and sequence of operations.

1.2 REQUIREMENTS: The work includes demolition or removal of all construction indicated or specified. All materials resulting from demolition work, except as indicated or specified otherwise, shall become the property of the Contractor and shall be removed from the limits of Government property. Remove rubbish and debris from the station daily, unless otherwise directed; do not allow accumulations inside or outside the building. Store materials which cannot be removed daily in areas specified by the Contracting Officer.

1.3 DUST CONTROL: Take appropriate action to check the spread of dust to occupied portions of the building and to avoid the creation of a nuisance in the surrounding area. Do not use water if it results in hazardous or objectionable conditions, such as ice, flooding or pollution. Comply with all dust regulations imposed by local air pollution agencies.

1.4 PROTECTION:

1.4.1 Buildings: Protect existing work that is to remain in place, that is to be reused, or that is to remain the property of the Government by temporary covers, shoring, bracing, and supports. Repair items damaged during performance of the work or replace with new. Do not overload structural elements. Provide new supports or reinforcement for existing construction weakened by demolition or removal work.

1.4.2 Weather Protection: Protect building interior and all materials and equipment from the weather at all times. Where removal of existing roofing is necessary to accomplish work, have materials and workmen ready to provide adequate and approved temporary covering of exposed areas. Temporary coverings shall be attended, as necessary, to insure effectiveness and to prevent displacement.

1.4.3 Personnel: Where pedestrian and driver safety is endangered in the area of removal work, use traffic barricades with flashing lights. Notify the Contracting Officer prior to beginning any such work.

1.5 EXPLOSIVES: Use of explosives will not be permitted.

PART 2 - EXECUTION

2.1 EXISTING MATERIALS TO BE REMOVED:

2.1.1 Roofing: Remove built-up roofing to effect the connections with new flashing or roofing. Cut existing felts and insulation along straight lines. Remove gravel surfacing from existing roofing felts for a distance of not less than 18 inches back from the cut. Remove gravel without damaging felts down to the top ply of felt. Remove roofing and insulation without damaging the roof deck.

2.1.2 Masonry: Remove masonry carefully so as to prevent damage to surfaces to remain and to facilitate the installation of new work.

2.1.3 Concrete: Where concrete work is to be removed, saw concrete along straight lines to a depth of not less than 2 inches. Make each cut perpendicular to the face. The remainder of the concrete shall be broken out, provided that the broken area is concealed in the finished work, and the remaining concrete is sound. At locations where the broken face cannot be concealed, it shall be ground smooth or the saw cut shall be made entirely through the concrete.

2.2 DISPOSITION OF MATERIAL:

2.2.1 Title to Materials: Title to all materials and equipment to be removed, except as specified otherwise, is vested in the Contractor upon receipt of notice to proceed. The Government will not be responsible for the condition or loss of, or damage to, such property after notice to proceed. Materials and equipment shall not be viewed by prospective purchasers or sold on the site.

2.3 CLEANUP:

2.3.1 Debris and Rubbish: Remove and transport debris and rubbish in a manner that will prevent spillage on streets or adjacent areas. Clean up spillage from streets and adjacent areas.

2.3.2 Regulations: Comply with federal, state, and local hauling and disposal regulations.

*** END OF SECTION ***

SECTION 02200

EARTHWORK

PART 1 - GENERAL

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

1.1.1 American Society for Testing and Materials (ASTM) Publications:

C 136-76	Sieve or Screen Analysis of Fine and Coarse Aggregates
D 698-78	Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using 5.5-lb. (2.49kg) Rammer and 12-in. (305-mm) Drop
D 1556-64 (R 1974)	Density of Soil in Place by the Sand Cone Method
D 2419-74 (R 1979)	Test for Sand Equivalent Value of Soils and Fine Aggregrates
D 2487-69 (R 1975)	Classification of Soils for Engineering Purposes
D 2922-78	Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth)
D 3017-78	Moisture Content of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth)

1.2 SUBMITTALS:

1.2.1 Certified Test Reports: Submit certified test reports before starting work for the following:

a. Porous fill tested in accordance with ASTM C 136 and ASTM D 2419

1.3 DELIVERY AND STORAGE: Deliver and store materials in a manner to prevent contamination or segregation.

1.4 CRITERIA FOR BIDDING: Base bids on the following criteria:

a. That the surface elevations are as indicated.

b. That no pipes or other artifical obstructions, except those indicated, will be encountered.

c. That the character of the material to be removed is as indicated.

d. That ground water elevations indicated are those existing at the time sub-surface investigations were made and do not necessarily represent ground water elevation at the time of construction.

1.5 PROTECTION:

1.5.1 Dewatering: Provide for the collection and disposal of all forms of surface and subsurface water that may be encountered in the course of construction.

1.5.1.1 Drainage of construction sites: It shall be the Contractor's responsibility to adequately and completely drain construction sites as required to keep subgrades and subsoils sufficiently dry to permit all construction operations to successfully progress during all periods in which work is in progress. In addition to permanent drainage features required, the Contractor shall provide all necessary additional temporary ditches, swales, and other drainage features and equipment required to maintain the soils dry during construction. Where the Contractor's operations or failure to comply with the above requirements results in the development of unsuitable working platforms for equipment operation and unsuitable soil support for subsequent construction features, the Contractor shall, at his expense, remove the unsuitable material to whatever depth is required to restore suitable working platforms and soil support and replace it with suitable material from sources outside the station.

PART 2 - PRODUCTS

2.1 SOIL MATERIALS: In general, shall be free of debris, roots, wood, scrap material, vegetable matter, refuse, soft unsound particles, frozen, deleterious, or objectionable materials.

2.1.1 Porous Fill: For capillary water barrier shall conform to the general requirements for soil materials above and shall be a clean, coarse grained crushed stone, uncrushed gravel, or crushed gravel conforming to the following gradation: 90 to 100 percent passing the 3/4-inch sieve and zero to five percent passing the No. 4 sieve, and with a sand equivalent of not less than 50 when tested in accordance with ASTM D 2419.

2.1.2 Backfill and Fill: Material shall conform to the general requirements for soil materials above and shall be an unclassified soil material from the station borrow area, submitted for approval by the Contractor as possessing the characteristics required for compaction to the specified values of soil density herein specified for the location of intended use.

2.1.3 Borrow: Shall be materials conforming to the requirements for backfill and fill, porous fill. Take borrow materials from Government property borrow pit.

PART 3 - EXECUTION

3.1 SURFACE PREPARATION:

3.1.1 Clearing and Grubbing: Remove any trees, logs,shrubs, and brush within the construction area except as indicated otherwise. Properly protect from damage trees and shrubs which are not to be cut. Remove stumps entirely. Grub out roots and matted roots to at least 18 inches below the existing surface.

3.1.2 Unsuitable Material: Remove vegetable matter, sod, muck, and rubbish under concrete slabs.

3.2 EXCAVATION: Shall be to the contours and dimensions indicated. Keep excavations free from water while construction is in progress. Notify the Contracting Officer immediately in writing in the event that it becomes necessary to remove hard, soft, weak, or wet material to a depth greater than indicated and an adjustment in contract price will be considered in accordance with "Differing Site Conditions" paragraph of the General Provisions. Refill excavations cut below the depths indicated, unless otherwise specified, with fill and compact to 95 percent of ASTM D698 maximum density. Excavate and refill soil disturbed or weakened by the Contractor's operations and soils permitted to soften from exposure to weather with fill and compact to 95 percent of ASTM D698 maximum density. All additional work of this nature will be at the Contractor's expense.

3.2.1 Excavations for Structures and Spread Footings: If cut below depths indicated shall be filled with concrete when the foundations or footings are placed.

3.2.2 Excavations for Pile Supported Foundations: Shall be to six inches above the elevations of the bottom of the supported foundations before driving the piles. After the piles are in place, remove the loose and displaced material and excavate to the indicated elevation.

3.3 FILLING AND BACKFILLING:

3.3.1 Backfill for Structures: Place under spread footings and concrete slabs not pile supported in lifts of 6 inches thick and compact each lift as specified herein before the overlaying lift is placed. Backfill adjacent to structural elements shall be placed, as far as practicable, as the adjacent structural elements have been completed and accepted. Backfill against concrete only when directed by the Contracting Officer.

3.3.2 General Site Fill and Embankments: Place in lifts of 6 inches thick and compact as specified herein, before the overlaying lift is placed. In all areas not accessible to rollers or compactors, compact the fill with mechanical hand tampers. If the mixture is excessively moistened by rain, aerate it by means of blade graders or harrows until the moisture content of the mixture is satisfactory. Finish the surface of the layer by blading or rolling with a smooth rolleer, or a combination thereof; surface shall be smooth.

3.3.3 Porous Fill Under Slabs: Place porous fill on a compacted subgrade in lifts of three inches and compact with a minimum of two passes of a hand-operated plate type vibratory compactor.

3.4 COMPACTION OF SUBGRADES:

3.4.1 Subgrade of Soils in Cut: For structures, concrete floor slabs and paved areas but not for primary roads or airfield pavements, shall have a density of 95 percent of ASTM D698 maximum density to a depth of 12 inches; if the existing subgrade natural density is less than 95 percent of ASTM D698 maximum density, compact to that value.

3.4.2 Structure, Spread Footing, and Concrete Floor Slab: Compact subgrades to 95 percent of ASTM D698 maximum density.

3.4.3 General Site: Compact area and embankment subgrades under vegetation to 85 percent of ASTM D698 maximum density.

3.5 FINISH OPERATIONS:

3.5.1 Grading: Shall be to finished grades indicated within one-tenth of a foot. Grade areas to drain water away from structures. Grade as directed existing grades which are to remain but are disturbed by the Contractor's operations.

3.5.2 Disposition of Surplus Material: Waste by disposition in he are indicated surplus or other soil material not required or suitable for filling, backfilling, or embankment. Comply with the requirements of Section 01560, "Environmental Protection."

3.5.3 Protection of Surfaces: Protect newly graded areas from traffic, erosion, and settlements that mayoccur and as required in Section 01560, "Environmental Protection." Repair or re-establish damaged grades, elevations, or slopes.

3.6 FIELD TESTING:

3.6.1 Tests: Perform one of each of the required tests for each material used when directed. Provide additional tests as specified above for each source change. Perform density tests in randomly selected locations and in accordance with ASTM D1556 or ASTM D2922 and ASTM D3017 as follows: one test per 400 square feet in each layer of lift.

END OF SECTION

SECTION 02310

TREATED TIMBER PILING

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

1.1 Federal Specification:

RR-S-00331B Shoes, for wood piles.

1.2 American Wood Preservers Association (AWPA):

Book of Standards, dated June 11, 1979.

1.3 American Society for Testing and Materials (ASTM):

D25-73 Round timber piles.

D1143-74 Piles under axial compressive load.

2. SUBMITTALS:

2.1 Materials Tests and Test Reports: The testing requirements for materials incorporated in referenced documents will be waived provided the manufacturer submits certificates stating the previously manufactured materials have been tested by recognized laboratories, that such materials meet testing requirements specified, and that the materials furnished for this project are of the same type, quality, manufacture and make as that tested. Copies of the test reports need not be submitted except as specifically requested by the Contracting Officer.

2.1.1 Certificates: Submit certificates from the manufacturer attesting that the following products conform to all requirements of this specification and of referenced documents:

a. Piles

b. Pile Treatemnt

2.1.2 Sample Certificate: The certificate shall not contain statements that could be interpreted to imply that the proposed material does not meet all requirements for the specified material, i.e.; "as good as"; "achieve the same end use and results as materials formulated in compliance with the specified material"; "exceed or equal service and performance for specified material". The certificate should be simple and should state only that the proposed material meets the requirements for the specified material.

SAMPLE CERTIFICATE

The manufacturer hereby certifies that previously manufactured materials have been tested by recognized laboratories, that the tested material is of the same type, quality, manufacture and formulation as that furnished for this project, and that the tested material meets all the requirements of the following specifications:

SPECIFIED MATERIAL	TESTED MATERIAL
C-150-74	John Doe Company Portland Cement

SIGNATURE AND TITLE

2.2 Plant Inspection: Generally, certificates of compliance with the specified standards will be acceptable for the preservative treatment; however, the Government reserves the right to perform plant inspection of the treating process, at its discretion. The Contractor shall notify the Contracting Officer at least two weeks prior to beginning the treatment, stating the place where treating will be done. The Government inspector shall have access to all parts of the plant and every facility shall be allowed him for the inspection of the treating process.

2.3 Pile Records: Within 15 days after completion of the pile driving, a complete and accurate record of all piles installed shall be furnished to the Contracting Officer. The record shall indicate the pile location, cross section shape and dimensions, length, the elevation of tips and butts of piles, pile hammer description, and the number of hammer blows per foot for the entire length of penetration.

3. GENERAL REQUIREMENTS: The work includes the provision of treated timber piling for foundations. Where the cut-off elevation for piles is below existing grade, and excavation for foundation or other construction is required at the location of the piles, the excavation shall be made before the piles are driven.

4. MATERIALS:

4.1 Piles shall conform to ASTM D25, Table 2, Yellow Pine or Douglas Fir, clean peeled, and shall be in one piece. Minimum circumference of each pile, measured at three feet from the butt, shall be 38 inches. Piles shall be given a pressure preservative treatment with coal tar creosote or water-borne preservative (ACA or CCA) in accordance with Standards C1 and C3 of the AWPA "Book of Standards", as specified for Foundation piles. Creosote and water-borne preservatives shall conform to Standards P1 and P5, respectively, of the AWPA "Book of Standards".

4.2 Pile Shoes shall conform to RR-S-331.

5. PRECAUTIONS IN HANDLING AND DRIVING TREATED PILES: Care shall be taken in handling and in driving to prevent damage to the shell of treated wood and every effort shall be made to prevent damage to piles, particularly in portions which will be exposed to attack by wood-destroying insects or decay. Piles will be inspected in the leads and, where the protective shell of creosote treated wood is impaired between cutoff and a point which will be not less than 10 feet below ground surface, the piles shall be handled and repaired in accordance with Standard M4-74 of the AWPA "Book of Standards", unless the pile is damaged to such an extent that it is rejected. All holes in the portion of the pile subject to exposure shall be plugged neatly and tightly with treated wood plugs.

6. LENGTHS AND NUMBERS OF PILES: Bids shall be based on providing 8 piles, and on an assumed pile length of 35 feet. The excess of length ordered over the point to cut-off length listed in the schedule as finally approved shall be the responsibility of the Contractor. If, in driving, it is found that any pile is not of a length sufficient to give the bearing power specified, the Contractor shall follow one of the following methods --(1), (2), (3), (4), (or) 5 - as may be directed by the Contracting Officer.

(1) The pile shall be withdrawn, a section spliced onto the lower end of the pile as specified hereinafter, the length of the lower portion being as directed and the pile redriven until the required bearing power is obtained and the splice is below elevation 0.0;

(2) An additional pile of the length directed shall be driven adjacent to the first pile;

(3) The first pile shall be pulled and a longer pile of the length directed driven.

(4) A pile section, of the length directed, shall be spliced onto the butt as specified hereinafter, and driving continued.

(5) If directed by the Contracting Officer, the pile may be driven to an elevation below design cutoff.

7. BEARING POWER: Design capacity for piles is 20 tons. Piles shall be driven to a minimum depth of 25 feet below cut-off elevation and to such additional depth as required to obtain a bearing capacity of not less than 20 tons, as determined in accordance with the following formulae:

$R = \frac{2E}{S + 0.1}$ for double-acting hammers;

$R = \frac{2WH}{S + 0.1}$ for single-acting hammers;

in which R is the approximate allowable pile load in pounds; E equals the energy in foot-pounds per blow based on an acceptable certified statement from the manufacturer of the hammer; W equals the weight of the hammer or ram in pounds; H equals the fall of the hammer or ram in feet; and S equals the average inches of penetration per blow for the last three blows. An allowance shall be made for reduced penetration caused by shock absorption of pile caps and by material penetrated which will be removed after the pile is driven. Water jets may be used in driving only when specifically authorized by the Contracting Officer. Where jetting is authorized, the jetting equipment shall be of a type and capacity approved by the Contracting Officer. All jetted piles shall be driven the last three feet of the required depth or penetration and the minimum number of blows per foot required by the Contracting Officer for normally driven piles must be attained. Prejetting of piles may be permitted by the Contracting Officer in certain unusual conditions.

8. PILE HAMMERS shall be air, steam, or diesel-powered hammers of a type approved by the Contracting Officer. The hammer furnished shall have a capacity at least equal to the hammer manufacturer's recommendation for the total weight of pile and character of subsurface material to be encountered. The required driving energy of the hammer shall be obtained by use of a heavy ram and a short stroke with low impact velocity, rather than a light ram and a long stroke with high impact velocity. The minimum driving energy of the hammer shall be as follows:

Length of Pile (feet)	Minimum Driving Energy (foot-pounds)
20 to 35	6,500
36 to 50	7,200
51 to 60	8,700
61 to 70	13,000
Over 70	15,000

For piles of any length, the maximum driving energy of the hammer shall be 15,000 foot-pounds. Diesel-powered hammers shall be operated at the rate recommended by the manufacturer throughout the entire driving period.

Sufficient pressure shall be maintained at the hammer so that: (1) for double-acting hammer, the number of blows per minute during and at the completion of driving of a pile is equal approximately to that at which the hammer is rated; (2) for single-acting hammer, there is a full upward stroke of the ram; and (3) for differential type hammer, there is a slight rise of the hammer base during each upward stroke.

9. DRIVING: Piles shall be driven with an approved hammer as specified hereinbefore. Jetting, when authorized, shall conform to the requirements specified hereinbefore. Driving of each pile shall be continuous until minimum bearing is attained. Piles shall have the heads and points squared to the driving axis. All pile heads at cut-off shall be entirely sound. All injured piles shall be replaced with sound piles or shall have the damaged parts repaired as directed; without additional cost to the Government.

9.1 Driving Helmets and Cushion Blocks: A driving helmet or cap including a cushion block or cap block of a design approved by the Contracting Officer shall be used between the top of the piles and the ram to prevent impact damage to the pile. The driving helmet or cap and cushion block combination shall be capable of protecting the head of the pile, minimize energy absorption, and transmit hammer energy uniformly and consistently during the entire driving period. The driving helmet or cap shall fit snugly on the top of the pile so that the energy transmitted to the pile is uniformly distributed over the entire surface of the pile head. The Contractor shall demonstrate that the equipment to be used on the project performs the above functions. The cushion block may be a solid or laminated softwood block with the grain parallel to the pile axis and enclosed in a close-fitted steel housing. The thickness of block shall be suitable for the length of pile to be driven and the character of subsurface material to be encountered. Generally, thicker blocks are required for longer piles and softer subsurface material. The cushion block shall be replaced if it has been damaged, split, highly compressed, charred or burned, or has become spongy or deteriorated in any manner. Under no circumstances will the use of small wood blocks, wood chips, rope, or other material permitting excessive loss of hammer energy be permitted. The Contractor shall submit to the Contracting Officer at least two weeks before the start of test pile driving operations, detail drawings of the cushion block, including records of successful use where the block is other than that specified above.

9.2 Tolerance in Driving:

(1) All piles shall be driven with a variation of not more than 0.25 inch per foot of pile length from the vertical for plumb piles. Butts shall be within 4 inches of the location indicated. Manipulation of piles to move them into position will be permitted only within the aforementioned tolerance to return the pile to its design location. However, piles shall not be manipulated more than 1-1/2 percent of their exposed length above the ground surface. In addition to complying with the tolerances stated herein or otherwise specified, the clear distance between the heads of piles and the edges of caps shall be not less than 5 inches. With prior approval of the Contracting Officer, and at no additional cost to the Government, additional concrete and reinforcement required to maintain the required minimum clear distance shall be placed. All piles will be checked for heave. Piles found to have heaved shall be redriven to the required point elevation.

(2) If, as directed by the Contracting Officer, a pile has been driven below the design cut-off to obtain bearing, the Contraacting Officer may direct the Contractor to cast the cap down to the level of the pile.

(3) If a pile is driven below design cut-off without approval of the Contracting Officer, the Contractor shall be required to cast the cap down to the level of the pile or remove the pile and redrive it to the proper elevation, as directed by the Contracting Officer at no additional cost to the Government.

10. PILE SPLICES directed by the Contracting Officer shall consist of steel pipe having a wall thickness of not less than 1/4 inch, a diameter approximating that of the pile at the plane of splicing but a minimum of 9 inches and length of not less than 1.5 feet above and below the joint. Before the sleeves are driven on them, piles to be spliced shall be trimmed sufficiently to preclude the slivers or shavings cut by the sleeve being heavy enough to produce objectionable shakes or splintering. Full bearing of timber on timber shall be provided and air pockets or cushions in the sleeves avoided. Cuts in the protective treated shell, as a result of splicing operations, shall be treated as specified hereinafter for surface treatment.

11. SURFACE TREATMENT: After piles have been driven and cut, the butts and cut and dapped surfaces shall be given two heavy brush coats of coal-tar creosote, the first coat being allowed to penetrate before the second is applied and then coated with a mixture of creosote and coal-tar pitch mixed to a paste consistency. Creosote shall be as specified for the original preservative treatment for piles.

12. PAYMENT: All costs incidental to providing treated timber piling shall be included in the lump sumcontraact price bid, including furnishing and driving the piles and further including mobilization, jetting, predrilling, redriving uplifted piles, and cutting off all piles at "cut-off" grade line. Should the total number of piles required or the pile length increase from that specified as the basis for bidding, at the direction of the Contracting Officer, or should the Contraating Officer direct splices to be made, the contract price or time for completion, or both, will be adjusted in accordance with the contract documents. No reduction in contract price will be required for piles driven shorter than the specified tip to cut-off length when the requirements for minimum penetration and bearing power have been met.

*** END OF SECTION ***

SECTION 02444
FENCE RELOCATION

PART 1 - GENERAL

1.1 APPLICABLE PUBLICATIONS: 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

C94-78a Ready-Mixed Concrete

1.2 DELIVERY, STORAGE AND PROTECTION: Deliver materials to the site in an undamaged condition. Carefully store materials off the ground to provide proper protection against oxidation caused by ground contact.

PART 2 - PRODUCTS

2.1 MATERIALS: Materials shall conform to referenced specifications and other requirements as specified herein.

2.1.1 Concrete: ASTM C94, using 3/4-inch maximum size aggregate, and having minimum compressive strength of 3,000 psi at 28 days. Proportion grout one part portland cement to three parts clean well-graded sand and minimum amount of water to produce a workable mix.

PART 3 - EXECUTION

3.1 Remove the existing fence and relocate as shown. As part of the existing fencing, the ten-foot section of fence to be relocated has a bottom tension wire, top rail, supporting arms and three strands of barbed wire. As part of the existing fencing, the remaining sections of fencing to be relocated have bottom and top tension wires, supporting arms and three strands of barbed wire. The existing fence fabric, tension wires, posts, braces, supporting arms and barbed wire shall be reused. Install the fence on previously prepared surfaces to line and grade as indicated on LANTDIV Plate F-1. Install fence in accordance with the fence manufacturer's written installation instructions except as modified herein.

3.1.1 Excavation: Excavate for concrete-embedded items to dimensions indicated, except in bedrock. If bedrock is encountered before reaching required depth, continue excavation to depth indicated or 18 inches into the bedrock, whichever is less, and a minimum of 2 inches larger than outside diameter of post. Clear post holes of loose material. Dispose of waste material outside the limits of the Station.

3.1.2 Post Setting: Set posts plumb. Provide concrete bases of dimensions indicated except in bedrock. Thoroughly compact concrete to be free of voids and finish in a dome. Straight runs between braced posts shall not exceed 500 feet. In bedrock, set posts with a minimum of one inch of grout around each post. Thoroughly work grout into the hole so as to be free of voids and finish in a dome. Cure concrete and grout a minimum of 72 hours before any further work is done on posts.

3.1.2.1 Posts and bracing reused from the relocated fence shall have all existing concrete footings removed before reuse.

3.1.3 Bracing: Brace gate, corner, end, and pull posts to the nearest post with a horizontal brace used as a compression member and two diagonal truss rods and truss tighteners used as tension members.

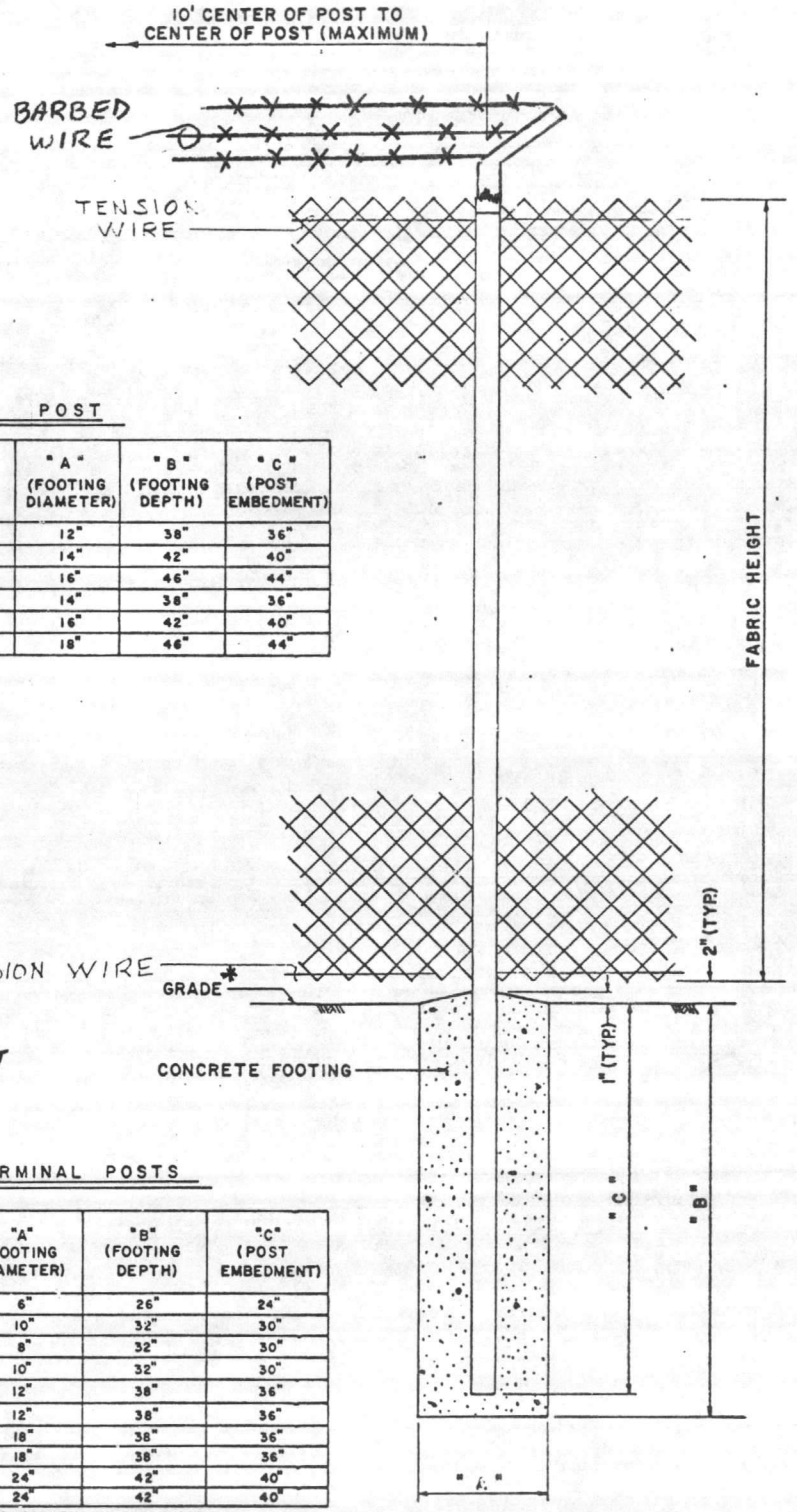
3.1.4 Supporting Arms: Install supporting arms as recommended by the manufacturer. In addition to manufacturer's standard connections, securely anchor supporting arms to posts in such manner that will prevent easy removal with hand tools. Studs driven by low-velocity powder-actuated tools may be used with steel, wrought iron, ductile iron, or malleable iron. Studs driven by any powder-actuated tool will not be used with gray iron or other material that will be fractured.

3.1.5 Top and Bottom Tension Wires: All relocated fencing shall have top and bottom tension wires. Install top and bottom tension wires before installing chain-link fabric and pull wires taut.

3.1.6 Fabric: Pull fabric taut and secure fabric to top wire and bottom wire close to both sides of each post and at intervals of not more than 24 inches on centers. Secure fabric to posts using stretcher bars and ties or clips or by integrally weaving to integral fastening loops of end, corner, pull, and gate posts for full length of each post. Install fabric on opposite side of posts from area being secured. Install fabric such that bottom of fabric is two inches above ground level.

3.1.7 Barbed Wire: Install three strands of barbed wire on supporting arms above fence posts. Extend each end member of gate frames sufficiently above top member to carry three strands of barbed wire in horizontal alignment with barbed wire strands on the fence. Pull each strand taut and securely fasten each strand to each supporting arm and extended member. The method of securing wires shall be positive and complete.

END OF SECTION



GATE POST

GATE LEAF WIDTH	GATE POST (OUTSIDE DIAMETER)	FABRIC HEIGHT	"A" (FOOTING DIAMETER)	"B" (FOOTING DEPTH)	"C" (POST EMBEDMENT)
3' TO 6'	2.875"	3' TO 5'	12"	38"	36"
		6' TO 9'	14"	42"	40"
		10' TO 12'	16"	46"	44"
7' TO 12'	4.000"	3' TO 5'	14"	38"	36"
		6' TO 9'	16"	42"	40"
		10' TO 12'	18"	46"	44"

LINE AND TERMINAL POSTS

FABRIC HEIGHT	TYPE OF POST	"A" (FOOTING DIAMETER)	"B" (FOOTING DEPTH)	"C" (POST EMBEDMENT)
3'-0" TO 4'-0"	LINE	6"	26"	24"
	TERMINAL	10"	32"	30"
5'-0"	LINE	8"	32"	30"
	TERMINAL	10"	32"	30"
6'-0" TO 9'-0"	LINE	12"	38"	36"
	TERMINAL	12"	38"	36"
10'-0" TO 12'-0"	LINE	18"	38"	36"
	TERMINAL	18"	38"	36"
13'-0" TO 18'-0"	LINE	24"	42"	40"
	TERMINAL	24"	42"	40"

NOTE- TERMINAL POSTS INCLUDE END, CORNER, AND PULL POSTS.

CHAIN LINK FENCE

LANTDIV PLATE F-1

05-82-2161

02444-3

SECTION 02690
PAVEMENT REMOVAL AND REPLACEMENT

PART 1 - GENERAL

1.1 APPLICABLE PUBLICATIONS: 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.

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION (NCDOT):

Standard Specifications for Roads and Structures, July 1978

1.2 GENERAL REQUIREMENTS: All "Section" references refer to NCDOT "Standard Specifications for Roads and Structures". In all references:

a. The articles entitled "Method of Measurement", "Basis of Payment" and "Acceptance of Bituminous Materials" will not apply.

b. All references to "Engineer" shall mean "Contracting Officer".

PART 2 - PRODUCTS

2.1 PRIME COAT: Work and materials shall be Grade MC-30 or RC-30 conforming to Section 600.

2.2 TACK COAT: Work and materials shall conform to Section 605.

2.3 STONE BASE COURSE shall conform to Sections 905 and 910, standard size No. ABC.

2.4 ASPHALTIC CONCRETE SURFACE COURSE shall be Type I-2, conforming to Section 645.

2.5 MIXING PLANT shall conform to the requirements of Section 610-5.

PART 3 - EXECUTION

3.1 CONSTRUCTION METHODS: Work shall conform to the NCDOT Standard Specifications sections refrenced hereinbefore and to the following.

3.1.1 Before commencing the operations on any portion of the work, the surface of the existing pavement and any new base course shall be thoroughly cleaned of all foreign matter, including grass, by mechanical means if feasible.

3.1.2 Patchwork: All asphalt surfacing and loose stone base course shall be removed. Stone base course materials removed shall be replaced with a new stone base course and asphaltic concrete mixture. Pavement compacted thickness shall be 1-1/2 inches.

3.1.3 Placing of the asphaltic concrete shall be as nearly continuous as possible. The rollers shall pass over the unprotected end of the mixture only when laying is discontinued for sufficient time to permit the mixture to cool, in which case, a joint shall be made by cutting back the surface course to expose a granular surface for its full depth to bond with the fresh mixture. When laying is resumed, the exposed edge shall be coated with hot asphaltic cement and the fresh mixture raked against the joint, thoroughly tamped with hot tamps and rolled.

3.1.4 Finished surfaces shall be even with existing adjacent surfaces, uniform in texture and appearance and free from cracks and creases. The finished surface shall vary not more than 1/8-inch when the test for smoothness is performed with a 10-foot straightedge. The finished thickness shall be not less than the specified thickness minus 1/8-inch. Where the irregularities of the surface or the deficiency in depth is more than the specified tolerances, the defective work shall be removed and replaced with new material, as directed, without additional cost to the Government.

3.1.5 Bituminous materials and/or mixtures shall not be produced or placed when weather is rainy or foggy, or when the air temperature is less than 40 degrees Fahrenheit in the shade away from artificial heat.

3.2 PROTECTION OF PAVEMENT: After final rolling, no vehicular traffic of any kind shall be permitted on the pavement until it has cooled and hardened.

END OF SECTION

SECTION 03302

CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

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

1.1.1 U. S. Department of Commerce Product Standard (PS) Publication:

1-74	Construction and Industrial Plywood

1.1.2 American Concrete Institute (ACI) Publications:

211.1-77	Recommended Practice for Selecting Proportions for Normal and Heavyweight Concrete
301-72 (R 1975)	Specifications for Structural Concrete for Buildings
315-74 (R 1978)	Manual of Standard Practice for Detailing Reinforced Concrete Structures
318-77 & 77C Suppl.	Building Code Requirements for Reinforced Concrete
347-78	Recommended Practice for Concrete Formwork

1.1.3 American Society for Testing and Materials (ASTM) Publications:

A 615-81	Deformed and Plain Billet-Steel Bars for Concrete Reinforcement
C 31-69 (R 1980)	Making and Curing Concrete Test Specimens in the Field
C 33-81	Concrete Aggregates
C 39-80	Compressive Strength of Cylindrical Concrete Specimens
C 94-81	Ready-Mixed Concrete
C 150-81	Portland Cement

C 171-69 (R 1980)	Sheet Materials for Curing Concrete
C 172-71 (R 1977)	Sampling Fresh Concrete
C 260-77	Air-Entraining Admixtures for Concrete
C 309-81	Liquid Membrane-Forming Compounds for Curing Concrete
D 98-80	Calcium Chloride
D 1190-74 (R 1980)	Concrete Joint Sealer, Hot Poured Elastic Type
D 1751-73 (R 1978)	Preformed Expansion Joint Fillers for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types)
D 1752-67 (R 1978)	Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction
D 1850-74 (R 1979)	Concrete Joint Sealer, Cold-Application Type

1.2 SUBMITTALS:

1.2.1 Shop Drawings: Submit shop drawings for reinforcing steel, prepared in accordance with ACI 315. Indicate bending diagrams, assembly diagrams, splicing and laps of rods, and shapes, dimensions and details of bar reinforcing and accessories. Do not use scaled dimensions from structural drawings to determine lengths of reinforcing rods.

1.2.2 Contractor Mix Design: Submit a mix design for each type of concrete, including a complete list of materials including admixtures and the applicable reference specifications, and copies of test reports showing that the mix has been successfully used to produce concrete with the properties specified.

1.2.3 Certification: Submit one copy of the delivery ticket for each load of ready-mixed concrete, showing all information required by ASTM C 94.

1.2.4 Catalog Data: Submit manufacturers' recommendations for the items listed below. Clearly mark data to indicate which type, size, or item is proposed. Data shall be sufficient to show conformance to specified requirements.

a. Joint Filler
b. Joint Sealer
c. Reinforcement

1.3 DELIVERY: Do not deliver concrete until forms, reinforcement, and embedded items are in place and ready for concrete to be placed.

1.4 STORAGE: Store reinforcement in a manner that will avoid excessive rusting or coating with grease, oil, dirt, and other objectionable materials. Store in separate piles or racks so as to avoid confusion or loss of identification after bundles are broken.

PART 2 - PRODUCTS

2.1 CONCRETE:

2.1.1 Contractor Furnished Mix Design: Design concrete mix in accordance with ACI 211.1 Slump shall be between 2 inches and 4 inches. The concrete shall have a 28-day compressive strength of 3,000 pounds per square inch.

2.1.2 Air-Entrained Concrete: Provide for all concrete exposed to the weather. Accomplish air-entrainment by using an air-entraining admixture, not air-entraining cement. If the entrained air content falls below the specified limit, add a sufficient quantity of admixture to bring the entrained air content within the specified limits. Dissolve the admixture in a portion of the mixing water and add to the mix in the drum in a manner that will ensure uniform distribution of the agent throughout the batch. The air content of freshly mixed air-entrained concrete shall be as follows:

Maximum aggregate size	Amount of air (percent volume of concrete)
1 inch	between 4 and 6
3/4 inch	between 5 and 7
1/2 inch	between 6 and 8
3/8 inch	between 7 and 9

2.2 MATERIALS:

2.2.1 Cement: ASTM C 150, Type I or II for all concrete. All cement for exposed concrete surfaces shall be of the same manufacture.

2.2.2 Water: Water, including free moisture and water in the aggregates, shall be fresh, clean, and potable.

2.2.3 Aggregates: ASTM C 33, size no. 57 except as modified herein. Obtain all aggregates for exposed concrete surfaces from one source. Aggregates shall be free from any substance which may be deleteriously reactive with the alkalies in the cement. One-inch maximum aggregate size unless indicated otherwise.

2.2.4 Admixtures:

2.2.4.1 Air-entraining: ASTM C 260, for all air-entrained concrete.

2.2.4.2 Accelerating: ASTM D 98, Type I or Type II. Use only when approved.

2.2.5 Materials for Forms: Wood, plywood, steel, or other suitable material. Wood forms, for surfaces exposed to view in the finished structure, shall be boards or plywood. Dress boards to a uniform thickness, evenly match, and provide boards free from loose knots, holes, and other defects. Plywood shall be B-B concrete form panels conforming to PS-1. Surfaces of steel forms shall be free from irregularities, dents, and sags.

2.2.6 Reinforcement:

2.2.6.1 Reinforcing Bars: ASTM A 615, Grade 60. All bars shall be deformed.

2.2.7 Materials for Curing Concrete:

2.2.7.1 Impervious Sheeting: Waterproof paper, polyethylene sheeting, or polyethylene coated burlap conforming to ASTM C 171.

2.2.7.2 Liquid Membrane-forming Compound: ASTM C 309, white-pigmented, Type 2, free of paraffin or petroleum.

2.2.7.3 Liquid Chemical Compound: A suitable sealer-hardener designed for sealing and hardening in addition to curing of the concrete, applied by the method and at the rate recommended by the manufacturer. It shall not reduce the adhesion of tile, paint, roofing, waterproofing, or other material to be applied to the concrete. The chemical compound shall be free of petroleum resins or waxes.

2.2.8 Joint Sealing Materials: ASTM D 1190 or ASTM D 1850 inside buildings; ASTM D 1190 outside of buildings.

2.2.9 Preformed Joint Filler: ASTM D 1751 or ASTM D 1752.

2.2.10 Vapor Barrier Material: Polyethylene sheeting of not less than 6-mil nominal thickness.

PART 3 - EXECUTION

3.1 FORMS:

3.1.1 General: Provide forms for all concrete not indicated or specified otherwise. Set forms true to line and grade and maintain so as to insure completed work within the allowable tolerances specified, and make mortar-tight. Construct forms so that they can be removed without damaging the concrete. Chamfer all exposed joints, edges, and external corners of concrete 3/4 inch unless otherwise indicated.

3.1.2 Coating: Before placing the concrete, coat the contact surfaces of forms with a non-staining mineral oil, non-staining form coating compound, or two coats of nitro-cellulose lacquer. Do not use mineral oil on forms for surfaces which are to be painted.

3.1.3 Tolerances and Variations: Set and maintain concrete forms to ensure that after removal of the forms no portion of the concrete work will exceed any of the tolerances specified in ACI 347.

3.2 PLACING REINFORCEMENT AND MISCELLANEOUS MATERIALS:

3.2.1 General: Provide all bars, and other reinforcing materials as indicated or specified, together with all necessary wire ties, supports, and other devices necessary to install and secure the reinforcement properly. All reinforcement, when placed, shall be free from rust, scale, oil, grease, clay, and other coating, and foreign substances that would reduce or destroy the bond. Rusting of reinforcement shall not be a basis of rejection, provided that the rusting has not reduced the effective cross sectional area of the reinforcement, and provided that loose rust shall be removed prior to placing. Where cover over reinforcing steel is not indicated, it shall be in accordance with ACI 318.

3.2.2 Vapor Barrier: Provide beneath the entire concrete slab as indicated. Use the greatest widths and lengths practicable so as to eliminate joints wherever possible. Where joints are necessary, lap not less than 6 inches and seal with approved adhesive. Torn, punctured, or damaged vapor barrier material shall be removed and replaced as directed, prior to the placing of concrete. Place concrete in such a manner as to preclude damage to the vapor barrier material.

3.2.3 Placing: Place reinforcement accurately and secure in place on suitable chairs, spacers, or metal hangers. On the ground, use concrete or other non-corrodible material for supporting reinforcement.

3.2.4 Splicing: Conform to ACI 318, except as otherwise indicated or specified. Where splices in addition to those indicated are necessary, they shall be approved prior to their use. Do not make splices at points of maximum stress. Make splices in welded wire fabric so that the overlap is not less than the spacing of the cross wires.

3.2.5 Setting Miscellaneous Material: Place and secure anchors and bolts, pipe sleeves, conduits, and other such items in position before the concrete is placed. Plumb anchor bolts, check for location and elevation, and secure rigidly in position. Fill voids in sleeves temporarily with readily removable material to prevent the entry of concrete into the voids.

3.2.6 Expansion Joints and Cleavage Joints: Make joints 1/2-inch wide except as indicated otherwise. Fill expansion joints not exposed to weather completely, and fill joints exposed to weather to a depth of one inch from the surface, with preformed joint material. Clean the one-inch deep space above the preformed material after the concrete has been cured and, when dry, fill flush with joint sealing material. Do not extend reinforcement or other embedded metal items bonded to the concrete through any expansion joint.

3.3 MEASURING, MIXING, TRANSPORTING, AND PLACING CONCRETE: In accordance with ACI 301, Chapters 7 & 8, except as modified herein.

3.3.1 Measuring: Make moisture, volumetric, and air determinations at intervals specified herein under testing requirements. Allowable tolerances for measuring cement and water shall be one percent; for aggregates, 2 percent; and for admixtures, 3 percent.

3.3.2 Mixing: Machine mix all concrete. Begin mixing within 30 minutes after the cement has been added to the aggregates. Introduce all mixing water in the drum before one-fourth of the mixing time has elapsed. The time elapsing between the introduction of the mixing water to the cement and aggregates or the cement to the aggregates and the start of placing of the concrete in final position in the forms shall not exceed 60 minutes if the the air temperature is less than 85 degrees Fahrenheit, and 45 minutes if the air temperature is equal or greater than 85 degrees F. On arrival at the job site, no addition of water will be allowed other than that required initially to adjust to the specified slump. Such an addition must not exceed the limits of the specified maximum water-cement ratio.

3.3.3 Conveying: Convey concrete from the mixer to the forms as rapidly as practicable and so as not to cause segregation or loss of ingredients. Deposit concrete as close as practicable to its final position in the forms. At any point in the conveying, the free vertical drop of the concrete shall not exceed 3 feet. Clean conveying equipment thoroughly before each run. Do not use aluminum pipe or chutes. Place concrete as soon as practicable after the forms and the reinforcement have been inspected and approved. Remove any concrete which has segregated in conveying and dispose of as directed.

3.3.4 Placing: Do not place concrete when weather conditions prevent proper placement and consolidation. Do not place concrete in uncovered areas during periods of precipitation. Do not place concrete in water. Prepare subgrades of earth or other material properly and, if

necessary, cover with heavy building paper or other suitable material to prevent the concrete from becoming contaminated. Dampen porous subgrades as required to prevent water of hydration from being absorbed into the subgrade. Clean forms of dirt, construction debris, water, snow, and ice. Place concrete in one continuous operation except where construction joints are provided. Place concrete in areas bounded by construction joints in one continuous operation. Remove water which accumulates on the surface of the concrete during placing by absorption with porous materials in a manner that prevents removal of cement.

3.3.5 Vibration: Compact all concrete, with the exception of concrete slabs 4 inches or less in depth, with high frequency, internal, mechanical vibrating equipment supplemented by hand spading and tamping. Consolidate concrete slabs 4 inches or less in depth by wood tampers, spading, and settling with a heavy leveling straight edge. Vibrators shall be designed to operate with vibratory element submerged in the concrete, and shall have a frequency of not less than 6,000 impulses per minute when submerged.

3.3.6 Cold Weather: Except with authorization, do not place concrete when the ambient temperature is below 40 degrees F or when the concrete is likely to be subjected to freezing temperatures within 24 hours. When so authorized, if concrete is likely to be subjected to freezing within 24 hours after placing, heat concrete materials so that the temperature of the concrete when deposited shall be between 65 and 80 degrees F. Methods of heating materials are subject to approval of the Contracting Officer. Do not heat mixing water above 165 degrees F. Remove lumps of frozen material and ice from the aggregates before placing aggregates in the mixer. When specifically approved by the Contracting Officer, the Contractor may add, not more than 2 pounds of Type I or not more than one pound, 10 ounces of Type II calcium chloride, ASTM D 98, per bag of cement. Dissolve the admixture in a portion of the mixing water and add to the mix at the drum in a manner that will ensure uniform distribution of the agent throughout the batch.

3.3.7 Hot Weather: Cool ingredients before mixing so as to prevent rapid drying of newly placed concrete. When the ambient temperature is more than 90 degrees F, the temperature of the concrete as placed shall not exceed 90 degrees F; shade the fresh concrete as soon as possible after placing; and start curing as soon as the surface of the fresh concrete is sufficiently hard to permit curing without damage to the concrete.

3.4 SURFACE FINISHES (EXCEPT FLOOR, SLAB, AND PAVEMENT FINISHES):

3.4.1 Defects: Repair all formed surfaces by patching minor honeycombed or otherwise defective areas with cement mortar of the same composition as that used in the concrete. Patch concrete as soon as the forms are removed. Concrete with honeycombing or other defects which affect the structural strength of the member, will be rejected, or the defects corrected as directed by the Contracting Officer.

3.4.2 Standard Finish: Provide standard finish for exposed concrete not indicated or specified otherwise. The surface of the concrete shall not vary more than 1/4 inch when measured from a five-foot template. Exposed surfaces shall be uniform in appearance.

3.4.2.1 Against Forms: Remove fins and other projections and level abrupt irregularities. Fill surface pits having a dimension greater than 1/8 inch with cement mortar as specified.

3.4.2.2 Not Against Forms: Finish surfaces not otherwise specified with wood floats to even surfaces.

3.5 FLOOR AND SLAB FINISHES:

3.5.1 General: For floors with drains, slope the floors uniformly to the drains. Interior floor slabs shall receive a steel trowelled finish. Interior slabs which do not receive floor covering shall receive a sealer-hardener finish. Exterior concrete slabs shall receive a broom finish. Do not place dry cement directly upon the new concrete surface to absorb excess moisture.

3.5.2 Finishing: Place, consolidate and immediately strike off concrete to bring the top surface of the slab to proper contour, grade, and elevation. Immediately darby or bull float the surface with wooden tools so as to correct any uneveness. Complete striking-off and darbying before bleed water appears on the surface of the freshly-placed concrete. Permit the concrete to attain a set sufficient for floating and sufficient to support the weight of the finisher and equipment. If the bleed water has not disappeared by the time floating of the surface is to start, drag the excess water off using a rubber hose. Do not use dry cement to absorb bleed water.

3.5.2.1 Floated finish: At the proper time, float the surface by hand with a wood or magnesium float, or by a power-driven float. Floating of any one area shall be the minimum necessary to produce an even finish, level within 1/4 inch in 10 feet.

3.5.2.2 Troweled Finish: First, provide a floated finish. When slab has attained a proper set, hand- or machine-trowel to a smooth, hard, dense finish, level within 1/8 inch in 10 feet.

3.5.2.3 Sealer-hardener Finish: Provide trowelled finish and then apply liquid chemical compound as specified herein.

3.5.2.4 Broomed Finish: Provide a floated finish and a steel troweled finish, as specified herein, and then broom with a flexible bristle broom. At time of brooming the troweled surface shall have hardened sufficiently to retain the scoring or ridges. Broom in a direction transverse to that of traffic or at right angles to the slope of the slab.

3.6 CURING AND PROTECTION:

3.6.1 General Requirements: Protect concrete adequately from injurious action by sun, rain, flowing water, frost, mechanical injury, tire marks and oil stains, and do not allow it to dry out from the time it is placed until the expiration of the minimum curing periods specified herein. Use impervious-sheeting curing, liquid chemical or liquid membrane-forming compound, except as specified otherwise herein. Do not use membrane-forming compound on surfaces where its appearance would be objectionable, on any surface to be painted, where coverings are to be bonded to the concrete, or on concrete to which other concrete is to be bonded. Begin curing immediately following the removal of forms. Maintain the temperature of the air next to the concrete at not less than 40 degrees F for the full curing periods.

3.6.2 Impervious-Sheeting Curing: Wet the entire exposed surface thoroughly with a fine spray of water and then cover with impervious sheeting. Lay sheets directly on the concrete surface and overlap 12 inches. Make sheeting not less than 18 inches wider than the concrete surface to be cured, and weight down on the edges and over the transverse laps to form closed joints. Repair or replace sheets if torn or otherwise damaged during curing. The sheeting shall remain on the concrete surface to be cured for not less than 7 days.

3.6.3 Liquid Membrane-Forming Compound Curing: Seal or cover all joint openings prior to application of the curing compound to prevent the curing compound from entering the joint. Compound shall remain on the concrete for 7 days before sealer or covering is removed and joint sealing material is placed in the joints.

3.6.3.1 Application: Apply the compound immediately after the surface loses its water sheen and has a dull appearance and before joints are sawed. Agitate curing compound thoroughly by mechanical means during use and apply uniformly in a two-coat continuous operation by suitable power-spraying equipment. The total coverage for the two coats shall be between 150 and 200 square feet per gallon of undiluted compound. The compound shall form a uniform, continuous, coherent film that will not check, crack, or peel and shall be free from pinholes or other imperfections. Apply an additional coat of the compound immediately to areas where the film is defective. Respray concrete surfaces that are subject to heavy rainfall within 3 hours after the curing compound has been applied in the same manner.

3.6.3.2 Protection of Treated Surfaces: Keep concrete surfaces to which liquid membrane-forming compounds have been applied free from foot and vehicular traffic and other sources of abrasion for not less than 72 hours. Maintain continuity of the coating for the entire curing period and repair damage to the coating during this period immediately.

3.6.4 Liquid Chemical Compound Curing: Provide for surfaces for which a sealer-hardener finish is specified, and, at the Contractor's option, provide in lieu of liquid membrane-forming compound curing for other surfaces. The application of the compound shall conform to the requirements for liquid membrane-forming compound curing except as specified otherwise herein. Sealing or covering of joints and openings in which joint sealer is to be applied will not be required. The coverage and number of applications shall be in accordance with the recommendations of the manufacturer of the compound.

3.6.5 Curing Periods: Cure not less than 10 days for concrete exposed to the weather and not less than 7 days for all other concrete.

3.6.6 Removal of Forms: Remove forms in a manner which will prevent damage to the concrete. Do not remove forms without approval, nor sooner than 24 hours after placement of concrete.

3.7 MISCELLANEOUS CONSTRUCTION:

3.7.1 Curbs: Construct to sizes and shapes indicated, cast-in-place. Provide contraction joints cut to a depth of 3/4 inch with jointing tool after the surface has been finished, spaced 8 feet to 10 feet center to center, and expansion joints as indicated. Curbs shall receive a smooth finish.

3.8 SAMPLING AND TESTING:

3.8.1 Sampling: Collect samples of fresh concrete in accordance with ASTM C 172 during each working day as required to perform all tests specified herein. Make test specimens in accordance with ASTM C 31.

3.8.2 Testing:

3.8.2.1 Compressive Tests: Determine compressive strength in accordance with ASTM C 39. Make four test specimens for each set of tests. Test two specimens at 7 days, and the other two at 28 days. The strength of the concrete will be considered satisfactory if the average of the 28-day test results equals or exceeds the specified 28-day compressive strength, and no individual strength test is less than the required 28-day compressive strength by more than 300 pounds per square inch. Frequency of compressive tests on concrete cylinders shall be not less than four test cylinders for each day for each class of concrete placed that day. If the foregoing criteria is not met, core samples shall be taken and tested at the Contractor's expense. In such event, three core samples for each cylinder test indicating defective concrete shall be taken for further testing. Sampling, testing, and evaluation of drilled cores shall be in accordance with ACI 318, Part 3, Chapter 4. Concrete which is determined to be defective based on the strength acceptance criteria therein shall be removed and replaced with acceptable concrete.

*** END OF SECTION ***

SECTION 05210
STEEL JOISTS

PART 1 - GENERAL

1.1 APPLICABLE PUBLICATIONS: 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 WELDING SOCIETY (AWS):

D1.1-82 Structural Welding Code

STEEL JOIST INSTITUTE (SJI):

Standard Specifications, Load Tables and Weight Tables for Steel Joists and Joist Girders, 1981

STEEL STRUCTURES PAINTING COUNCIL (SSPC):

SSPC-PS 14.01 Steel Joist Shop Paint System

1.2 SUBMITTALS: Submit the following information:

1.2.1 Shop Drawings for all joists and accessories. Shop drawings shall show joist type and size, layout in plan, methods of anchoring, framing at openings, and spacing of bridging.

1.2.2 Certificates of Conformance or Compliance: Certificates of Conformance and Compliance for joists and accessories.

1.3 DELIVERY AND STORAGE: Handle, transport, and store joists at the job site in a manner to prevent permanent distortion of any part or other damages affecting their structural integrity Replace damaged items that cannot be restored to like-new condition. Store all items off the ground in a well drained location protected from the weather and easily accessible for inspection and handling.

PART 2 - PRODUCTS

2.1 JOISTS AND ACCESSORIES: Except as otherwise specified herein, joists and accessories shall be in accordance with the applicable SJI Standard Specification for the joist series indicated.

PART 3 - EXECUTION

3.1 SHOP PAINTING: Clean and prime joists in accordance with SSPC PS 14.01, Steel Joist Shop Paint System, except that paint shall conform to SKI specifications and shall be suitable for top coating.

3.2 PAINT: Paints used for touch-up and shop painting may contain toxic lead or zinc compounds. Appropriate measures shall be taken to control worker exposure to toxic substances during their use.

3.3 HANDLING: Erection shall be in accordance with the applicable SJI Standard Specification for the joist series indicated.

3.4 FIELD WELDING shall be performed in accordance with AWS D1.1 and shall be performed by welders qualified in accordance with the requirements specified therein.

3.5 TOUCH-UP PAINTING: After erection of joists, connections and areas of abraded shop coat shall receive touch-up paint of the same type used for the shop coat.

END OF SECTION

SECTION 05500

METAL FABRICATIONS

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

1.1 Federal Specifications (Fed. Spec.):

RR-G-661D	Grating, Metal, Bar Type
TT-C-490B	Cleaning Methods and Pretreatment of Ferrous Surfaces for Organic Coatings
TT-P-645A	Primer, Paint, Zinc-Chromate, Alkyd Type

1.2 Military Specifications (Mil. Spec):

MIL-P-15328C & Am-1	Primer (Wash), Pretreatment Blue, (Formula No. 117-B for Metal)
MIL-P-21035A & Am-1	Paint, High Zinc Dust Content, Galvanizing Repair

1.3 American Institute of Steel Construction (AISC) Publication:

Code of Standard Practice for Steel Buildings and Bridges, dated November 1978

Manual of Steel Construction, 8th Edition

1.4 American National Standards Institute (ANSI) Standards:

B18.22.1-65 (R-1975)	Plain Washers

1.5 American Society for Testing and Materials (ASTM) Standards:

A 36-77a	Structural Steel
A 53-79	Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless
A 123-78	Zinc (Hot-Galvanized) Coatings on Products Fabricated from Rolled, Pressed and Forged Steel Shapes, Plates, Bars, and Strip

A 153-78	Zinc Coating (Hot-Dip) on Iron and Steel Hardware
A 307-76B	Zinc-Coating (Hot-Dip) on Iron and Steel Hardware
C 827-75T	Early Volume Change of Cementitious Material

1.6 American Welding Society (AWS) Publication:

D1.1-81	Structural Welding Code, Steel

1.7 Corps of Engineers Publication:

CRD-C588-76	Nonshrink Grout

1.8 Steel Structures Painting Council (SSPC) Publications:

SP6-63	Surface Preparation Specification No. 6, Commercial Blast Cleaning

2. SUBMITTALS:

2.1 Shop Drawings: Submit shop drawings of all steel work for approval prior to fabrication. Include complete information necessary for the fabrication and erection, including the location, type, and size of all rivets, bolts, and welds. Include all welds by standard welding symbols of the AWS.

3. DELIVERY, STORAGE AND HANDLING: Handle, ship, and store material in a manner that will prevent distortion or other damage. Store material in a clean, properly drained location out of contact with the ground. Replace all damaged material with new material or repair the damaged material in an approved manner.

4. MATERIALS: Materials shall conform to the respective specifications specified herein. Materials not otherwise specified herein shall conform to the AISC "Manual of Steel Construction."

4.1 Carbon Grade Steel: ASTM A 36.

4.2 Common Bolts and Nuts: ASTM A 307.

4.3 Circular Washers for Common Bolts: ANSI B 18.22.1.

4.4 Steel Pipe: ASTM A 53, galvanized.

4.5 Welding Electrodes and Rods: AWS Code D1.1.

4.6 Zinc-Coating: ASTM A 123 for steel and ASTM A 153 for threaded products.

4.7 Non-Shrink Grout: Crops of Engineers CRD-C588. Grout shall show no shrinkage when tested in th plastic state in accordance with ASTM C 827, and shall not break up under expansion due to moisture or gaseous releases.

4.8 Metal Grating shall be galvanized and conform to Fed. Spec. RR-G-661D, Type 1, Class 1. Shop prime coat shall be as specified herein. End banding bars shall be provided unless indicated otherwise.

5. FABRICATION: Fabricate in accordance with the applicable provisions of the Specification for the Design, Fabrication, and Erection of Structural Steel for Buildings as set forth in Part 5 of the AISC "Manual of Steel Construction." Provide workmanship equal to standard commercial practice in modern structural steel fabrication shops. Fabricate and assemble in the shop to the greatest extent possible.

5.1 Welding of Structural Steelwork: AWS D1.1. Perform welding with qualified welders. The qualification of welders and the duration of qualification period shall be in accordance with the requirements of AWS D1.1. Any welder found to be producing unsatisfactory work even though he has passed qualification tests shall be immediately recertified or replaced with a qualified welder.

5.2 Shop Painting: Shop paint all ferrous metal, except zinc-coated surfaces and items to be embedded in concrete or mortar. Surfaces to be welded shall not be coated within three inches of the weld prior to welding. Insure that surfaces are thoroughly dry and clean when the paint is applied. Do not paint in freezing or wet weather except under cover. Do not apply paint when the temperature is below 40 degrees Fahrenheit or expected to drop to 32 degrees Fahrenheit or below before the paint has completely dried. Do not apply paint to steel which is at a temperature that will cause blistering or porosity, or will otherwise be detrimental to the life of the paint. Apply paint in a workmanlike manner, and coat all joints and crevices thoroughly. Prior to assembly, paint all surfaces which will be concealed or inaccessible after assembly.

5.2.1 Cleaning: Except as modified herein, blast clean surfaces in accordance with SSPC-SP6. Insure that steel to be embedded in concrete is free of dirt and grease. Do not paint or galvanize bearing surfaces including contact surfaces within friction-type joints, but coat them with an approved rust preventative, applied in the shop. remove such coting just prior to field erection using a remover approved by the rust preventative manufacturer. Insure that the surfaces, when assembled, re free from rust, grease, dirt and other foreign matter.

5.2.2 Pretreatment: Except as modified herein, immediately after cleaning and before any rust has formed, coat surfaces with a pretreatment coating conforming to Mil. Spec. MIL-P-15328 applied to a dry film thickness of 0.3 to 0.5 mil or with a crystalline phosphate base coating conforming to Fed. Spec. TT-C-490, Method I, except apply phosphate base coating only to blast cleaned, bare metal surfaces.

5.2.3 Priming: Prime treated surfaces as soon as practicable after the pretreatment coating has dried. Except as modified herein, prime with zinc chromate primer conforming to Fed. Spec. TT-P-645, applied to a minimum dry film thickness of 1.0 mil. Repair damage to primed surfaces with primer.

5.3 Repair of Zinc-Coating: Repair zinc-coating that has been damaged in handling or transporting or in welding, riveting, or bolting by the application of a galvanizing repair paint conforming to Mil. Spec. MIL-P-21035. Clean all areas to be repaired and remove slag from the welds. Do not heat surfaces to which the repair paint is applied.

5.4 Match Marking: Match mark members and component parts prior to erection to insure proper position on final erection. Painted assembly markings shall be remote from any surface to be welded or riveted. Locate scratch or notch marks so as not to affect the strength of the member or cause concentrations of stress.

6. ERECTION:

6.1 General: Erect steel in accordance with the AISC "Manual of Steel Construction." Provide erecting equipment suitable for the work and in first class condition. Where parats cannot be assembled or fitted properly as a result of errors in fabrication or of deformation due to handling or transportation, report such condition immediately to the Contracting Officer. Straighten plates and angles or other shapes by approed methods. If heating of metal is approved for straightening, it shall not be to a higher temperature than that producing a dark "cherry red" color. After heating, cool the metal as slowly as possible. Insure that there is no evidence of fracture on the surface of the metal after straightening. Do not heat heat-treated prts for straightening. Drain steelwork properly; fill pockets in structures exposed to the weather with an approved waterproof material. When calibrated wrenches are used for tightening of bolts, calibrate them at least once each working day, using not less than three typical bolts of each diameter. Do not use impact torque wrenches to tighten anchor bolts set in concrete.

6.2 Connections: Provide anchor bolts and other connections between the structural steel and foundations properly and build them into connecting work. Design connections for which details are not indicated in accordance with AISC "Manual of Steel Construction."

6.3 Base Plates and Bearing Plates: Provide column base plates for columns and bearing plates for beams, girders, and similar members. Provide base plates and bearing plates with full bearing after the supported members have been plumbed and properly positioned. Dry pack the area under the plate solidly with a non-shrinking type of grouting mortar. Grouting shall be in accordance with the printed instructions of the grouting mortar manufacturer.

6.4 Tolerances: In accordance with the"Code of Standard Practice" of the AISC "Manual of Steel Construction," as modified herein.

7. DETAIL REQUIREMENTS:

7.1 Fastenings: Anchors and bolts, in addition to those indicated, shall be provided where required for securing the work in place. Sizes, types and spacings of anchors and bolts not indicated or specified otherwise shall be suitable for their purposes. Anchors and bolts in contact with ferrous metal shall be of zinc-coated steel and those adjacent to nonferrous metals shall be of the same or approved metals compatible with the materials which they adjoin. All fastenings shall be concealed where practicable. Standard bolts and screws shall be used for attachment of work to structure. Where hollow concrete masonry units make the use of expansion bolts unsuitable, provide toggle bolts or other suitable fastening devices as approved. Wood plugs shall not be used in any material.

7.2 Inserts and sleeves: Inserts of suitable and approved types shall be provided for the support or anchorage of equipment and finish construction. Inserts shall be gray or malleable iron castings or of galvanized steel unless indicated or specified otherwise. Sleeves required for the passage of pipes through concrete or masonry construction shall be standard weight zinc-coated steel pipe.

7.3 Ladders shall be constructed of structural steel as indicated. Exposed ends of rungs shall be finished smooth. Brackets of suitable sizes shall be provided to secure a rigid installation with the centers of the rungs not less than 7 inches from the adjacent construction. Ladder assemblies shall be securely anchored to the supporting construction. All ladders shall conform to the requirements for Fixed Ladders, Article 1910.27 of the Occupational Safety and Health Act.

7.4 Railings: Galvanized, 1-1/2-inch standard steel pipe. Fixed railings shall be securely anchored to the supporting construction. Pipe railings shall be of the configurations indicated with flush welded or mechanical joints. Railings shall be complete with standards, brackets, caps, plugs and all other accessories and fastenings for a complete installation.

*** END OF SECTION ***

SECTION 07500

ROOFING AND FLASHING

PART 1 - GENERAL

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

1.1.1 Federal Specification (Fed. Spec.):

SS-C-153C	Cement; Bituminous, Plastic

1.1.2 American Society for Testing and Materials (ASTM) Standards:

D 41-78	Asphalt Primer Used in Roofing, Dampproofing, and Waterproofing
D 250-80	Asphalt-Saturated Asbestos Felts Used in Roofing and Waterproofing
D 312-78	Asphalt Used in Roofing
D 2170-76	Kinematic Viscosity of Asphalt (Bitumen)
D 2178-76	Asphalt-Impregnated Glass Mat Used in Roofing and Waterproofing

1.2 GENERAL: The work includes providing new insulation and roofing where existing insulation and roofing are damaged or removed during performance of the work and providing new built-up flashing and metal flashing to produce a completely watertight installation.

1.3 DELIVERY, STORAGE, AND HANDLING:

1.3.1 Delivery: Deliver materials in manufacturers' original unopened containers and rolls with manufacturer's labels intact and legible. Where materials are covered by a referenced specfication, the container shall bear the specification number, type, and class, as applicable. Labels or bill of lading for roofing asphalt shall indicate bitumen type, flash point (FP), finish blowing temperature (FBT), and equiviscous temperature (EVT), i.e., the temperature at which the viscosity is 125 centistokes when tested in accordance with the requirements of ASTM D 2170. Deliver materials in sufficient quantity to allow continuity of work.

1.3.2 Storage: Protect roll materials against moisture absorption. Store roll materials on end on clean raised platforms in dry locations with adequate ventilation. Do not store roll materials in buildings under construction until concrete, mortar, and plaster work is finished and dry. Immediately before application, store roll materials for 24 hours in an area maintained at temperatures above 50 degrees F. Completely cover felt stored outdoors with waterproof protective coverings. Tie covering securely to the pallets in such a way as to be completely weathertight and yet provide sufficient ventilation to prevent condensation. Polyethylene coverings are not permitted. Do not store more materials on the roof than can be installed the same day. Locate materials temporarily stored on the roof in approved areas and distribute the load to stay within the live load limits of the roof construction.

1.3.3 Handling: Select and operate material handling equipment so as not to damage existing construction and applied roofing. Handle roll materials in a manner to prevent damage to edges and ends.

1.4 ENVIRONMENTAL CONDITIONS: Application will not be permitted during inclement weather or when air temperature is below 40 degrees Fahrenheit (F) or is expected to go below 40 degrees F within 24 hours after application, or when there is ice, frost, surface moisture, or visible dampness on the roof deck. The restriction on the application of roofing materials below 40 degrees F will be waived if the Contractor devises some artificial means, satisfactory to the Contracting Officer, of: (1) maintaining the surrounding temperature above 40 degrees F; and (2) maintaining the application temperature of heated materials without exceeding the maximum specified kettle temperature. Maximum kettle temperature shall not be exceeded under any conditions.

1.5 PROTECTION OF PROPERTY:

1.5.1 Protective Coverings: Install protective coverings at paving and building walls adjacent to hoist and kettles prior to starting the work. Lap protective coverings not less than 6 inches, secure against wind, and vent to prevent collection of moisture on covered surfaces. Protective coverings shall remain in place for the duration of the roofing work.

1.5.2 Flame-heated Equipment: Locate and use flame-heated equipment at locations that will not endanger the structure or other materials on the site or adjacent property. Do not place flame-heated equipment on the roof. Provide and maintain one fire extinguisher of appropriate type and size adjacent to flame-heated equipment.

PART 2 - PRODUCTS

2.1 DESCRIPTION OF ROOFING SYSTEMS: Provide one of the following roofing systems wherever existing roofing is removed to facilitate new work:

2.1.1 SYSTEM AAA: Asbestos felt, asphalt bitumen, aggregate surfaced.

Substrate: Roof Insulation	
Components:	Quantity:
Plying Felt (AA15)	4 Plies
Asphalt:	
Between Substrate and First Ply	15-20 Lbs/100 sq. ft.
Between Adjacent Plies	15-20 Lbs/100 sq. ft.
Top Coat:	55-65 Lbs/100 sq. ft.
Surfacing:	
Gravel	400 Lbs/100 sq. ft.
or other	
Aggregate	300 Lbs/100 sq. ft.

2.1.2 SYSTEM GAA: Glass mat, asphalt bitumen, aggregate surfaced.

Substrate: Roof Insulation	
Components:	Quantity:
Plying Felt (GA)	4 Plies
Asphalt:	
Between Substrate and First Ply	20-30 Lbs/100 sq. ft.
Between Adjacent Plies	20-30 Lbs/100 sq. ft.
Top Coat	55-65 Lbs/100 sq. ft.
Surfacing:	
Gravel	400 Lbs/100 sq. ft.
or other	
Aggregate	300 Lbs/100 sq. ft.

2.2 MATERIALS: Shall conform to the respective specifications and to the requirements specified herein.

2.2.1 Asphalt: ASTM D 312, Type II.

2.2.2 Felts: Felts for built-up roofing and flashing shall conform to the specifications and requirements listed in the following table:

Designation	Use	Felt or Mat	Saturant or Impregnant	Coating	Specification
AA15	Plying Felt	Asbestos	Asphalt	None	ASTM D 250, Type I, Min. Wt. 13 lbs./sq.
GA	Plying Felt	Glass	Asphalt	None	ASTM D 2178, Type IV
FF	Flashing Felt				None (see Note (1))

Note (1) Flashing felt shall be of a type specifically prepared in the manufacturing process for use in two-ply base flashing construction and shall be one of two types; (A) A single thickness of glass felt conforming to the properties listed in ASTM D 2178, for Type IV, modified as described below or (B) Felt reinforced with a woven glass fiber scrim or cotton fabric manufactured with a single thickness of asbestos felt impregnated with asphalt. Both types, i.e., (A) and (B) are then coated in the manufacturing process on both sides with an asphaltic coating which may include a fine mineral stabilizer insoluble in water and surfaced on both sides with a fine mineral surfacing.

2.2.3 Primer: ASTM D 41.

2.2.4 Bituminous Plastic Cement: Fed. Spec. SS-C-153, Type I.

PART 3 - EXECUTION

3.1 PREPARATION: Coordinate the work with that of the other trades to assure that components which are to be secured to or stripped into the roofing system are available and that flashing and counterflashing is installed as the work progresses. Provide rigid insulation of fiberboard, mineral fiber board, or perlite board as required to match thickness of existing insulation. Hot mop insulation in place. Provide preservative treated wood blocking as indicated and as required for securing new roofing and flashing.

3.1.1 Priming of Surfaces:

3.1.1.1 Priming of Vertical Surfaces: Coat concrete surfaces which are to receive base flashing uniformly with primer. Allow the primer to dry thoroughly prior to application of the flashing materials.

3.1.1.2 Priming of Metal Surfaces: Prime flanges of metal with bituminous plastic cement prior to stripping into the roofing system.

3.1.2 Heating of Asphalt: Break up solid bitumen on a surface free of dirt and debris. Heat bitumen in a kettle or tanker designed to prevent contact of flame with surfaces in contact with the bitumen. Kettles and tankers shall have visible thermometer and thermostatic controls set to the temperature limits specified herein. Maintain controls in working order and calibrated. Use immersion thermometer accurate to "plus or minus 2 degrees" to check temperatures of the bitumen frequently. If temperatures exceed maximums specified, the bitumen shall be removed from the site. Upon determination that the temperature of the bitumen, at the instant of application, is below the minimum specified, the affected roofing shall be removed and replaced with new material. Cutting back, adulterating, or fluxing of bitumen is not permitted.

3.2 APPLICATION: Apply roofing materials as specified herein unless specified or recommended otherwise by the manufacturer's printed application instructions. Keep roofing materials dry before, during, and after application. Maintain the specified temperatures for the bitumen. Do not apply top surfacing until the other roofing application procedures specified herein are completed.

3.2.1 Plying Felts: Apply plying felts shingle fashion in hot-moppings of bitumen. Apply felts in a continuous operation. Phased construction is not permitted. Provide starter sheets of felt to maintain the specified number of plies of felt throughout the roofing. Apply felts of 36-inch widths, as specified herein, with side laps not less than 27-1/2 inches and starter sheets of not less than 9, 18, 27, and 36 inch widths. Extend felts approximately 2 inches above the tops of cant strips and fasten at approximately 8 inches o.c. Trim felts to a neat fit around projections through the roof.

3.2.1.1 Hot-Mopping of Plying Felts: Use hot bitumen for bonding of plies of felt to each other and to the substrate. Apply the felts immediately following the application of the hot bitumen. Working ahead with the bitumen is not permitted. The bitumen shall be completely fluid, with mop temperatures within the range specified, at the instant the felts come into contact with the bitumen. Embed felts in the bitumen. As felts are being rolled into the hot bitumen, immediately and thoroughly broom down to eliminate trapped air and to provide tight smooth laminations resulting in a composite roofing membrane without wrinkles, buckles, kinks, and fish mouths. The completed roofing system shall be free of pockets and blisters. The practice of laying the felts dry and turning back the laps for mopping between plies is not permitted.

3.2.1.2 Temperature Limitations for Bitumen: Heat and apply bitumen at the temperatures specified below unless specified otherwise by the manufacturer. Use thermometer to check temperature during heating and application. Have kettleperson in attendance at all times during heating process to insure that temperatures specified are maintained.

3.2.1.2.1 Asphalt: Do not heat asphalt more than 25 degrees F above the finish blowing temperature (FBT), and do not heat asphalt above the FBT for longer than 4 consecutive hours. Do not heat asphalt above the flash point (FP). Apply asphalt and embed roofing felts when the temperature of the asphalt is not lower than 25 degrees F below the equiviscous temperature (EVT) and not higher than 25 degrees F above the EVT. Before heating and application of the asphalt refer to the asphalt manufacturer's label or bill of lading for the FBT, FP, and EVT of the asphalt used.

3.2.2 Flashing: Provide built-up bituminous flashing in the angles formed where the roof deck abuts walls, curbs, ventilators, pipes, and other vertical surfaces, and where necessary to make the work watertight. Install flashing after plies of felt have been applied but before the top surfacing is applied. Provide metal flashing collars and cap flashings of stainless steel, not less than 0.015 inch thick. Provide roof drain sump of 4-pound lead at new roof drain.

3.2.2.1 Base Flashing: Use one of the following base flashing systems as recommended by the manufacturer of the plying felt used in the roofing membrane:

3.2.2.1.1 Three-ply Bituminous Built-up Base Flashing: Provide three plies of AA15 plying felt conforming to the requirements specified herein. Embed each ply in a uniform trowelling of bituminous plastic cement not less than 1/8 inch thick. Smooth and press felts firmly into place so that a uniformly attached and completely laminated membrane results. Extend felts not less than 6, 9, and 12 inches, respectively, over the roofing membrane beyond the toe of the cant, and not less than 4 inches or more than 10 inches above the top of the cant on vertical surfaces. Lap ends of felts not less than 12 inches and seal watertight with bituminous plastic cement. Stagger end laps. Nail top edges of base flashing to wood nailers with large head roofing nails through metal discs or one-piece composite fasteners spaced not more than 8 inches o.c. on a line 1-1/2 inches below the top edge of the base flashing. Coat the finished base flashing with bituminous plastic cement 1/8 inch thick, extending from one inch above the top of the base flashing on the vertical surface to one inch beyond the edge of the base flashing on the roofing membrane.

3.2.2.1.2 Two-ply Bituminous Built-up Base Flashing: Provide one ply of plying felt, AA15 or GA, and one ply of flashing felt, FF, in accordance with the manufacturer's printed installation instructions.

3.2.2.2 Strip Flashing: Set flanges of sheet metal work to be incorporated into the roofing system into a uniform coating of bituminous plastic cement not less than 1/16 inch thick, and strip-in with two layers of plying felt cemented to the tops of the flanges, roofing membrane, and to each other with coatings of bituminous plastic cement not less than 1/16 inch thick. Extend felts 3 and 6 inches, respectively, beyond the edges of the flanges and onto the roofing membrane. Coat the finished strip flashing with bituminous plastic cement 1/8 inch thick.

3.2.2.3 Flashing at Roof Drain Sumps: Roof drains shall be as indicated. Provide felt underlayment below sumps with two sheets of plying felt. Cement the two sheets in place and to each other with bituminous plastic cement not less than 1/16 inch thick for each coating. Extend sheets 4 inches and 6 inches respectively beyond the edges of the sump on top of the roofing membrane. Strip in the flanges of sump pans with two layers of plying felt cemented to the tops of the flanges and to each other with 1/16-inch thick coatings of bituminous plastic cement. The first layer of felt shall be 10 inches wide and the second layer 12 inches wide. Neatly fit and press the fabric membranes and sump pan into a heavy coat of bituminous plastic cement applied to the roof drain flange. Securely clamp fabric membrane and sump pan in the flashing clamping ring. Secure clamps so that felt underlayment and sump pan are free from wrinkles and folds. Do not apply top surfacing until drain sump test requirements, specified herein under "FIELD TESTS," have been met.

3.2.2.4 Flashing at Juncture of New and Existing Roofing: Where built-up flashing does not extend onto existing roof membrane, provide not less than 4 layers of plying felt to cover the joint between new and existing roofing. Make each layer 6 inches wider than the preceeding layer, and hot mop each layer in place.

3.2.3 Top Surfacing: Redistribute aggregate surfacing materials after felt flashings, tests, repairs, and corrective action have been completed and approved. Embed aggregate surfacing in a top coat of hot bitumen poured from a dipper or approved bitumen spreading device.

3.2.4 Metal Flashing: Provide stainless steel cap flashing as indicated. Secure flashing to hopper with a stainless steel draw band and seal joints with an elastomeric sealant.

3.3 FIELD TESTS: Field tests shall be performed in the presence of the Contracting Officer. Notify the Contracting Officer one day prior to the date of performing tests.

3.3.1 Drain Sump Test: After the roofing system is completed except for surfacing, plug the drains and fill drain sumps with water for 24 hours to test watertightness. Make careful measurement of the water level at the beginning and end of the 24-hour period. If precipitation occurs during the 24-hour period, repeat the test. In the event that the water level falls, remove the water and thoroughly dry and inspect the installation. Make repairs or replacement as directed, and repeat the test until requirements for passing this test are met.

3.4 CLEANUP: Each day remove from the job site debris, scraps, containers, and other rubbish and trash resulting from the installation of the roofing system.

*** END OF SECTION ***

SECTION 09910
FIELD PAINTING

PART 1 - GENERAL

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

FEDERAL SPECIFICATIONS (Fed. Spec.):

TT-E-489G	Enamel, Alkyd, Gloss (for Exterior and Interior Surfaces)
TT-E-509B & Am 2	Enamel, Odorless, Alkyd, Interior, Semigloss, White and Tints
TT-E-545B & Am 1	Enamel, Odorless, Alkyd, Interior Undercoat, Flat Tints and White
TT-P-98C	Paint, Stencil, Flat
TT-P-645A	Primer, Paint, Zinc-chromate, Alky Type

OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION (OSHA)::

29 CFR 1910	Safety and Health Standards

1.2 SUBMITTALS:

1.2.1 Certificates of Conformance: Submit certificates of compliance from the manufacturer stating that previously manufactured materials have been tested by recognized laboratories; that such materials meet testing requirements in referenced specifications; and that the material furnished for this project is the same type, quality, manufacture, and make as that tested. Copies of the test reports need not be submitted except as specifically requested by the Contracting Officer. The Government will take one pint samples from coatings being used on the job for testing by the Government.

1.2.2 Qualification Data: Submit data as required by paragraph entitled "QUALIFICATION OF AIRLESS SPRAY APPLICATORS."

1.3 QUALIFICATION OF AIRLESS SPRAY APPLICATORS: Application of paint by airless spray shall be accomplished by firms or persons possessing the experience set forth herein. Prior to any application of coating by airless spray, submit data for approval by the Contracting Officer that indicates that the Contractor has successfully applied paint by airless spray or has a firm contractual agreement with a subcontractor having such required experience. The data shall include the names and locations of not less than two sites where the Contractor or subcontractor referred to herein has applied paint by airless spray. Indicate the type and design of the equipment, including safety devices, and certify that the method of applying coating has been performed satisfactorily.

1.4 APPROVAL OF MATERIALS: Do not apply any coating before required test reports, certificates, and requests for substitutions have been submitted and the respective material approved for use on this project. Submit all requests for substitutions to the Contracting Officer. Each such request shall include specific identification of the proposed substitute; justification for the necessity of the substitution; certified test reports of the proposed substitute, including all tests required by the specification for the substituted material; and a tabulation of the specified material compared to the proposed substitute. The tabulation shall include all tests, composition of both pigment and vehicle, and quantitative and qualitative requirements for both the specified and the proposed material; clearly indicate any deviations from specified requirements.

1.5 DELIVERY AND STORAGE: Deliver coatings and coating materials in unbroken original packages bearing the manufacturer's name and brand designation, specification number, batch number, color, date of manufacture, and manufacturer's instructions for application. Restrict storage of coatings and coating materials and the mixing of coatings to the locations directed.

1.6 SELECTION OF COLORS: Colors of finish coats shall be as indicated. Where colors are not indicated, the colors shall be as selected by the Contracting Officer .
Manufacturers' names and color designations, if indicated, are used for the purpose of color designations only and are acceptable for use on this project only if they conform to all specified requirements. Products of other manufacturers are acceptable if the colors closely approximate colors indicated and the product conforms to all specified requirements.

1.7 DESCRIPTION OF WORK: Surfaces concealed by portable objects and by surface mounted articles readily detachable by removal of fasteners such as screws and bolts are included in the work. Surfaces concealed

and made inaccessible by panelboards, fixed ductwork, machinery, and equipment fixed in place are not included. Remove articles obstructing access to those surfaces specified to be included in the work and restore to their original position on completion. Do not coat surfaces in concealed spaces unless specifically so stated. Concealed spaces are defined as spaces above furred spaces and chases. Do not coat surfaces of steel to be imbedded in concrete. Do not coat copper, stainless steel, and aluminum except where specifically so stated. Do not coat new factory finished materials except those that require identification or color coding and those factory-finished surfaces which are damaged during installation. Restore damaged factory-finished surfaces to their original condition. Do not paint zinc-coated ducts, zinc-coated pipe, or copper pipe under insulation or in concealed spaces.

1.7.1 Exterior Painting: Includes new surfaces including items on or a part of the roof and existing surfaces damaged during performance of the work.

1.7.2 Interior Painting: Includes new surfaces and existing surfaces damaged during performance of the work.

1.7.3 Mechanical and Electrical Painting: Includes the field coating of interior and exterior new piping, conduit, ductwork, supports, hangers, and miscellaneous metalwork.

PART 2 - PRODUCTS

2.1 MATERIALS: Conform to the respective specifications and standards listed for use in PART 3 and to the following requirements.

2.1.1 Lead Content: Do not use coatings having a lead content of over 0.06 percent by weight of nonvolatile content.

PART 3 - EXECUTION

3.1 PROTECTION OF AREAS AND SPACES: Remove, mask, or otherwise protect prior to surface preparation and painting operations such items as hardware, hardware accessories, machined surfaces, radiator covers, plates, lighting fixtures, and similar items in contact with coated surfaces. Following completion of painting, reinstall removed items utilizing workmen skilled in the trades involved for such removal and reinstallation. Protect from contamination by coating materials all surfaces not to be coated. Restore surfaces that are contaminated by painting materials to original condition.

3.2 PREPARATION OF SURFACES: Remove all dirt, rust, scale, splinters, loose particles, grease, oil, and other deleterious substances from all surfaces which are to be coated or otherwise finished. Allow putty to set one week before coating. Calking and glazing compounds shall be allowed to cure for times stated in manufacturers' literature prior to being coated. Inspect surfaces after preparation and receive approval before application of any coatings. On surfaces to be coated with water thinned coatings, spot prime with a brush all exposed nails and other ferrous metal with zinc chromate primer, Fed. Spec. TT-P-645.

3.3 APPLICATION: Provide finished surfaces free from runs, drops, ridges, waves, laps, brush marks, and variations in colors. Avoid contamination of other surfaces and public and private property in the area; repair all damage thereto. Allow sufficient time between coats to permit thorough drying and provide each coat in proper condition to receive the next coat. Each coat shall cover the surface of the preceding coat or surface completely; there shall be an easily perceptible difference in shades of successive coats. Thoroughly clean surfaces to be coated. Interior areas shall be broom-clean and dust-free before and during the application of coating material. Prior to erection, use two coats of the designated primer to treat and prime wood and metal surfaces which will be inaccessible after erection. Thoroughly work painting materials into all joints, crevices, and open spaces. Finished surfaces shall be smooth, even, and free of defects. Retouch damaged painting before applying succeeding coats of paint. Spray painting operations shall comply with OSHA 29 CFR 1910, Sections .94, .107, .134, and .1000. Procure and utilize the engineering controls and/or personal protective equipment necessary for safe and effective application of specified paint systems.

3.3.1 Equipment: Apply coatings carefully with good, clean brushes or approved spray equipment, except as specified otherwise. Spray areas made inaccessible to brushing by ducts and other equipment. Use airless type spray equipment. Use approved rollers for the application of flat latex coatings to interior walls and ceilings.

3.3.2 Thinning of Paints: Reduce paints to proper brushing consistency by adding fresh paint, except that when thinning is mandatory for the type of paint being used, obtain written permission from the Contracting Officer to use thinners. The written permission shall include quantities and types of thinners to use.

3.3.3 Environmental Conditions: Do not apply exterior coatings in foggy or rainy weather or when the temperature of the air at the surface is below 45 degrees F or over 95 degrees F, unless approved by the Contracting Officer. Apply interior coatings when the surfaces to be painted are dry and the temperature can be kept above 45 degrees F and below 95 degrees F during the application of ordinary paints and between 65 degrees F and 95 degrees F during the application of enamels and varnishes.

3.3.4 Paint Systems: New surfaces shall receive the following coatings conforming to the respective specifications listed. Apply paints, primers, varnishes, enamels, undercoats, and other coatings to a dry film thickness of not less than 1.0 mil each coat except as specified otherwise. Where coating thickness is specified, it is the minimum dry film thickness.

3.3.4.1 Exterior Surfaces:

a. Metal Surfaces:

Touch up shop prime coat on shop primed surfaces
Primer, Fed. Spec. TT-P-645, two coats on surfaces not shop primed, one coat on shop primed surfaces
Two coats of alkyd enamel, Fed. Spec. TT-E-489

3.3.4.2 Interior Surfaces Not Specified Otherwise:

a. Metal Surfaces:

Touch up shop primer coat on shop primed surfaces
One coat of alkyd primer, Fed. Spec. TT-P-645, on surfaces not shop primed
One coat of alkyd enamel undercoat, Fed. Spec. TT-E-545
One coat of alkyd semigloss enamel, Fed. Spec. TT-E-509

3.3.4.3 Existing Surfaces Damaged During Performance of the Work (including new patches in existing surfaces):

One coat of suitable primer
One coat of undercoat or intermediate coat
One finish coat to match adjacent surfaces

3.3.4.4 Mechanical, Electrical, and Miscellaneous Metal Items: Prefinishing of new mechanical and electrical equipment is specified in the section covering the particular item.

Coating systems as specified hereinbefore
Color of finish coat to match adjacent surfaces

a. Surfaces Not Adjacent to Painted Surfaces:

One coat of primer, Fed. Spec. TT-P-645
Two coats of enamel, Fed. Spec. TT-E-489, or of same coating as used for coating metal in same space

3.3.4.5 Coat other surfaces for which the type of coating has not been specified herein as specified for surfaces having similar conditions of exposure.

*** END OF SECTION ***

SECTION 15011. MECHANICAL GENERAL REQUIREMENTS

1. APPLICATION: This section applies to all sections of Division 15, except as specified otherwise in each individual section.

2. SUBMITTALS: Submit shop drawings, manufacturers data and certificates for equipment, materials and finish, and pertinent details for each system where specified in each individual section, and have them approved before procurement, fabrication or delivery of the items to the job site. Partial submittals will not be acceptable and will be returned without review. Submittals shall include the manufacturer's name, trade name, catalog model or number, nameplate data, size, layout dimensions, capacity, project specification and paragraph reference, applicable Federal, Military, industry and technical society publication references, and other information necessary to establish contract compliance of each item the Contractor proposes to furnish.

2.1 Shop Drawings: Drawings shall be a minimum of 8.5 inches by 11 inches in size, except as specified otherwise. Drawings shall include floor plans, sectional views, wiring diagrams, installation details of equipment; and equipment spaces identifying and indicating proposed location, layout and arrangement of items of equipment, control panels, accessories, piping, ductwork, and other items that must be shown to assure a coordinated installation. Wiring diagrams shall identify circuit terminals, and indicate the internal wiring for each item of equipment and the interconnection between each item of equipment. Drawings shall indicate adequate clearance for operation, maintenance and replacement of operating equipment devices. If equipment is disapproved, drawings shall be revised to show acceptable equipment and resubmitted.

2.2 Manufacturer's Data: Submittals for each manufactured item shall be manufacturer's descriptive literature of cataloged products, equipment drawings, diagrams, performance and characteristic curves, and catalog cuts.

2.3 Publication Compliance: Where equipment or materials are specified to conform to industry and technical society publications of organizations such as American National Standards Institute (ANSI), American Society for Testing and Materials (ASTM), and Underwriters' Laboratories, Inc. (UL), proof of such compliance shall be submitted. The label or listing by the specified organization will be acceptable evidence of compliance. Submit a certificate from an independent testing organization adequately equipped and competent to perform such services, and approved by the Contracting Officer, stating that the item has been tested in accordance with the specified organization's test methods and that the item conforms to the specified organization's publication.

2.4 Certified Test Reports: Referenced publications' testing requirements for materials will be waived provided the manufacturer's original certificates are submitted stating that previously manufactured materials have been tested by approved laboratories, that such materials meet testing requirements specified, and that the materials furnished for this project are of the same type, quality, manufacture, and make as that tested. Copies of the test reports need not be submitted except as specifically requested by the Contracting Officer.

2.5 Certificates of Compliance: Submit certification attesting that materials and equipment to be furnished for this project comply with the requirements of this specification and of the reference publications. Pre-printed certifications will not be acceptable; certifications shall be the manufacturer's original. The certification shall not contain statements that could be interpreted to imply that the product does not meet all requirements specified, such as "as good as"; "achieve the same end use and results as materials formulated in accordance with the referenced publications"; "equal or exceed the service and performance of the specified material". The certification shall simply state that the product conforms to the requirements specified.

3. OPERATION AND MAINTENANCE MANUAL: Furnish an operation and maintenance manual for each item of equipment. Furnish three copies of the manual bound in hardback binders or an approved equivalent. Furnish one complete manual prior to the time that equipment tests are performed, and furnish the remaining manuals before the contract is completed. Inscribe the following identification on the cover: the words "OPERATION AND MAINTENANCE MANUAL", the name and location of the equipment or the building, the name of the Contractor, and the contract number. The manual shall include the names, addresses, and telephone numbers of each subcontractor installing equipment, and of the local representatives for each item of equipment. The manual shall have a table of contents and be assembled to conform to the table of contents with the tab sheets placed before instructions covering the subject. The instructions shall be legible and easily read, with large sheets of drawings folded in. The manual shall include: wiring and control diagrams with data to explain detailed operation and control of each item of equipment; a control sequence describing start-up, operation and shut-down; description of the function of each principal item of equipment; the procedure for starting; the procedure for operating; shut-down instructions; installation instructions; maintenance instructions; lubrication schedule including type, grade temperature range, and frequency; safety precautions, diagrams, and illustrations; test procedures; performance data; and parts list. The parts lists for equipment shall indicate the sources of supply, recommended spare parts, and the service organization which is reasonably convenient to the project site. The manual shall be complete in all respects for equipment, controls, accessories, and associated appurtenances provided.

4. POSTED OPERATING INSTRUCTIONS: Furnish approved operating instructions for each principal item of equipment for the use of the operation and maintenance personnel. The operating instructions shall include wiring diagrams, control diagrams, and control sequence for each principal item of equipment. Operating instructions shall be printed or engraved, and shall be framed under glass or in approved laminated plastic and posted where directed by the Contracting Office. Operating instructions shall be attached to or posted adjacent to each principal item of equipment including start-up, proper adjustment, operating, lubrication, shut-down, safety precautions, procedure in the event of equipment failure, and other items of instruction as recommended by the manufacturer of each item of equipment. Operating instructions exposed to the weather shall be made of weather-resisting materials or shall be suitably enclosed to be weather protected. Operating instructions shall not fade when exposed to sunlight and shall be secured to prevent easy removal or peeling.

5. INSTRUCTION TO GOVERNMENT PERSONNEL: Furnish the services of competent instructors to give full instruction to the Government personnel in the adjustment, operation and maintenence, including pertinent safety requirements, of each item of equipment and each system. Each instructor shall be thorougly familiar with all parts of the installation and shall be trained in operating theory as well as practical operation and maintenance work. Instruction shall be given during the first regular work week after the equipment or system has been accepted and turned over to the Government for regular operation. The number of mandays (8 hours) of instruction furnished shall be as specified in each idividual section.

6. DELIVERY AND STORAGE: Properly store, adequately protect and carefully handle equipment and materials to prevent damage before and during installation. Handle, store, and protect equipment and materials in accordance with the manufacturer's recommendations. Damaged or defective items shall have new undamaged item substituted for the damaged or defective items.

7. CATALOGED PRODUCTS: Materials and equipment shall be cataloged products of manufacturers regularly engaged in production of such materials or equipment and shall be manufacturer's latest design that complies with the specification requirements. Materials and equipment shall duplicate items that have been in satisfactory commercial or industrial use. Where two or more items of the same class of equipment are required, these items shall be products of a single manufacturer; however, the component parts of the items need not be the products of the same manufacturer. Each item of equipment shall have the manufacturer's name, address, model number and serial number on the nameplate securely affixed in a conspicuous place; the nameplate of the distributing agent will not be acceptable.

8. VERIFICATION OF DIMENSIONS: Coordinate the proper relation of the work to the building structure and to the work of all trades. Visit the premises and become familiar with the dimensions in the field, and advise the Contracting Officer of any discrepancy before performing any work.

9. MANUFACTURER'S RECOMMENDATIONS: Where installation procedures or any part thereof are required to be in accordance with the recommendations of the manufacturer of the material being installed, printed copies of these recommendations shall be furnished to the Contracting Officer prior to installation. Installation of the item will not be allowed to proceed until the recommendations are received. Failure to furnish these recommendations can be cause for rejection of the material.

10. ELECTRICAL REQUIREMENTS: Furnish motors, controllers, contactors, and disconnects with their respective pieces of equipment except controllers indicated as part of the motor control centers shall be provided under Section 16402, "Interior Wiring System". Motors, controllers, contactors, and disconnects shall conform to and shall have electrical connections provided under Section 16402. Furnish internal wiring for components of packaged equipment as an integral part of the equipment. Extended voltage range motors will not be permitted. Controllers and contactors shall have a maximum of 120-volt control circuits. When motors and equipment furnished are larger than sizes indicated, the cost of additional electrical service and related work shall be included under the section that specified that motor or equipment. Power wiring and conduit for field installed equipment, and motor control equipment forming part of motor control centers or switchgear assemblies, and conduit and wiring connecting such centers, assemblies or other power sources to equipment shall be provided under and conform to the requirements of Section 16402.

SECTION 15215

BULK LIME DISTRIBUTION SYSTEMS

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

1.1 Federal Specifications (Fed. Spec.):

L-P-387A & Am-2	Plastic Sheet, Laminated, Thermosetting (For Designation Plates)
GG-G-76E	Gages, Pressure and Vacuum, Dial Indicating
WW-U-531E	Unions, Pipe; Steel or Malleable Iron, Threaded Connections
WW-V-51F	Valves, Bronze; Angle, Check and Globe (125, 150 and 200 Pound; Threaded, Flanged and Solder)
WW-V-54D & Am-3	Valves, Gate, Bronze (125, 150 and 200 Pounds; Threaded, Flanged and Solder)
WW-V-58B	Valves, Gate, Cast Iron (Threaded and Flanged)

1.2 Military Specifications (Mil. Spec.):

MIL-V-18826B	Valves; Globe and Angle, Cast Iron

1.3 American National Standards Institute (ANSI) Publications:

B16.3-77	Malleable Iron Threaded Fittings
B16.5-81	Steel Pipe Flanges, and Flanged Fittings
B16.9-78	Factory Made Wrought Steel Buttwelding Fittings
B16.11-80	Forged Steel Fittings, Socket Welding and Threaded
B16.21-78	Nonmetallic Gaskets for Pipe Flanges
B31.1-80	Power Piping

1.4 American Society for Testing and Materials (ASTM) Publications:

A36-77	Structural Steel
A53-80	Welded and Seamless Steel Pipe
A126-73 (R 79)	Gray Iron Castings for Valves, Flanges, and Pipe Fittings
A193-80c	Alloy Steel and Stainless Steel Bolting Materials for High Temperature Service
A194-80a	Carbon and Alloy Steel Nuts for Bolts for High Pressure and High Temperature Service

1.5 National Fire Protection Association (NFPA) Publications:

70-81	National Electrical Code

1.6 Underwriters' Laboratories, Inc. (UL) Publications:

UL 429-73	Electrically Operated Valves

2. GENERAL REQUIREMENTS: Section 15011, "General Requirements, Mechanical", applies to this section, with the additions and modifications specified herein.

2.1 Description of Work: The work includes providing new bulk lime distribution systems, and related work. Each system shall be complete and ready for operation. Each item of equipment shall be of the factory assembled packaged weatherproof type for outdoor installation with all components designed to exclude driving rain and snow. Provide easily and quickly removable noeprene gasketed access panels and cover plates. Equipment, materials, installation and workmanship shall be in accordance with NFPA 70 and ANSI B31.1, except as specified or indicated otherwise. In the publications referred to herein, the advisory provisions shall be considered to be mandatory, as though the word "shall" had been substituted for "should" wherever it appears; reference to the "authority having jurisdiction" shall be interpreted to mean the Contracting Officer. Capacity of equipment shall be not less than that indicated. Piping shall be installed straight and true, and shall bear evenly on supports.

2.2 Submittals Required: The submittal requirements of Section 15011, "General Requirements, Mechanical" applies to the following lists.

2.2.1 Manufacturer's Data:

a. Storage Silo and Storage Hoppers
b. Airslide
c. Dust Collector
d. Sensors
e. Rotary Cut-Off Valve
f. Rotary Feeder and Rotary Air Lock
g. Blowers
h. Air Filters
i. Air Silencers
j. Air Compressor
k. Air Receiver
l. Vibrator
m. Pipe and Fittings

2.2.2 Shop Drawings:

a. Storage Silo and Storage Hopper Assembly
b. Airslide Assembly
c. Dust Collector Assembly
d. Pipe and Fittings
e. Pipe Supports

2.2.3 Certificates of Compliance:

a. Pipe and Fittings
b. Valves

2.3 Cleaning of Piping: The Contractor shall keep the interior and ends of all new piping thoroughly cleaned of all foreign matter and water before and after being installed. Piping systems shall be kept clean during installation by means of plugs or other approved methods. When work is not in progress, open ends of piping and fittings shall be securely closed so that no water or other foreign substance will enter the pipes or fittings. All piping shall be inspected before placing into position. It shall be the Contractor's responsibility for insuring that the interior of the piping is free of all foreign matter when it is connected into the system.

2.4 Drawings: The drawings indicate the extent and arrangement of the piping. If departures from the contract drawings or the provisions of this section of the specification are deemed necessary by the Contractor, details of the reasons therefore shall be submitted as soon as practicable to the Contracting Officer for consideration. Such departures shall not be made without prior written approval of the Contracting Officer.

2.5 Field Painting: Piping, hangers, supports, and miscellaneous metal shall be painted under Section 09910, "Field Painting".

2.6 Concrete Construction: Concrete work shall be provided under Section 03302, "Cast-In-Place Concrete."

2.7 Pipe Supports: Pipe supports shall be provided under Section 05210, "Steel Joists."

2.8 Demolition: Demolition shall be as specified in Section "Demolition and Removal."

3. LIME STORAGE SILO AND LIME STORAGE HOPPER ASSEMBLIES: Each item of equipment shall be of the factory assembled packaged weatherproof type for outdoor installation with all components designed to exclude driving rain and snow, and for hazardous dust locations.

3.1 Storage Silo and Storage Hoppers: Silo and hopper including supporting legs, inlet box, dust collector housing, outlet reducer chute, vent chute,and adapter tee shall be constructed of ASTM A36 structural steel shapes and plates. Materials, erections, welding, installation and workmanship shall conform to Section 05500, "Metal Fabrication". Flange connections for piping shall conform to ANSI B16.5 Class 150. Threaded connections for piping shall conform to ANSI B16.5 Class 150. Flange connections for inlet box, duct collector housing, outlet reducer chute, vent chute, adapter tee, rotary cut-off valve, rotary feeder, rotary airlock, side inlet connection to adapter tee,and connections for level sensors shall be provided as recommended by the silo and hopper manufacturer.

3.2 Airslide: The storage silo shall be provided with an air operated silo vibrator or impactor to prevent bridging of materials in the silo. Provide an OFF-ON switch and a timer with blow frequency adjustment of from one to 30 times per minute. Provide three-way solenoid valve with 0.5 inch port size to operate with the timer. The controls shall be provided so that the vibrator operates when the rotary feeder and rotary air lock operates.

3.3 Vibrator: Vibrator shall be an electro-magnetic type, sized for a 1/4 inch steel plate hopper with a capacity of 18 tons.

3.4 Dust Collector: Collector shall be of the complete self-contained single-compartment, intermittent type including multibag polyester cloth filters, filter access door, filter shaker with motor and totally enclosed drive assembly, discharge air fan, fan outlet damper, and timer. Timer shall prevent simultaneous operation of the discharge air fan and the filter shaker motor. When the stop button for the exhaust fan is pushed, the fan shall stop and the filter shaker shall automatically operate for a predetermined time period after which the timer shall reset so that the fan can be restarted. Provide weatherproof fan discharge with bird screen. Dust collector housing shall be constructed of not less than 12 gage steel sheet.

3.5 Sensors (Lime Level Indicators): Sensors shall be designed to indicate the level of lime in each storage silo and hopper. Sensor shall conform to Underwriters Laboratories, Inc. for use on Class II, Groups E, F and G, Hazardous Dust Locations and for outdoor weather locations. Sensor includes a material sensing paddle rotated by a shaded pole induction motor housed in a casing outside the silo and hopper. The motor and reduction gears shall be mounted on an extension of the paddle shaft. When the lime restrains paddle movement, reactive torque shall cause the motor and its mounting to revolve about the drive shaft, actuating two switches. When lime falls away from the paddle, an adjustable tension spring returns motor and frame to initial position, releasing switches and causing motor to turn paddle again. For high level control, the motor operates continuously until paddle rotation is resisted by rising level of lime. For low level control, the paddle is held by the lime while motor frames is held against the switches until lime falls below paddle. When this occurs, the adjustable tension spring returns the motor assembly to original starting position, releasing switches and restarting paddle. Each sensor shall have remote indicating to indicate when each paddle is rotating.

3.6 Rotary Cut-Off Valve (Manual): Valve shall provide positive cut-off for unrestricted flow of lime from each storage silo and hopper. Valve shall have cast iron body and rotor with steel manual operated lever. Rotar shall be designed to provide double seal, at top and bottom, in the closed position for positive cut-off. Valve shall have rectangular flanged inlet and outlet connections.

3.7 Rotary Feeder: Feeders shall be designed to meter dry lime and to serve as airlocks for pneumatic lime conveying systems. Feeders shall have cast iron body with integral motor supports. Rotors shall be cast iron and shall have six or eight beveled vanes with four vanes in seal between the inlet and outlet. Feeders shall have rectangular flanged inlet and outlet connections. Provide weatherproof electric gearmotor drive with totally enclosed sprockets, chain assembly, and protective metal chain guard for feeder operation. Provide air purge connections.

3.8 Flexible Connection: The flexible connection shall be as recommended by the manufacturer of the Government furnished and installed volumetric feeder.

4. AIR BLOWERS: Provide continuous duty rotary positive displacement belt driven air blower with totally enclosed electric motor mounted on structural steel frame. Belt drive shall be completely enclosed. Casing and impellers shall be cast-iron. Shafts and gear shall be steel. Provide anti friction ball or roller bearings. Timing gears and gear end bearings shall be oil-splash lubricated from an oil tight housing surrounding the timing gears. Drive end bearings shall be grease lubricated through fittings. Provide lip-type seak to prevent oil and grease from entering the impeller chamber. Provide dry-type air intake filter with baked enamel steel housing; filter shall be 99 percent efficient at 10 micron rating. Provide residential class air silencers with baked enamel steel housing.

5. AIR COMPRESSOR: Provide tank mounted, electric motor driven, air cooled, reciprocating type air compressor including motor, controller, pressure switch, belt guard, pressure reducing valve, pressure relief valve, automatic moisture drain valve, air intake filter, and silencer. Piston speed shall not exceed 450 fpm. Set relief valve for 10 psig above the control switch cut-off pressure. Pressure switches shall start compressor at 60 psig and stop compressor at 80 psig.

5.1 Air Receiver: Provide zinc coated steel tank constructed in accordance with the ASME code for not less than 125 psig working pressure with 80 gallons minimum capacity.

5.2 Intake Air Filter and Silencer: Provide dry-type combination intake air filter and silencer with baked enamel steel housing. Filter shall be 99 percent efficient at 10 micron rating. Provide residential class intake air silencer.

5.3 Compressed Air Filter: Provide dry type filter, 99 percent efficient in removing oil and solid particles at 0.03 micron rating, with baked enamel steel housing and manual drain valve.

5.4 Pressure Regulator: Provide pressure reducing valve withfield adjustable range of zero to 7 psig discharge pressure, with inlet pressure of 60 to 80 psig. Provide inlet pressure gage with range of zero to 100 psig, and outlet pressure gage with range of zero to 30 psig.

6. PIPING: Horizontal piping shall be pitched up with a minimum grade of one inch in 50 feet in the direction of flow. Fittings shall be provided for changes in direction of piping, and for all connections. Stab type connections will not be permitted. Jointing compound for pipe threads shall be pipe cement and oil, or graphite and oil. Short nipples shall be extra strong. Changes in piping sizes shall be made through reducing fittings; bushings will not be permitted.

6.1 Air-Lime Pipe and Air Pipe: ASTM A53, Grades A or B, Schedule 40, black steel pipe. Changes in direction of air-lime pipe shall be made by bending of the pipe with a hydraulic pipe bender; bent pipe showing kinks, wrinkles, or malformations will not be acceptable. Changes in direction of air pipe shall be made by using pipe fittings.

6.2 Fittings and End Connections: Sizes less than one inch shall have threaded fittings and end connections. Sizes one to twoinches shall have threaded or socket-welding or buttwelding fittings and end connections; provide threaded connections for threaded valves and threaded connections to equipment. Sizes 2.5 inches and larger shall have buttwelding fittings and end connections; provide flanged connections for flanged valves and flanged connections to equipment.

6.2.1 Threaded Fittings: ANSI B16.11, or ANSI B16.3, Class 150.

6.2.2 Socket Welding Fittings: ANSI B16.11.

6.2.3 Buttwelding Fittings: ANSI B16.9, of the same material and weight as the piping in which they are installed.

6.2.4 Dresser Couplings: Provide of the slip-on design type including neoprene compression rings and glands with bolts and nuts.

6.3 Welding: ANSI B31.1, metallic arc process, including qualification of welders. Certifications of each welder's qualifications shall be submitted to the Contracting Officer.

6.4 Flanges and Unions: Provide at valves and connections to equipment.

6.4.1 Flanges: ANSI B16.5, Class 150.

6.4.2 Unions: Fed. Spec. WW-U-531, Type A, Class 150.

6.5 Gaskets, Bolts, and Nuts:

6.5.1 Gaskets: ANSI B16.21, composition ring 0.0625 inch thick.

6.5.2 Bolts: ASTM A193, Grade B8. Lengths of bolts shall be such that not less than two full threads will extend beyond the nut with the bolts tightened to the required tensions and the washers seated.

6.5.3 Nuts: ASTM A194, Grade 8.

6.6 Valves: Provide with stems horizontal or above. Valves shall have flanged end connections, except valves smaller than 2.5 inches may have threaded end connections with a union on one side of the valve. Cast iron components shall conform to ASTM A126, Class B or C.

6.6.1 Gate Valves: Fed. Spec. WW-V-54 Class 125 or Fed. Spec. WW-V-58 Class 125.

6.6.2 Check Valves: Fed. Spec. WW-V-51 Class 125 or Mil. Spec. MIL-V-18826 Class 125.

6.6.3 Solenoid Valve: Solenoid valve shall be a motor operated control valve conforming to UL 429, stainless steel aluminum or brass body and shall be suitable for 125 psig at 190 degrees Fahrenheit hot water. Solenoid valve shall be in the open position when the blower system is energized.

6.7 Pressure Gage: GG-G-76, single style for air, with 4.5 inch dial, brass or aluminum case, bronze tube, gage cock, pressure snubber and syphon. Scale range shall be as indicated.

7. ELECTRICAL:

7.1 Electrical Motors, Controllers, Contactors, and Disconnects: Furnish motors, controllers, contactors, and disconnects with their respective pieces of equipment. Motors, controllers, contactors, and disconnects shall conform to and shall have electrical connections provided under Section 16402, "Electrical Wiring Systems." Controllers and contactors shall have a maximum of 120 volt control circuits, and auxiliary contacts for use with the controls furnished. When motors and equipment furnished are larger than sizes indicated, the cost of providing additional electrical service and related work shall be included under this section.

7.2 Electrical Work: Is specified in the Section 16402, "Electrical Wiring Systems", except for control wiring. Control wiring shall be provided under this section and shall conform to NFPA 70. Rigid metal conduit or intermediate metal conduit shall be used, except EMT conduit may be used in dry locations not enclosed in concrete or where not subject to mechanical damage.

8. INSTRUCTING OPERATING PERSONNEL: Upon completion of the work and at a time designated by the Contracting Officer, the services of a competent technician shall be provided for the instructions of the Government personnel in the proper operation and maintenance of each system. The period of instructions shall be for not less than one 8-hour working day.

9. NAMEPLATES: Laminated plastic nameplates shall be provided for all control items listed or shown in the submittal and approved control diagrams. Each inscription shall identify its function; and when applicable, its position. Laminated plastic shall be 0.125 inch thick Melamine plastic conforming to Fed. Spec. L-P-387, black with white center core. Surface shall be a matte finish. All corners shall be square. The lettering shall be accurately aligned and engraved into the white core. Size of nameplates shall be one by 2.5 inches minimum. Lettering shall be minimum 0.25 inch high normal block lettering. Key nameplates to a chart and schedule for each system. Mount charts and schedules under glass, in a frame, and place where directed near each system. Furnish two copies of each chart and schedule.

10. FIELD TESTING: Upon completion and before final acceptance of the work, each system shall be tested as in service to demonstrate conformance with the contract requirements. Controls shall be tested through every cycle of operation. Defects in the work provided by the Contractor shall be corrected by him at his own expense and the test repeated. The Contractor shall furnish instruments, connecting devices and personnel for the tests. Piping shall be thoroughly flushed and cleaned before being placed in operation. Equipment, piping, and filters shall be cleaned thoroughly in accordance with the best practice.

10.1 Piping Systems: Before painting each new piping system shall be hydrostatically tested at not less than 1.5 times the working pressure and shall show no leakage or reduction in gage pressure after 4 hours.

10.2 Equipment: Test in operation for a continuous period of not less than one hour. The Government will furnish lime for the tests. During the tests, all equipment shall be tested under every condition of operation.

***** END OF SECTION *****

SECTION 16011

ELECTRICAL GENERAL REQUIREMENTS

PART 1 - GENERAL

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

1.1.1 Federal Specifications (Fed. Spec.):

TT-E-489F & Am 1	Enamel, Alkyd, Gloss (for Exterior and Interior Surfaces)
TT-E-496B & Am 2	Enamel, Heat-Resisting (400 Degrees Fahrenheit), Black
TT-P-645A	Primer, Paint, Zinc-Chromate, Alkyd Type

1.1.2 Military Specifications (Mil. Spec.):

DOD-P-15328D	Primer (Wash), Pretreatment (Formula No. 117 for Metals) (Metric)

1.1.3 American Society for Testing and Materials (ASTM) Publication:

B117-73 (R79)	Salt Spray (Fog) Testing, Method of

1.2 APPLICATION: This section applies to all sections of Division 16, "Electrical" of this project except as specified otherwise in each individual section.

1.3 SUBMITTALS: Submit shop drawings, manufacturers data and certificates for equipment, materials and finish, and pertinent details for each system where specified in each individual section, and have them approved before procurement, fabrication or delivery of the items to the job site. Partial submittals will not be acceptable and will be returned without review. Submittals shall include the manufacturer's name, trade name, catalog model or number, nameplate data, size, layout dimensions, capacity, project specification and paragraph reference, applicable Federal, Military, industry and technical society publication references, and other information necessary to establish contract compliance of each item the Contractor proposes to furnish.

1.3.1 Shop Drawings: Drawings shall be a minimum of 8.5-inches by 11-inches in size, except as specified otherwise. Drawings shall include floor plans, sectional views, wiring diagrams, and installation details of equipment; and equipment spaces identifying and indicating proposed location, layout and arrangement of items of equipment, control panels, accessories, piping, ductwork, and other items that must be shown to assure a coordinated installation. Wiring diagrams shall identify circuit terminals, and indicate the internal wiring for each item of equipment and the interconnection between each item of equipment. Drawings shall indicate adequate clearance for operation, maintenance and replacement of operating equipment devices. If equipment is disapproved, drawings shall be revised to show acceptable equipment and be resubmitted.

1.3.2 Manufacturer's Data: Submittals for each manufactured item shall be manufacturer's descriptive literature of cataloged products, equipment drawings, diagrams, performance and characteristic curves, and catalog cuts.

1.3.3 Publication Compliance: Where equipment or materials are specified to conform to industry and technical society publications of organizations such as American National Standard Institute (ANSI), American Society for Testing and Materials (ASTM), and Underwriters Laboratories, Inc. (UL), proof of such compliance shall be submitted. The label or listing by the specified organization will be acceptable evidence of compliance. Submit a certificate from an independent testing organization adequately equipped and competent to perform such services, and approved by the Contracting Officer, stating that the item has been tested in accordance with the specified organization's test methods and that the item conforms to the specified organization's publication.

1.3.4 Certificates of Compliance: Submit certification attesting that materials and equipment to be furnished for this project comply with the requirements of this specification and of the reference publications. Pre-printed certifications will not be acceptable; certifications shall be the manufacturer's original. The certification shall not contain statements that could be interpreted to imply that the product does not meet all requirements specified, such as "as good as"; "achieve the same end use and results as materials formulated in accordance with the referenced publications"; "equal or exceed the service and performance of the specified material". The certification shall simply state that the product conforms to the requirements specified.

1.4 OPERATION AND MAINTENANCE MANUAL: Furnish an operation and maintenance manual for each item of equipment. Furnish three copies of the manual bound in hardback binders or an approved equivalent. Furnish one complete manual prior to the time that equipment tests are performed, and furnish the remaining manuals before the contract is completed. Inscribe the following identification on the cover: the words OPERATION AND MAINTENANCE MANUAL, the name and location of the equipment or the building, the name of the Contractor, and the contract number. The

manual shall include the names, addresses, and telephone numbers of each subcontractor installing equipment, and of the local representatives for each item of equipment. The manual shall have a table of contents and be assembled to conform to the table of contents with the tab sheets placed before instructions covering the subject. The instructions shall be legible and easily read, with large sheets of drawings folded in. The manual shall include: wiring and control diagrams with data to explain detailed operation and control of each item of equipment; a control sequence describing start-up, operation and shut-down; description of the function of each principal item of equipment; the procedure for starting; the procedure for operating; shut-down instructions; installation instructions; maintenance instructions; lubrication schedule including type, grade, temperature range, and frequency; safety precautions, diagrams, and illustrations; test procedures; performance data; and parts list. The parts lists for equipment shall indicate the sources of supply, recommended spare parts, and the service organization which is reasonably convenient to the project site. The manual shall be complete in all respects for equipment, controls, accessories, and associated appurtenances provided.

1.5 POSTED OPERATING INSTRUCTIONS: Furnish approved operating instructions for each principal item of equipment for the use of the operation and maintenance personnel. The operating instructions shall include wiring diagrams, control diagrams, and control sequence for each principal item of equipment. Operating instructions shall be printed or engraved, and shall be framed under glass or in approved laminated plastic and posted where directed by the Contracting Officer. Operating instructions shall be attached to or posted adjacent to each principal item of equipment including start up, proper adjustment, operating, lubrication, shut-down, safety-precautions, procedure in the event of equipment failure, and other items of instruction as recommended by the manufacturer of each item of equipment. Operating instructions exposed to the weather shall be made of weather-resisting materials or shall be suitably enclosed to be weather protected. Operating instructions shall not fade when exposed to sunlight and shall be secured to prevent easy removal or peeling.

1.6 DELIVERY AND STORAGE: Properly store, adequately protect and carefully handle equipment and materials to prevent damage before and during installation. Handle, store, and protect equipment and materials in accordance with the manufacturer's recommendations. Replace damaged or defective items.

1.7 CATALOGED PRODUCTS: Materials and equipment shall be cataloged products of manufacturers regularly engaged in production of such materials or equipment and shall be manufacturer's latest design that complies with the specification requirements. Materials and equipment shall duplicate items that have been in satisfactory commercial or industrial use. Where two or more items of the same class of equipment are required, these items shall be products of a single manufacturer; however, the component parts of the items need not be the

products of the same manufacturer. Each item of equipment shall have the manufacturer's name, address, model number and serial number on the nameplate securely affixed in a conspicuous place; the nameplate of the distributing agent will not be acceptable.

1.8 VERIFICATION OF DIMENSIONS: Coordinate the proper relation of the work to the building structure and to the work of all trades. Visit the premises and become familiar with the dimensions in the field, and advise the Contracting Officer of the discrepancy before performing any work.

1.9 MANUFACTURER'S RECOMMENDATIONS: Where installation procedures or any part thereof are required to be in accordance with the recommendations of the manufacturer of the material being installed, printed copies of these recommendations shall be furnished to the Contracting Officer prior to installation. Installation of the item will not be allowed to proceed until the recommendations are received. Failure to furnish these recommendations can be cause for rejection of the material.

1.10 ELECTRICAL REQUIREMENTS: Furnish motors, controllers, contactors, and disconnects with their respective pieces of equipment. Motors, controllers, and disconnects shall conform to and shall have electrical connections provided under Section 16402, "Interior Wiring Systems". Furnish internal wiring for components of packaged equipment as an integral part of the equipment. Extended voltage range motors will not be permitted. Controllers and contactors shall have a maximum of 120 volt control circuits. When motors and equipment furnished are larger than sizes indicated, the cost of additional electrical service and related work shall be included under the section that specified that motor or equipment. Power wiring and conduit for field installed equipment, and motor control equipment shall be provided under and conform to the requirements of Section 16402, "Interior Wiring Systems".

PART 2 - PRODUCTS

2.1 PAINTING OF EQUIPMENT: Equipment painting, factory applied or shop applied, shall be as specified herein, and provided under each individual section of this specification.

2.1.1 Factory Painting Systems: Manufacturer's standard factory painting systems may be provided subject to certification that the factory painting system applied will withstand 125 hours in a salt-spray fog test, except that equipment located outdoors shall withstand 500 hours in a salt spray fog test. Salt spray fog test shall be in accordance with ASTM B117. Immediately after completion of the test, the paint shall show no signs of blistering, wrinkling or cracking; and no loss of adhesion; and the specimen shall show no signs of rust creepage

beyond 0.125 inch on either side of the scratch mark. The film thickness of the factory paintimg system applied on the equipment shall not be less than the film thickness used on the test specimen. If manufacturer's standard factory painting system is being proposed for use in lieu of the shop painting systems using Fed. Spec. TT-E-496, certifications that the manufacturer's standard factory painting system will conform to the heat resistance requirement of Fed. Spec. TT-E-496 as applicable, shall be submitted in addition to other certifications.

2.1.2 Shop Painting Systems: Clean, pretreat, prime and paint metal surfaces; except aluminum surfaces shall not be painted. Apply coatings to clean dry surfaces. Clean the surfaces to remove dust, dirt, rust, oil and grease by wire brushing and solvent degreasing prior to application of paint, except metal surfaces subject to temperatures in excess of 120 degrees Fahrenheit (F) shall be cleaned to bare metal. Where more than one coat of paint is specified, apply the second coat after the preceding coat is thoroughly dry. Lightly sand damaged painting and retouch before applying the succeeding coat.

2.1.2.1 Metal Surfaces Subject to Temperatures Less Than 120 Degrees F.: Immediately after cleaning, the metal surfaces shall receive one coat of Mil. Spec. DOD-P-15328 pretreatment primer applied to a minimum dry film thickness of 0.3 mil, one coat of Fed. Spec. TT-P-645 primer applied to a minimum dry film thickness of one mil; and two coats of Fed. Spec. TT-E-489 enamel applied to a minimum dry film thickness of one mil per coat.

2.1.2.2 Metal Surfaces Subject to Temperatures Between 120 and 400 Degrees F.: Surfaces shall receive two coats of Fed. Spec. TT-E-496, Type II, heat-resisting enamel applied to a total minimum thickness of 2 mils.

*** END OF SECTION ***

SECTION 16402

ELECTRICAL WIRING SYSTEMS

PART 1 - GENERAL

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

1.1.1 Federal Specifications (Fed. Spec.):

W-C-375B	Circuit Breaker, Molded Case, Branch-Circuit and Service
W-S-896E(1)	Switch, Toggle (Toggle and Lock), Flush Mounted

1.1.2 American National Standards Institute (ANSI) Publications:

C80.1-1977	Specification for Rigid Steel Conduit, Zinc-coated
C80.3-1977	Specification for Electrical Metallic Tubing, Zinc-coated

1.1.3 American Society for Testing and Materials (ASTM) Publications:

B 1-70 (R 1976)	Hard-Drawn Copper Wire
B 8-77	Concentric-Lay-Stranded Copper Conductor, Hard, Medium-Hard, or Soft

1.1.4 National Electrical Manufacturers Association (NEMA) Publications:

KS1-1975	Enclosed Switches
MG1-1978 (Rev. 5-80)	Motors and Generators
ST20-1972 (R 1978)	Dry-Type Transformers for General Applications
TC2-1978 (Rev. 2-80)	Electrical Plastic Tubing (EPT) and Conduit (EPC-40 and EPC-80)

TC3-1978	PVC Fittings for Use with Rigid PVC Conduit and Tubing
TC9-1978 (Rev. 1-78)	Fittings for ABS or PVC Plastic Utilities Duct for Underground Installation
WD1-1979 (Rev. 1-79)	General Purpose Wiring Devices

1.1.5 National Fire Protection Association (NFPA) Publication:

70-1981	National Electrical Code (NEC)

1.1.6 Underwriters' Laboratories, Inc. (UL) Publications:

1-1979 (Mar 80)	Flexible Metal Conduit
50-1980	Cabinets and Boxes
67-1979 (Dec 80)	Panelboards
83-1980	Thermoplastic-Insulated Wires and Cables
198C-1981 (May 81)	High-Interrupting Capacity Fuses, Current-limiting Type
198E-1979	Class R Fuses
467-1972 (May 79)	Grounding and Bonding Equipment
486A-1980	Wire Connectors and Soldering Lugs for Use with Copper Conductors
486B-1978 (Feb 81)	Wire Connectors for Use with Aluminum Conductors
510-1976 (Jun 80)	Insulating Tape
514-1979 (Apr 80)	Outlet Boxes and Fittings

1.2 GENERAL REQUIREMENTS: Section 16011, "Electrical General Requirements," applies to this section with additions and modifications specified herein. In each of the standards referred to herein, consider the advisory provisions to be mandatory, as though the word "shall" had been substituted for "should" wherever it appears. Interpret reference in these standards to the "authority having jurisdiction," or words of similar meaning, to mean the Contracting Officer.

1.2.1 Motor Control System: The equipment and materials to be furnished under this specification for the motor control system, shall be products of manufacturers regularly engaged in the production of such equipment and shall be the manufacturer's latest design. All items of the same type or ratings shall be identical. The motor control system shall be the coordinated and integrated design of a single manufacturer. The supplier of the system shall be able to show satisfactory evidence that he maintains a service department equipped to provide service and replacement parts for the equipment provided.

1.2.2 Electrical Characteristics: Electrical characteristics for this project shall be 60 hertz, and 277/480 volts secondary, three phase, four wire, wye connected. Final connections to the power distribution system at the existing panelboard shall be made by the Contractor as directed by the Contracting Officer.

1.3 SUBMITTALS:

1.3.1 Manufacturer's Data:

a. Light Fixture
b. Exhaust Fan
c. Level Indicator
d. Dust Collector Timer Unit
e. Disconnect Switches
f. Transformer

1.3.2 Shop Drawings:

a. Load Center Panelboard
b. Motor Starter Panelboard complete with catalog cuts on all devices and complete control wiring diagrams within the control system).

1.3.3 Certificates of Conformance or Compliance:

a. Conduit
b. Outlet and Junction Boxes
c. Insulating Tapes
d. Conduit Fittings
e. Device Plates
f. Conductors

PART 2 - PRODUCTS

2.1 MATERIALS AND EQUIPMENT: All materials, equipment, and devices shall, as a minimum, meet the requirements of UL where UL Standards are established for those items and the requirements of NFPA-70. All items shall be new unless specified or indicated otherwise.

2.1.1 Conduit and Fittings:

2.1.1.1 Rigid Steel Conduit (Zinc-coated): ANSI C80.1

2.1.1.2 Rigid Nonmetallic Conduit: NEMA TC2, Type EPC-40, PVC only

2.1.1.3 Electrical Metallic Tubing (EMT): ANSI C80.3

2.1.1.4 Flexible Metal Conduit: UL 1, zinc-coated steel only

2.1.1.5 Fittings for Metal Conduit, Electrical Metallic Tubing, and Flexible Metal Conduit: Ul 514. All ferrous fittings shall be cadmium- or zinc-coated per UL 514.

2.1.1.5.1 Fittings for rigid metal conduit shall be threaded type. Split couplings are not acceptable.

2.1.1.5.2 Fittings for electrical metallic tubing (EMT) shall be the compression type.

2.1.1.6 Fittings for Rigid Nonmetallic Conduit: NEMA TC3 or NEMA TC9, as required.

2.1.2 Outlet Boxes and Covers: UL 514, cadmium or zinc-coated if of ferrous metal.

2.1.3 Cabinets, Junction Boxes, and Pull Boxes (With Volume Greater than 100 Cubic Inches): UL 50, hot-dip zinc-coated if of sheet steel.

2.1.4 Wires and Cables: Wires and cables shall meet the applicable requirements of NFPA 70 and UL for the type of insulation, jacket, and conductor specified or indicated. Unless indicated or specified otherwise, conductor sizes are based on copper. Conductors No. 10 AWG and smaller shall be solid copper. Conductors No. 8 AWG and larger shall be stranded copper. Wires and cables manufactured more than twelve months prior to date of delivery to the site shall not be used.

2.1.4.1 Color coding is required for all feeder, branch, control, and signalling circuit conductors. Color shall be white for neutrals and green for grounding conductors. The color of the ungrounded conductors in different voltage systems shall be as follows:

a. 277/480 volt, 3-phase: yellow, brown, and orange

b. 120/240 volt, single phase: red and black

All ungrounded conductors of the same color shall be connected to the same ungrounded feeder conductor.

2.1.4.2 Conductor sizes are expressed in American Wire Gage (AWG). Minimum size for branch circuits shall be No. 12 AWG, except that control circuits shall be No. 14 AWG.

2.1.4.3 Power and Lighting Conductors: UL 83, type THW or THWN.

2.1.4.4 Grounding and Bonding Conductors: ASTM B 1, solid bare copper wire for sizes No. 8 AWG and smaller; ASTM B 8, class B, stranded bare copper wire for sizes No. 6 AWG and larger. Grounding and bonding conductors shall be insulated type where indicated or specified.

2.1.4.5 Flexible Connections: Connections to movable equipment shall be flexible metal conduit with the number of conductors indicated.

2.1.5 Splices and Termination Components: UL 486A and UL 486B, as applicable for wire connectors, and UL 510 for insulating tapes. Connectors for wires No. 10 and smaller shall be insulated pressure-type or wirenut-type. Provide solderless terminal lugs on stranded conductors.

2.1.6 Device Plates: Provide one-piece device plates for outlets and fittings to suit the devices installed. Plates on unfinished walls and on fittings shall be of zinc-coated sheet steel or cast metal having round or beveled edges. Screws shall be machine type with countersunk heads in a color to match the finish of the plate. The use of sectional type device plates will not be permitted. Plates installed in wet locations shall be gasketed.

2.1.7 Switches:

2.1.7.1 Toggle Switches: Fed. Spec. W-S-896, totally enclosed with bodies of thermosetting plastic and a mounting strap. Handles shall be brown. Wiring terminals shall be of the screw type, side wired. Switches shall be rated quiet-type AC only, 20 ampere, 120-277 volts, with the number of poles indicated.

2.1.7.2 Disconnect Switches: NEMA KS1, heavy duty nonfused unless otherwise indicated, single throw, quick-make quick-break, 600 volts, and the number of poles indicted. Provide switches enclosure type as indicated per NEMA ICS6. Provide fused switches with fuse-holders to accept the specified fuse type. Switches serving as motor-disconnect means shall be horsepower rated.

2.1.8 Receptacles: NEMA WD 1,heavy duty, grounding type. Ratings and configurations shall be as indicated. Bodies shall be of brown thermosetting plastic supported on a metal mounting strap. Wiring terminals shall be of the screw type, side wired. Connect grounding pole to the mounting strap.

2.1.9 Panelboards: UL 67 and UL 50, as applicable. Panelboards shall be circuit breaker equipped. Design complete panelboard assembly so that any individual breaker can be removed without disturbing adjacent units or without loosening or removing supplemental insulation supplied as a means of obtaining clearances as required by UL. Where "space only" is indicated, make provisions for the future installation of a breaker sized as indicated.

2.1.9.1 Panelboard Buses: Provide copper bus bars supported on bases independent of the circuit breakers. Design main buses and back pans so that breakers may be changed without machining, drilling, or tapping. Provide an insulated neutral bus in each panel for connection of circuit neutral conductors. Provide a separate ground bus marked with a green stripe along its front and bonded to the steel cabinet for connecting grounding conductors.

2.1.9.2 Circuit Breakers: Fed. Spec. W-C-375 unambient-compensated thermal magnetic type with interrupting capacity of 10,000 amperes symmetrical minimum unless otherwise indicated. Design breakers to accept copper, copper-clad, and aluminum conductors.

2.1.10 Fuses: Provide a complete set of fuses for each fusible switch. Time-current characteristics curves of fuses serving motors or connected in series with circuit breakers or other circuit protective devices shall be coordinated for proper operation. Fuses shall have a voltage rating not less than the circuit voltage.

2.1.10.1 Cartridge Fuses, Current-limiting type (Class J): UL 198C

2.1.10.2 Cartridge Fuses, Current-limiting Type (Class RK): UL 198E, Class RK5 rated 600 volts.

2.1.11 Transformers: NEMA ST20, general purpose, dry-type, self cooled, ventilated. Provide transformers in a NEMA 1 enclosure. Transformer shall have 220 degrees C insulation system with a temperature rise not exceeding 115 degrees C under full rated load in a maximum ambient of 40 degrees C. Transformer shall be capable of carrying continuously 115 percent of the nameplate KVA without exceeding the insulation rating.

2.1.12 Motors: NEMA MG1. The approximate size of each motor is indicated. Determine specific motor characteristics to insure provision of correctly sized starters and overload heaters. Motors for operation on 480-volts, 3-phase shall have voltage rating of 460 volts. Motors shall be designed to operate at full capacity with a voltage variation of plus or minus 10 percent of the motor voltage rating. Motors shall be of sufficient size for the duty to be performed and shall not exceed their full load nameplate current rating when driven equipment is operated at specified capacity under the most severe conditions likely to be encountered.

2.1.13 Motor Control System:

2.1.13.1 Motor Starter Panelboard: Rigid, totally-enclosed unit consist of vertical sections as indicated. Approximate dimensions shall be 94 inches high, 40 inches wide and 10 inches deep. The unit shall be front-accessible and designed for mounting against a wall. The starter center shall be equipped with the required pull boxes, conduit access spaces, and horizontal and vertical wiring channels necessary to provide easy installation and neat construction.

2.1.13.2 Rating: The motor starter panelboard shall be rated 600 volts with copper bus. Main bus ratings shall be 225 amps. Bus bracing shall be manufacturer's standard.

2.1.13.3 Enclosure: The front doors shall be hinged and gasketed and the enclosure shall be NEMA Type 1. The enclosure shall be constructed of minimum 12 gauge steel, formed and reinforced with structural members, to give a rigid construction.

2.1.13.4 Combination Starters: Each starter shall be a combination circuit breaker and starter. Minimum interrupting rating shall be 10,000 amp. symmetrical. Circuit breakers shall be molded case. Circuit breaker handles shall be operable from the outside front of the access door and shall be interlocked so that the door cannot be opened unless the breaker or switch is in the "off" position. Each starter unit shall contain all accessories as indicated or required to provide motor operational requirements as specified.

2.1.13.5 Truck Driver Control Panel shall be NEMA 4 with hinged cover and shall include and be sized to adequately house the following devices: (a) red high level and red motor running (pulse switch) indicating lights for high level indicator for silo; (b) start-stop push buttons for dust collector fan for silo with red and green indicating lights and push-to-test switch; (c) alarm horn and push-button silencer; (d) all wiring devices, and associated equipment required to provide motor control operational requirements as specified.

2.1.13.6 Level Indicators: Level indicators shall contain a pre-wired terminal strip, 120 V. single phase shaded pole induction motor, switches and accessories as indicated.

2.1.13.7 Dust Collector Timer Units: Timer units shall be NEMA 1 enclosed and shall contain all devices as indicated or required to sequence dust collector fan and shaker motors.

2.1.13.8 Nameplates: Laminated plastic nameplates shall be provided for each device in motor starter panelboard to identify its function. Laminated plastic shall be 1/8 inch thick Melamine plastic conforming to specification L-P-387 white with black center core. Surface shall be a matte finish. All corners shall be square. The lettering shall be accurately aligned and engraved into the black core. Size of nameplates shall be 1 inch by 2-1/2 inches minimum. Lettering shall be minimum 1/4 inch high normal block lettering.

2.1.14 Grounding and Bonding Equipment: UL 467

2.1.14.1 Equipment Grounds: Provide a green-colored equipment grounding conductor which shall be separate from the electrical system neutral conductor. Provide equipment ground conductors in all branch circuits.

PART 3 - EXECUTION

3.1 INSTALLATION:

3.1.1 General Requirements: Electrical installations shall conform to the requirements of ANSI C2 and NFPA 70 and to the requirements specified herein. Measure mounting heights specified or indicated to the center of the device or outlet. Installation of the motor control system shall be accomplished by a qualified responsible control system contractor recognized as a fully experienced specialist primarily engaged in providing control systems for material conveying systems.

3.1.2 Wiring Methods: Wiring method shall be insulated conductors installed in conduit. Conduit shall be rigid metal conduit, or electrical metallic tubing (EMT) except where specified or indicated otherwise.

3.1.2.1 Electrical Metallic Tubing: Do not install underground, encase in concrete, use in areas where subject to severe physical damage, or use in outdoor work.

3.1.2.2 Nonmetallic Conduit: Use only where specifically indicated or specified for special situations or systems.

3.1.3 Conduit Installation: All conduit shall be run exposed. Keep conduit at least 6 inches away from parallel runs of flues and steam or hot-water pipes. Install conduit parallel with or at right angles to ceilings, walls, and structural members.

3.1.3.1 Support Conduit by pipe straps, wall brackets, hangers, or ceiling trapeze. Fasten by toggle bolts on hollow masonry units; by concrete inserts or expansion bolts on concrete or brick; by machine screws, welded threaded studs, or spring-tension clamps on steel work. Threaded studs driven in by a powder charge and provided with lock washers and nuts may be used in lieu of expansion bolts. Threaded C-clamps may be used on rigid steel conduit only. Do not weld conduits or pipe straps to steel structures. The load applied to fasteners shall not exceed one-fourth of the proof test load. Fasteners attached to concrete ceiling shall be vibration and shock resistant. Holes cut to a depth of more than 1-1/2 inches in reinforced concrete beams or to a depth of more than 3/4-inch in concrete joints shall not cut the main reinforcing bars. Fill holes that are not used. In partitions of light steel construction, use sheet- metal screws.

3.1.3.2 Make changes in direction of runs with symmetrical bends or cast-metal fittings. Make field-made bends and offsets with a hickey or conduit-bending machine. Do not install crushed or deformed conduits. Avoid trapped conduits. Prevent plaster, dirt, or trash from lodging in conduits, boxes, fittings, and equipment during construction. Free clogged conduits of all obstructions.

3.1.3.3 Fasten conduits to sheet metal boxes and cabinets with two locknuts where required by NFPA 70, where insulated bushings are used, and where bushings cannot be brought into firm contact with the box; otherwise, use at least a single locknut and bushing. Locknuts shall be the type with sharp edges for digging into the wall of metal enclosures. Install bushings on the ends of conduits and provide insulating type where required by NFPA 70.

3.1.3.4 Flexible connections of short length shall be provided for equipment subject to vibration, noise transmission, or movement and for all motors. Liquid-tight flexible conduit shall be used in wet locations. A separate ground conductor shall be provided across flexible connections.

3.1.4 Boxes, Outlets, and Supports: Provide boxes in the wiring or raceway systems wherever required for pulling of wires, making connections, and mounting of devices or fixtures. Boxes for metallic raceways shall be of the cast-metal hub type when located in normally wet locations, when surface mounted on outside of exterior surfaces, and when installed exposed up to 7 feet above interior floors and walkways. Boxes in other locations shall be sheet steel except non-metallic boxes may be used with non-metallic conduit. Each box shall have the volume required by the NEC for the number of conductors enclosed in the box. Boxes for mounting lighting fixtures shall be not less than 4 inches square (or octagonal), except that smaller boxes may be installed as required by fixture configurations, as approved. Provide gaskets for cast-metal boxes installed in wet locations and boxes installed flush with the outside of exterior surfaces. Fasten boxes and supports with bolts and expansion shields on concrete or brick, with toggle bolts on hollow masonry units, and with machine screws or welded studs on steel work. [Threaded studs driven in by powder charge and provided with lockwashers and nuts [or nail-type nylon anchors] may be used in lieu of expansion shields, or machine screws.] In open overhead spaces, cast boxes threaded to raceways need not be separately supported except where used for fixture support; support sheet metal boxes directly from the building structure or by bar hangers. Where bar hangers are used, attach the bar to raceways on opposite sides of the box and support the raceway with an approved type fastener not more than 24 inches from the box. When penetrating reinforced-concrete members, avoid cutting any reinforcing steel.

3.1.4.1 Boxes for use with raceway systems shall not be less than 1-1/2 inches deep except where shallower boxes required by structural conditions are approved. Boxes for other than lighting-fixture outlets shall be not less than 4 inches square except that 4 by 2 inch boxes may be used where only one raceway enters the outlet.

3.1.4.2 Pull Boxes: Construct of not less than the minimum size required by the NEC of code-gage aluminum or galvanized sheet steel except where cast-metal boxes are required in locations specified above. Furnish boxes with screw-fastened covers. Where several feeders pass through a common pull box, tag the feeders to indicate clearly the electrical characteristics, circuit number, and panel designation.

3.1.5 Mounting Heights: Mount panelboards so the height of the top operating handle will not exceed 78 inches from the floor. Mount lighting switches 3 feet, 10 inches above finished grade, receptacles, and other devices as indicated.

3.1.6 Conductor Identification: Provide conductor identification within each enclosure where a tap, splice, or termination is made. Make identification with color-coded insulated conductors, plastic-coated self-sticking printed markers, colored nylon cable ties and plates, or heat-shrink type sleeves. Identify control circuit terminations.

3.1.7 Splices: Make splices in accessible locations. Make splices in conductors No. 10 AWG and smaller with an insulated pressure type connector. Make splices in conductors No. 8 AWG and larger with a solderless connector and cover with an insulation material equivalent to the conductor insulation.

3.1.8 Covers and Device Plates: Install with all four edges in continuous contact with finished wall surfaces without the use of mats or similar devices. Plaster fillings will not be permitted. Plates shall be installed with an alignment tolerance of 1/16 inch. The use of sectional type device plates will not be permitted. Plates installed in wet locations shall be gasketed.

3.1.9 Grounding and Bonding: In accordance with NFPA 70. Ground all exposed non-current-carrying metallic parts of electrical equipment, metallic raceway systems, grounding conductor in nonmetallic raceways, and neutral conductor of wiring systems.

3.1.9.1 Equipment Grounds: Equipment grounds shall be solid and continuous from a connection at earth to panelboards. Make ground connections at panelboards, outlets, equipment, and apparatus in an approved and permanent manner.

3.1.10 Equipment Connections: Provide power wiring for the connection of motors and control equipment under this section of the specification.

3.1.11 Repair of Existing Work: Layout the work carefully in advance. Where cutting, channeling, chasing, or drilling of floors, walls, partitions, ceilings, or other surfaces is necessary for the proper installation, support, or anchorage of the conduit, raceways, or other electrical work, do this work carefully. Repair any damage to buildings, piping, or equipment by skilled mechanics of the trades involved.

3.2 FIELD TESTS: As an exception to requirements that may be stated elsewhere in the contract, the Contracting Officer shall be given 5 working days notice prior to each test.

3.2.1 Devices Subject to Manual Operation: Each device subject to manual operation shall be operated at least five times, demonstrating satisfactory operation each time.

3.2.2 Test on 600-Volt Wiring: Test all 600-volt wiring to verify that no short circuits or accidental grounds exist. Tests shall be made using an instrument which applies a voltage of approximately 500 volts to provide a direct reading of resistance.

3.2.3 Grounding System Test: Test the grounding system to assure continuity and that the resistance to ground is not excessive.

3.2.4 Motor Control System Test: An operational system test shall be performed by the Contractor in the presence of the Contracting Officer and the equipment manufacturer representative to verify conformance with the motor control operational requirements of the specification.

3.3 MOTOR CONTROL OPERATIONAL REQUIREMENTS:

3.3.1 Control of dust collector for silo with associated timer shall be as indicated. This dust collector shall operate independently from the the remainder of the motor control system and shall contain all devices as indicated or required for the timed sequence of fan and shaker motor operation.

3.3.2 The control system shall function to convey lime from the silo to the storage hopper. The control system shall contain all required devices to automatically start, in the proper operating sequence with appropriate time delays as recommended by the equipment manufacturer, the air compressor, silo rotary blower motor, airslides blower motor, airlock gear motor, and feeder gear motor by engaging a single start push button located in the motor starter center in Building 110. The control system shall contain all required devices to automatically stop, in the proper operating sequence with appropriate time delays to purge the system as recommended by the equipment manufacturer, the conveying system by: (a) engaging a single stop push button located in the motor starter center in Building 110; (b) a high level condition as indicated by the high level indicator of the storage hopper being pumped into. Once the conveying system is stopped by activating the stop push button, or automatically by a high level condition, the dust collector shaker motor shall be automatically sequenced for the pre-determined time as recommended by the equipment manufacturer.

3.3.3 Alarms: The following alarms shall be provided for the motor control system: (a) audible and visual high and low level alarm for the silo and storage hopper at the motor starter center located in Building No. 110; (b) audible and visual high level alarm for the silo at the truck drivers control panel. Alarm horn shall have provisions to silence horn once an alarm condition is received.

*** END OF SECTION ***

SUPERSEDEAS DECISION

STATE: NORTH CAROLINA
COUNTIES: BRUNSWICK, CARTERET, COLUMBUS, CRAVEN, DUPLIN, JONES, LENOIR, NEW HANOVER, ONSLOW, PAMLICO, AND PENDER
DECISION NUMBER: NC81-1201 DATE: DATE OF PUBLICATION
Supersedes Decisions Number NC81-1181, dated January 23, 1981, 46 FR 7745; NC81-1182, dated January 23, 1981, 46 FR 7744; Number NC81-1147, dated December 30, 1980, 45 FR 86200.
DESCRIPTION OF WORK: BUILDING CONSTRUCTION PROJECTS (does not include single family homes and apartments up to and including four stories).

	Basic Hr. Rate	FRINGE BENEFITS PAYMENTS			
		H&W	Pensions	Vacation	Edu and/or Appr. Tr.
Asbestos Workers	$7.26				
Bricklayers	7.10				
Carpenters	6.02				
Cement Masons	5.68				
Drywell Mechanics	7.00				
Electricians	6.22				
Electronic Technicians	4.50				
Glaziers	5.38				
Ironworkers	6.66				
Laborers:					
Laborers - General	3.78				
Pipe Layers	4.94				
Millworkers	9.45				
Painters	5.00				
Plasters	6.00				
Plumbers & Pipefitters	6.52				
Roofers	5.91				
Sheet Metal Workers	6.38				
Soft Floor Layers	7.00				
Sprinkler Fitters	7.95				
Tile Setters	6.00				
Truck Drivers	3.90				
Welders - Rate for Craft					
Power Equipment Operators:					
Asphalt Raker	4.27				
Backhoe	5.32				
Bulldozer	5.25				
Crance	6.80				
Distributor	4.70				
Fork Lift	6.50				
Front End Loader	4.50				
Motor Grader	5.36				
Paver - Screed	4.25				
Roller	5.00				
Scraper - Pan	4.60				
Tractor	5.00				

Unlisted classifications needed for work not included within the scope of the classifications listed may be added after award only as provided in the labor standards contract clause (29 CFR, 5.5(a)(1)(ii)).

05-82-2161

WAGE DETERMINATION