Preliminary Determination

and

Technical Evaluation

U.S. Naval Station, Mayport

BCP 750T Incinerator

Duval County, Florida

Permit Number: AC 16-74130

Florida Department of Environmental Regulation

Bureau of Air Quality Management

Central Air Permitting

December 6, 1983

NOTICE OF PROPOSED AGENCY ACTION

The Department of Environmental Regulation gives notice of its intent to issue a permit to Naval Station, Mayport for the construction of a classified waste incinerator at their existing facility in Mayport, Duval County, Florida. A determination of best available control technology (BACT) was not required.

A person who is substantially affected by the department's proposed permitting decision may request a hearing in accordance with Section 120.57, Florida Statutes, and Chapters 17-1 and 28-5, Florida Administrative Code. The request for hearing must be filed (received) in the Office of General Counsel of the department at 2600 Blair Stone Road, Twin Towers Office Building, Tallahassee, Florida 32301, within fourteen (14) days of publication of this notice. Failure to file a request for hearing within this time period shall constitute a waiver of any right such person may have to request a hearing under Section 120.57, Florida Statutes.

The application, technical evaluation and department intent are available for public inspection during normal business hours, 8:00 a.m. to 5:00 p.m., Monday through Friday, except legal holidays, at the following locations:

DER Bureau of Air Quality Management
2600 Blair Stone Road
Tallahassee, Florida 32301

DER Northeast District
3426 Bills Road
Jacksonville, Florida 32207

Duval County Dept. of Health Welfare and
Bio-Environmental Services
515 West Sixth Street
Jacksonville, Florida 32206

Comments on this action shall be submitted in writing to Bill Thomas of Tallahassee office within thirty (30) days of this notice.

RULES OF THE ADMINISTRATIVE COMMISSION
MODEL RULES OF PROCEDURE
CHAPTER 28-5
DECISIONS DETERMINING SUBSTANTIAL INTERESTS

28-5.15 Requests for Formal and Informal Proceedings

(1) Requests for proceedings shall be made by petition to the agency involved. Each petition shall be printed typewritten or otherwise duplicated in legible form on white paper of standard legal size. Unless printed, the impression shall be on one side of the paper only and lines shall be double spaced and indented.

(2) All petitions filed under these rules should contain:

(a) The name and address of each agency affected and each agency's file or identification number, if known;

(b) The name and address of the petitioner or petitioners;

(c) All disputed issues of material fact. If there are none, the petition must so indicate;

(d) A concise statement of the ultimate facts alleged, and the rules, regulations and constitutional provisions which entitle the petitioner to relief;

(e) A statement summarizing any informal action taken to resolve the issues, and the results of that action;

(f) A demand for the relief to which the petitioner deems himself entitled; and

(g) Such other information which the petitioner contends is material.

SYNOPSIS OF APPLICATION

I. APPLICANT NAME AND LOCATION

A. Name and Address of Applicant

U.S. Naval Station, Mayport
Maine Street, NS Mayport
NAS Cecil Field, Florida 32215

B. Source Location

The proposed source is located at Maine Street, in the city of Mayport, in Duval County, Florida.

The UTM coordinates are 459.918 Km East and 3,362.294 Km North.

C. Project Description

The applicant proposes to construct a 575 lb/hr classified waste (paper products) incinerator. This incinerator (Model No. BCP 750T, manufactured by Environmental Products, Inc.) will consist of a primary and secondary chamber and will be equipped with an ash removal system. The primary combustion chamber will partially burn and convert the combustible material to gas and the secondary combustion chamber will consume combustible gases and entrained combustible particles. The secondary chamber has additional air introduced so that the fine particles are oxidized rapidly. This incinerator will operate on a batch feed basis.

II. RULE APPLICABILITY

The proposed project is subject to preconstruction review under the provisions of Chapter 403, Florida Statutes, and Chapter 17-2, Florida Administrative Code. Specifically, the Naval Station Mayport's incinerator is a minor stationary source, as defined in Chapter 17-2, Florida Administrative Code.

The proposed source is located in the area of influence of the Duval County particulate nonattainment area. This location is also designated as nonattainment for ozone (Rule 17-2.410), attainment for NO_x and CO (Rule 17-2.420), and unclassifiable for SO_2 (Rule 17-2.430).

The proposed project is exempt from provisions of Rule 17-2.510, New Source Review for Nonattainment Areas.

The proposed project shall comply with provisions of Rules 17-2.600(1)(a)1. and 2., Specific Source Emission Limiting Standards, 17-2.620, General Pollutant Emissions Limiting

Standard, and 17-2.700, Stationary Point Source Emissions Test Procedures.

The proposed project shall be permitted under Rule 17-2.520, Sources Not Subject to Prevention of Significant Deterioration or Nonattainment Requirements.

III. SOURCE IMPACT ANALYSIS

A. Emissions Limitations

The operation of the proposed incinerator will produce emissions of particulate matter (PM), sulfur dioxide (SO_2), nitrogen oxide (NO_x), carbon monoxide (CO), and volatile organic compounds (VOC).

Table 1 summarizes the potential emissions of all pollutants regulated under the Act which are affected by the proposed source. As the table shows, the proposed source is a minor emitting facility for all pollutants. The emission limit selected as permitted emission, which was made a condition of the permit, is listed in Table 2. The permitted emission is in compliance with the department's applicable rules and regulations.

B. Air Quality Analysis

No ambient monitoring or modeling is required to provide reasonable assurance that ambient air standard will not be violated.

IV. CONCLUSIONS

Based on review of the data submitted by Naval Station Mayport for the operation of a BCP 750T incinerator, the FDER concludes that compliance with all applicable state air quality regulations will be achieved provided certain specific conditions are met.

TABLE 1
SUMMARY OF POTENTIAL EMISSIONS

Pollutant	Emission Factor(1) (lb/ton)	Process Rate (ton/hr)	Emission Rate (lb/hr)	Emission Rate (ton/yr)*
Particulates	7	0.29	2.0	2.91
SO_2	2.5	0.29	0.7	1.02
CO	10	0.29	2.9	4.22
HC	3	0.29	0.9	1.31
NO_x	3	0.29	0.9	1.31

(1) Industrial and commercial wastes based on AP-42 Emission factors Table 2.1-1 and a process rate of 0.29 ton/hr.

* Annual operating time is 2912 hours per year.

TABLE II
ALLOWABLE EMISSIONS

OPACITY

No visible emissions shall be allowed (5% opacity) except that visible emissions with a density of Number 1 on the Ringelmann Chart (20% opacity) shall be allowed for up to three minutes in any one hour period.

STATE OF FLORIDA

DEPARTMENT OF ENVIRONMENTAL REGULATION

TWIN TOWERS OFFICE BUILDING
2600 BLAIR STONE ROAD
TALLAHASSEE, FLORIDA 32301-8241

BOB GRAHAM
GOVERNOR

VICTORIA J. TSCHINKEL
SECRETARY

PERMITTEE:

U. S. Naval Station, Mayport
Maine Street, NS Mayport
NAS Cecil Field, Florida
32215

Permit Number: AC 16-74130
Date of Issue:
Expiration Date: June 30, 1985
County: Duval
Latitude/Longitude: 30° 23' 37"N
81° 25' 02"W
Project: BCP 750T Incinerator

This permit is issued under the provisions of Chapter(s) 403, Florida Statutes, and Florida Administrative Code Rule(s) 17-2 and 17-4. The above named permittee is hereby authorized to perform the work or operate the facility shown on the application and approved drawing(s), plans, and other documents attached hereto or on file with the department and made a part hereof and specifically described as follows:

For the operation of an incinerator manufactured by Environmental Products Inc., Model No. BCP 750T, burning 575 lb/hr Type I waste to be located at the Naval Station, in Mayport, Duval County, Florida. The UTM coordinates are 459.91 Km East ad 3,362.29 Km North.

The construction shall be in accordance with the attached permit application, plans and documents except as otherwise noted on pages 5 through 7, Specific Conditions.

Attachments:

1. Application to Construct Air Pollution Sources, DER Form 17-1.202(1) received on August 15, 1983.

2. Clair Fancy's letter of September 13, 1983.

3. Response to Clair Fancy's letter received on October 24, 1983.

PERMITTEE: U.S. Naval Station, Mayport
I. D. Number:
Permit Number: AC 16-74130
Date of Issue:
Expiration Date:

GENERAL CONDITIONS:

1. The terms, conditions, requirements, limitations, and restrictions set forth herein are "Permit Conditions" and as such are binding upon the permittee and enforceable pursuant to the authority of Sections 403.161, 403.727, or 403.859 through 403.861, Florida Statutes. The permittee is hereby placed on notice that the department will review this permit periodically and may initiate enforcement action for any violation of the "Permit Conditions" by the permittee, its agents, employees, servants or representatives.

2. This permit is valid only for the specific processes and operations applied for and indicated in the approved drawings or exhibits. Any unauthorized deviation from the approved drawings, exhibits, specifications, or conditions of this permit may constitute grounds for revocation and enforcement action by the department.

3. As provided in Subsections 403.087(6) and 403.722(5), Florida Statutes, the issuance of this permit does not convey any vested rights or any exclusive privileges. Nor does it authorize any injury to public or private property or any invasion of personal rights, nor any infringement of federal, state or local laws or regulations. This permit does not constitute a waiver of or approval of any other department permit that may be required for other aspects of the total project which are not addressed in the permit.

4. This permit conveys no title to land or water, does not constitute state recognition or acknowledgement of title, and does not constitute authority for the use of submerged lands unless herein provided and the necessary title or leasehold interests have been obtained from the state. Only the Trustees of the Internal Improvement Trust Fund may express state opinion as to title.

5. This permit does not relieve the permittee from liability for harm or injury to human health or welfare, animal, plant or aquatic life or property and penalties therefore caused by the construction or operation of this permitted source, nor does it allow the permittee to cause pollution in contravention of Florida Statutes and department rules, unless specifically authorized by an order from the department.

GENERAL CONDITIONS:

6. The permittee shall at all times properly operate and maintain the facility and systems of treatment and control (and related appurtenances) that are installed or used by the permittee to achieve compliance with the conditions of this permit, as required by department rules. This provision includes the operation of backup or auxiliary facilities or similar systems when necessary to achieve compliance with the conditions of the permit and when required by department rules.

7. The permittee, by accepting this permit, specifically agrees to allow authorized department personnel, upon presentation of credentials or other documents as may be required by law, access to the premises, at reasonable times, where the permitted activity is located or conducted for the purpose of:

a. Having access to and copying any records that must be kept under the conditions of the permit;

b. Inspecting the facility, equipment, practices, or operations regulated or required under this permit; and

c. Sampling or monitoring any substances or parameters at any location reasonably necessary to assure compliance with this permit or department rules.

Reasonable time may depend on the nature of the concern being investigated.

8. If, for any reason, the permittee does not comply with or will be unable to comply with any condition or limitation specified in this permit, the permittee shall immediately notify and provide the department with the following information:

a. a description of and cause of non-compliance; and

b. the period of noncompliance, including exact dates and times; or, if not corrected, the anticipated time the noncompliance is expected to continue, and steps being taken to reduce, eliminate, and prevent recurrence of the noncompliance.

PERMITTEE: U.S. Naval Station, Mayport
I. D. Number:
Permit Number: AC 16-74130
Date of Issue:
Expiration Date:

GENERAL CONDITIONS:

The permittee shall be responsible for any and all damages which may result and may be subject to enforcement action by the department for penalties or revocation of this permit.

9. In accepting this permit, the permittee understands and agrees that all records, notes, monitoring data and other information relating to the construction or operation of this permitted source, which are submitted to the department, may be used by the department as evidence in any enforcement case arising under the Florida Statutes or department rules, except where such use is proscribed by Sections 403.73 and 403.111, Florida Statutes.

10. The permittee agrees to comply with changes in department rules and Florida Statutes after a reasonable time for compliance, provided however, the permittee does not waive any other rights granted by Florida Statutes or department rules.

11. This permit is transferable only upon department approval in accordance with Florida Administrative Code Rules 17-4.12 and 17-30.30, as applicable. The permittee shall be liable for any non-compliance of the permitted activity until the transfer is approved by the department.

12. This permit is required to be kept at the work site of the permitted activity during the entire period of construction or operation.

13. This permit also constitutes:

( ) Determination of Best Available Control Technology (BACT)
( ) Determination of Prevention of Significant Deterioration (PSD)
( ) Compliance with New Source Performance Standards.

14. The permittee shall comply with the following monitoring and record keeping requirements:

a. Upon request, the permittee shall furnish all records and plans required under department rules. The retention period for all records will be extended automatically, unless otherwise stipulated by the department, during the course of any unresolved enforcement action.

PERMITTEE: U.S. Naval Station, Mayport
I. D. Number:
Permit Number: AC 16-74130
Date of Issue:
Expiration Date:

GENERAL CONDITIONS:

b. The permittee shall retain at the facility or other location designated by this permit records of all monitoring information (including all calibration and maintenance records and all original strip chart recordings for continuous monitoring instrumentation), copies of all reports required by this permit, and records of all data used to complete the application for this permit. The time period of retention shall be at least three years from the date of the sample, measurement, report or application unless otherwise specified by department rule.

c. Records of monitoring information shall include:

- the date, exact place, and time of sampling or measurements;
- the person responsible for performing the sampling or measurements;
- the date(s) analyses were performed;
- the person responsible for performing the analyses;
- the analytical techniques or methods used; and
- the results of such analyses.

15. When requested by the department, the permittee shall within a reasonable time furnish any information required by law which is needed to determine compliance with the permit. If the permittee becomes aware that relevant facts were not submitted or were incorrect in the permit application or in any report to the department, such facts or information shall be submitted or corrected promptly.

SPECIFIC CONDITIONS:

1. No visible emissions shall be allowed (5% opacity) except that visible emissions with a density of Number 1 on the Ringelmann Chart (20% opacity) shall be allowed for up to three minutes in any one hour period. Visible emission standard shall be determined by DER Method 9 as described in Chapter 17-2.700, FAC. The department shall be notified 30 days in advance of the compliance test. The test shall be conducted at 90 to 100% capacity.

2. The fuel used to fire the incinerator will be fuel oil No. 2. The sulfur content in the fuel shall not exceed 0.3%.

PERMITTEE: U.S. Naval Station, Mayport

I. D. Number:
Permit/Number: AC 16-74130
Date of Issue:
Expiration Date:

SPECIFIC CONDITIONS:

3. The minimum temperature in the secondary chamber shall be 1500°F.

4. This source shall be allowed to operate:

$$2912 \text{ hours per year } \left(8 \frac{\text{hrs}}{\text{day}} \times 7 \frac{\text{days}}{\text{week}} \times \frac{52 \text{ weeks}}{\text{year}}\right)$$

5. No objectionable odor shall be allowed from this unit.

6. This incinerator shall be used only for the combustion of Type I waste (paper products).

7. This incinerator shall not be loaded in excess of its permitted capacity of 575 pounds per hour.

8. Any time this unit is found to be performing inadequately because of overloading, neglect, or other reasons, the owner shall discontinue its use until measures are provided to correct the cause of such performance.

9. The incinerator shall have a metal name plate affixed in a conspicuous place on the incinerator shell showing manufacturer, model number, type waste, rated capacity, and construction permit number.

10. There shall be no open burning at this site.

11. Ash residue shall be disposed of at the permitted landfill.

12. The applicant will demonstrate compliance with the conditions of the construction permit, and submit a complete application for an operating permit to the Duval County's Bio-Environmental Services and a copy to the Department's Northeast District office prior to 90 days of the expiration date of the construction permit. The applicant may continue to operate in compliance with all terms of the construction permit until its expiration date or issuance of an operating permit.

13. Upon obtaining an operating permit, the applicant will be required to submit periodic reports on the actual operation and emissions of the unit. Reports will give emission data, emission results, and hours of operation.

PERMITTEE: Naval Station
Mayport

I. D. Number:
Permit Number: AC 16-74130
Date of Issue:
Expiration Date:

SPECIFIC CONDITIONS:

14. The source shall comply with the provisions and requirements of the attached general conditions.

Issued this ___ day of_____, 1983

STATE OF FLORIDA DEPARTMENT OF
ENVIRONMENTAL REGULATION

_____
VICTORIA J. TSCHINKEL, Secretary

____ pages attached.

ATTACHMENT 1

DEPARTMENT OF HEALTH, WELFARE
& BIO-ENVIRONMENTAL SERVICES
Bio-Environmental Services Division
Air and Water Pollution Control

August 30, 1983

Bill Teresa

Mr. C. H. Fancy
Deputy Chief
Bureau of Air Quality Management
Dept. of Environmental Regulation
2600 Blairstone Road
Tallahassee, Florida 32301

Re: Classified Waste Incinerator

Dear Mr. Fancy:

A copy of the construction permit application for the subject source has been reviewed by this Office and the following comments are offered -

This new source of particulates is a modification to a minor facility, and is exempted from the provisions of Section 17-2.510 (4) Florida Administrative Code (FAC). It should be permitted in accordance with Section 17-2.600(1)(a)FAC. The sizing and operating characteristics appear suitable for the intended use.

If you have any questions, please telephone this Office at 685-3303 (suncom).

Very truly yours,

Wayne E. Tutt

Wayne E. Tutt
Associate Engineer

WET/vj

DEPARTMENT OF THE NAVY
SOUTHERN DIVISION
NAVAL FACILITIES ENGINEERING COMMAND
2144 MELBOURNE ST., P.O. BOX 10068
CHARLESTON, S. C. 29411
TEL. #803-743-5510

PLEASE ADDRESS REPLY TO THE COMMANDING OFFICER, NOT TO THE SIGNER OF THIS LETTER. REFER TO:
Code 1141

CERTIFIED - RETURN RECEIPT REQUESTED

DER 15 AUG 1983

AUG 17 1983
BAQM

Mr. C. H. Fancy, Deputy Chief
Bureau of Air Quality Management
Department of Environmental Regulation
Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, Florida 32301-8241

Subj: Classified Waste Incinerator, Naval Station, Mayport, Florida

Dear Mr. Fancy:

Pursuant to Chapter 17-2 of the Florida Administrative Code, an application to operate/construct air pollution sources, with calculations, one set of plans and specifications for the subject project are forwarded for your review and approval. The project involves construction of an incinerator capable of burning 575 lbs/hr of classified waste (paper products). The unit will also be equipped with an ash removal system. As you discussed with Mr. Mike Goldston of this Command the last week in July, the funding for this project expires at the end of September, therefore an expeditious review and determination will be appreciated.

In order to aid in expediting this review, one copy of this letter and enclosures are being sent to Mr. Jerry Woosley of the Department of Health, Welfare and Bio-Environmental Control.

As required, the attached check is the processing fee of $100.00 made out to the Florida Department of Environmental Regulation. If there is any additional information needed or should you have any questions, please call Mr. Goldston at the above telephone number.

Very truly yours,

Donald B Campbell

DONALD B. CAMPBELL
CAPT, CEC, USN
Acting Commanding Officer

Copy to:
NAVSTA Mayport, FL (Rosado)
DHWB (Mr. Jerry Woosley)

AC 16- 7413O

STATE OF FLORIDA

DEPARTMENT OF ENVIRONMENTAL REGULATION

NORTHEAST DISTRICT
3426 BILLS ROAD
JACKSONVILLE, FLORIDA 32207

DER

AUG 17 1983

BAQM

BOB GRAHAM
GOVERNOR

VICTORIA J. TSCHINKEL
SECRETARY

G. DOUG DUTTON
DISTRICT MANAGER

APPLICATION TO OPERATE/CONSTRUCT AIR POLLUTION SOURCES

SOURCE TYPE: Incinerator [X] New[1] [ ] Existing[1]

APPLICATION TYPE: [X] Construction [ ] Operation [ ] Modification

COMPANY NAME: Naval Station Mayport COUNTY: Duval

Identify the specific emission point source(s) addressed in this application (i.e. Lime Kiln No. 4 with Venturi Scrubber; Peaking Unit No. 2, Gas Fired) Classified Waste Incinerator

SOURCE LOCATION: Street Maine St., NS Mayport City Mayport

UTM: East 459918.64 North 3362294.213

Latitude 30 ° 23 ' 37 "N Longitude 81 ° 25 ' 02 "W

APPLICANT NAME AND TITLE: Commanding Officer

APPLICANT ADDRESS: NAS Cecil Field, FL 32215

SECTION I: STATEMENTS BY APPLICANT AND ENGINEER

A. APPLICANT

I am the undersigned owner or authorized representative* of Naval Station Mayport

I certify that the statements made in this application for a construction permit are true, correct and complete to the best of my knowledge and belief. Further, I agree to maintain and operate the pollution control source and pollution control facilities in such a manner as to comply with the provision of Chapter 403, Florida Statutes, and all the rules and regulations of the department and revisions thereof. I also understand that a permit, if granted by the department, will be non-transferable and I will promptly notify the department upon sale or legal transfer of the permitted establishment.

*Attach letter of authorization

Signed: Donald R Campbell

Name and Title (Please Type)

Date: _____ Telephone No. _____

B. PROFESSIONAL ENGINEER REGISTERED IN FLORIDA (where required by Chapter 471, F.S.)

This is to certify that the engineering features of this pollution control project have been designed/examined by me and found to be in conformity with modern engineering principles applicable to the treatment and disposal of pollutants characterized in the permit application. There is reasonable assurance, in my professional judgment, that

[1] See Florida Administrative Code Rule 17-2.100(57) and (104)

the pollution control facilities, when properly maintained and operated, will discharge an effluent that complies with all applicable statutes of the State of Florida and the rules and regulations of the department. It is also agreed that the undersigned will furnish, if authorized by the owner, the applicant a set of instructions for the proper maintenance and operation of the pollution control facilities and, if applicable, pollution sources.

Signed: Glenn C. Bradley

GLENN C. BRADLEY
Name (Please Type)

Southern Division, Naval Facilities Engineering Command
Company Name (Please Type)

P. O. Box 10068, Charleston, SC 29411
Mailing Address (Please Type)

Florida Registration No. 8954 Date: 8 Aug 1983 Telephone No. (803) 745-5510

SECTION II: GENERAL PROJECT INFORMATION

A. Describe the nature and extent of the project. Refer to pollution control equipment, and expected improvements in source performance as a result of installation. State whether the project will result in full compliance. Attach additional sheet if necessary.

The U.S. Navy plans to construct a classified waste disposal system consisting of an Environmental Products, Inc. Model No. BCP 750T incinerator. The unit is designed to dispose of 575 #/hr of Type I waste and will operate on No. 2 fuel oil. Project will result in full compliance.

B. Schedule of project covered in this application (Construction Permit Application Only)

Start of Construction October 1983 Completion of Construction October 1984

C. Costs of pollution control system(s): (Note: Show breakdown of estimated costs only for individual components/units of the project serving pollution control purposes. Information on actual costs shall be furnished with the application for operation permit.)

Classified Waste Incinerator - $115,000

D. Indicate any previous DER permits, orders and notices associated with the emission point, including permit issuance and expiration dates.

N/A

E. Requested permitted equipment operating time: hrs/day 8 ; days/wk 7 ; wks/yr 52 ;

if power plant, hrs/yr_____; if seasonal, describe:_____

F. If this is a new source or major modification, answer the following questions. (Yes or No)

1. Is this source in a non-attainment area for a particular pollutant? Yes

   a. If yes, has "offset" been applied? No

   b. If yes, has "Lowest Achievable Emission Rate" been applied? No

   c. If yes, list non-attainment pollutants. Ozone

2. Does best available control technology (BACT) apply to this source? If yes, see Section VI. No

3. Does the State "Prevention of Significant Deterioriation" (PSD) requirement apply to this source? If yes, see Sections VI and VII. No

4. Do "Standards of Performance for New Stationary Sources" (NSPS) apply to this source? No

5. Do "National Emission Standards for Hazardous Air Pollutants" (NESHAP) apply to this source? No

H. Do "Reasonably Available Control Technology" (RACT) requirements apply to this source? No

   a. If yes, for what pollutants?_____

   b. If yes, in addition to the information required in this form, any information requested in Rule 17-2.650 must be submitted.

Attach all supportive information related to any answer of "Yes". Attach any justification for any answer of "No" that might be considered questionable.

SECTION III: AIR POLLUTION SOURCES & CONTROL DEVICES (Other than Incinerators)

A. Raw Materials and Chemicals Used in your Process, if applicable:

Description	Contaminants		Utilization Rate - lbs/hr	Relate to Flow Diagram
	Type	% Wt		

B. Process Rate, if applicable: (See Section V, Item 1)

1. Total Process Input Rate (lbs/hr): _____

2. Product Weight (lbs/hr): _____

C. Airborne Contaminants Emitted: (Information in this table must be submitted for each emission point, use additional sheets as necessary)

Name of Contaminant	Emission[1]		Allowed[2] Emission Rate per Rule 17-2	Allowable[3] Emission lbs/hr	Potential[4] Emission		Relate to Flow Diagram
	Maximum lbs/hr	Actual T/yr			lbs/yr	T/yr	

[1]See Section V, Item 2.

[2]Reference applicable emission standards and units (e.g. Rule 17-2.600(5)(b)2. Table II, E. (1) - 0.1 pounds per million BTU heat input)

[3]Calculated from operating rate and applicable standard.

[4]Emission, if source operated without control (See Section V, Item 3).

D. Control Devices: (See Section V, Item 4)

Name and Type (Model & Serial No.)	Contaminant	Efficiency	Range of Particles Size Collected (in microns) (If applicable)	Basis for Efficiency (Section V Item 5)

E. Fuels

Type (Be Specific)	Consumption*		Maximum Heat Input (MMBTU/hr)
	avg/hr	max./hr	

*Units: Natural Gas--MMCF/hr; Fuel Oils--gallons/hr; Coal, wood, refuse, other--lbs/hr.

Fuel Analysis:

Percent Sulfur: _____ Percent Ash: _____

Density: _____ lbs/gal Typical Percent Nitrogen: _____

Heat Capacity: _____ BTU/lb _____ BTU/gal

Other Fuel Contaminants (which may cause air pollution): _____

_____

F. If applicable, indicate the percent of fuel used for space heating.

Annual Average _____ Maximum _____

G. Indicate liquid or solid wastes generated and method of disposal.

_____

_____

_____

_____

H. Emission Stack Geometry and Flow Characteristics (Provide data for each stack):

Stack Height: _____ ft. Stack Diameter: _____ ft.

Gas Flow Rate: _____ ACFM _____ DSCFM Gas Exit Temperature: _____ °F.

Water Vapor Content: _____ % Velocity: _____ FPS

SECTION IV: INCINERATOR INFORMATION

Type of Waste	Type 0 (Plastics)	Type I (Rubbish)	Type II (Refuse)	Type III (Garbage)	Type IV (Pathological)	Type V (Liq.& Gas By-prod.)	Type VI (Solid By-prod.)
Actual lb/hr Incinerated							575
Uncontrolled (lbs/hr)							--

Description of Waste: Classified Waste (Paper Products)

Total Weight Incinerated (lbs/hr): 575 Design Capacity (lbs/hr): 575

Approximate Number of Hours of Operation per day: 8 day/wk: 7 wks/yr.: 52

Manufacturer: Environmental Products, Inc.

Date Constructed: U/K Model No.: BCP 750T

	Volume $(ft)^3$	Heat Release (BTU/hr)	Fuel Type	Fuel BTU/hr	Temperature (°F)
Primary Chamber	198	2.07 MMBTU/Hr	#2 Fuel Oil	4,080,000	1400
Secondary Chamber	131	0.52 MMBTU/Hr	#2 Fuel Oil	4,080,000	1600

Stack Height: 20 ft. Stack Diamter: 3.0 ft Stack Temp. 900°F

Gas Flow Rate: 6120 ACFM 2308 DSCFM* Velocity: 14.4 FPS

*If 50 or more tons per day design capacity, submit the emissions rate in grains per standard cubic foot dry gas corrected to 50% excess air.

Type of pollution control device: [ ] Cyclone [ ] Wet Scrubber [ ] Afterburner

[X] Other (specify) Ash Removal System

Brief description of operating characteristics of control devices: Secondary chamber receives combustion products from the primary chamber. Solid particles are consumed before discharge to the secondary chamber. An ash removal vacuum type with ash shredder shall be provided.

Ultimate disposal of any effluent other than that emitted from the stack (scrubber water, ash, etc.):

Ash will be disposed of in sanitary landfill.

NOTE: Items 2, 3, 4, 6, 7, 8, and 10 in Section V must be included where applicable.

SECTION V: SUPPLEMENTAL REQUIREMENTS

Please provide the following supplements where required for this application.

1. Total process input rate and product weight -- show derivation [Rule 17-2.100(127)]

2. To a construction application, attach basis of emission estimate (e.g., design calculations, design drawings, pertinent manufacturer's test data, etc.) and attach proposed methods (e.g., FR Part 60 Methods 1, 2, 3, 4, 5) to show proof of compliance with applicable standards. To an operation application, attach test results or methods used to show proof of compliance. Information provided when applying for an operation permit from a construction permit shall be indicative of the time at which the test was made.

3. Attach basis of potential discharge (e.g., emission factor, that is, AP42 test).

4. With construction permit application, include design details for all air pollution control systems (e.g., for baghouse include cloth to air ratio; for scrubber include cross-section sketch, design pressure drop, etc.)

5. With construction permit application, attach derivation of control device(s) efficiency. Include test or design data. Items 2, 3 and 5 should be consistent: actual emissions = potential (1-efficiency).

6. An 8 1/2" x 11" flow diagram which will, without revealing trade secrets, identify the individual operations and/or processes. Indicate where raw materials enter, where solid and liquid waste exit, where gaseous emissions and/or airborne particles are evolved and where finished products are obtained.

7. An 8 1/2" x 11" plot plan showing the location of the establishment, and points of airborne emissions, in relation to the surrounding area, residences and other permanent structures and roadways (Example: Copy of relevant portion of USGS topographic map).

8. An 8 1/2" x 11" plot plan of facility showing the location of manufacturing processes and outlets for airborne emissions. Relate all flows to the flow diagram.

9. The appropriate application fee in accordance with Rule 17-4.05. The check should be made payable to the Department of Environmental Regulation.

10. With an application for operation permit, attach a Certificate of Completion of Construction indicating that the source was constructed as shown in the construction permit.

SECTION VI: BEST AVAILABLE CONTROL TECHNOLOGY N/A

A. Are standards of performance for new stationary sources pursuant to 40 C.F.R. Part 60 applicable to the source?

[ ] Yes [ ] No

Contaminant	Rate or Concentration

B. Has EPA declared the best available control technology for this class of sources (If yes, attach copy)

[ ] Yes [ ] No

Contaminant	Rate or Concentration

C. What emission levels do you propose as best available control technology?

Contaminant	Rate or Concentration

D. Describe the existing control and treatment technology (if any).

1. Control Device/System:
2. Operating Principles:
3. Efficiency:*
4. Capital Costs:

*Explain method of determining

5. Useful Life:

6. Operating Costs:

7. Energy:

8. Maintenance Cost:

9. Emissions:

Contaminant	Rate or Concentration

10. Stack Parameters

a. Height: ft.

b. Diameter: ft.

c. Flow Rate: ACFM

d. Temperature: °F.

e. Velocity: FPS

E. Describe the control and treatment technology available (As many types as applicable, use additional pages if necessary).

1.

a. Control Device:

b. Operating Principles:

c. Efficiency:[1]

d. Capital Cost:

e. Useful Life:

f. Operating Cost:

g. Energy:[2]

h. Maintenance Cost:

i. Availability of construction materials and process chemicals:

j. Applicability to manufacturing processes:

k. Ability to construct with control device, install in available space, and operate within proposed levels:

2.

a. Control Device:

b. Operating Principles:

c. Efficiency:[1]

d. Capital Cost:

e. Useful Life:

f. Operating Cost:

g. Energy:[2]

h. Maintenance Cost:

i. Availability of construction materials and process chemicals:

[1]Explain method of determining efficiency.
[2]Energy to be reported in units of electrical power - KWH design rate.

j. Applicability to manufacturing processes:

k. Ability to construct with control device, install in available space, and operate within proposed levels:

3.

a. Control Device:

b. Operating Principles:

c. Efficiency:[1]

d. Capital Cost:

e. Useful Life:

f. Operating Cost:

g. Energy:[2]

h. Maintenance Cost:

i. Availability of construction materials and process chemicals:

j. Applicability to manufacturing processes:

k. Ability to construct with control device, install in available space, and operate within proposed levels:

4.

a. Control Device:

b. Operating Principles:

c. Efficiency:[1]

d. Capital Costs:

e. Useful Life:

f. Operating Cost:

g. Energy:[2]

h. Maintenance Cost:

i. Availability of construction materials and process chemicals:

j. Applicability to manufacturing processes:

k. Ability to construct with control device, install in available space, and operate within proposed levels:

F. Describe the control technology selected:

1. Control Device:

2. Efficiency:[1]

3. Capital Cost:

4. Useful Life:

5. Operating Cost:

6. Energy:[2]

7. Maintenance Cost:

8. Manufacturer:

9. Other locations where employed on similar processes:

a. (1) Company:

(2) Mailing Address:

(3) City:

(4) State:

[1]Explain method of determining efficiency.
[2]Energy to be reported in units of electrical power - KWH design rate.

(5) Environmental Manager:

(6) Telephone No.:

(7) Emissions:[1]

Contaminant	Rate or Concentration

(8) Process Rate:[1]

b. (1) Company:

(2) Mailing Address:

(3) City: (4) State:

(5) Environmental Manager:

(6) Telephone No.:

(7) Emissions:[1]

Contaminant	Rate or Concentration

(8) Process Rate:[1]

10. Reason for selection and description of systems:

[1]Applicant must provide this information when available. Should this information not be available, applicant must state the reason(s) why.

SECTION VII - PREVENTION OF SIGNIFICANT DETERIORATION

A. Company Monitored Data

1. _____no. sites _____ TSP _____( ) SO^{2}* _____ Wind spd/dir

Period of Monitoring _____/_____/_____ to _____/_____/_____
month day year month day year

Other data recorded _____

Attach all data or statistical summaries to this application.

*Specify bubbler (B) or continuous (C).

2. Instrumentation, Field and Laboratory

a. Was instrumentation EPA referenced or its equivalent? [ ] Yes [ ] No

b. Was instrumentation calibrated in accordance with Department procedures?

[ ] Yes [ ] No [ ] Unknown

B. Meteorological Data Used for Air Quality Modeling

1. _____ Year(s) of data from ____/____/____ to ____/____/____
month day year month day year

2. Surface data obtained from (location)_____

3. Upper air (mixing height) data obtained from (location)_____

4. Stability wind rose (STAR) data obtained from (location)_____

C. Computer Models Used

1. _____ Modified? If yes, attach description.

2. _____ Modified? If yes, attach description.

3. _____ Modified? If yes, attach description.

4. _____ Modified? If yes, attach description.

Attach copies of all final model runs showing input data, receptor locations, and principle output tables.

D. Applicants Maximum Allowable Emission Data

Pollutant	Emission Rate	
TSP	_____	grams/sec
SO^2	_____	grams/sec

E. Emission Data Used in Modeling

Attach list of emission sources. Emission data required is source name, description of point source (on NEDS point number), UTM coordinates, stack data, allowable emissions, and normal operating time.

F. Attach all other information supportive to the PSD review.

G. Discuss the social and economic impact of the selected technology versus other applicable technologies (i.e., jobs, payroll, production, taxes, energy, etc.). Include assessment of the environmental impact of the sources.

H. Attach scientific, engineering, and technical material, reports, publications, journals, and other competent relevant information describing the theory and application of the requested best available control technology.

INCINERATOR CALCULATIONS

1. Data: Assume Moisture of 15%
   Burn Rate = 575 lb/hr
   Heat Value of Paper = 7590 BTU/lb

2. Composition:

   Dry Combustibles - (575 lb/hr)(0.85) = 489 lb/hr
   Moisture - (575 lb/hr)(0.15) = 86 lb/hr

3. Gross Heat of Combustion:

   (489 lb/hr)(7590 BTU/lb) = 3,709,612 BTU/hr

4. Heat Losses:

   Radiation, etc.: (0.2)(3709612) = 741,923 BTU/hr

   Evaporation (Contained Mosture): (86 lb/hr)(1060 BTU/lb) = 91,425

   Evaporation (Water): (0.56)(489 lb/hr)(1060 BTU/lb) = 290,122

   1,123,470 BTU/hr

5. Net Heat:

   3,709,612 - 1,123,470 = 2,586,142 BTU/hr

6. Weight of Products of Combustion with 30% Excess Air:

   Paper (489)(21.7) = 10606 lb/hr

   Water = 86 lb/hr

   10692 lb/hr

7. Gas Temperature:

$$\Delta t = \frac{2586142 \text{ BTU/hr}}{(0.26 \text{ BTU/lb } ^{o}\text{F})(10{,}692 \text{ lb/hr})} = 930^{o}\text{F}$$

   $T = 930 + 60 = 990^{o}\text{F}$

8. Volume - Products of Combustion:

$$(489 \text{ lb/hr})(283.33 \text{ cf/lb}) = 138{,}478 \text{ cfh}$$

$$\frac{(86 \text{ lb/hr})(379 \text{ ft}^3/\text{lb - mol})}{18 \text{ lb/mol}} = 1{,}816$$

$$140{,}294 \text{ cfh}$$

or 2340 cfm

$$\text{Actual Volume} = \frac{460 + 900}{460 + 60}\ (2340) = 6120 \text{ ACFM}$$

DSCFM = 138478 cfh/60 = 2348 DSCFM

9. Fuel (BTU/hr) = (0.5 gpm)(60 min/hr)(136,000 BTU/gal) = 4,080,000 BTU/hr

10. Velocity = $(6120 \text{ ft}^3/\text{min})\left(\frac{1}{60}\right)/(7.1 \text{ ft}^2)$ = 14.4 ft/sec

750T
HEAVY DUTY, NON-CONTINUOUS OPERATION
(NO AUTOMATIC ASH REMOVAL)

Burn Rate	
Type 0	575 #/hr.
Type 1	750 #/hr.
Type 2	900 #/hr.
Type 3	675 #/hr.
Type 4	600 #/hr.
Heat Release Capacity	4,875,000 BTU/hr.
Specific Heat Release	14,850 BTU/hr./ft.³
Flame Port Area	550 sq. in.
Effective Grate Area	31 sq. ft.
Nominal Retention Time, Upper Chamber @ 1800°F	
Type 0	1.04 sec.
Type 1	1.02 sec.
Type 2	1.20 sec.
Type 3	2.20 sec.
Type 4	2.60 sec.

Physical Properties	**Lower Chamber**	**Upper Chamber**
Chamber		
Volume	198 ft.³	131 ft.³ (329 total)
O.D.	6'6"	5'6"
Length	8'0"	8'0"
Length/Diam. Ratio	1.45:1	1.78:1
Lockout Temperature	2100°F.	2300°F.
Refractory	A. P. Green	
Type	Steelkon	
Thickness	5"	5"
Density	130 #/ft.³	130 #/ft.³
Temperature Rating	2800°F.	2800°F.
Insulation	A. P. Green	
Type	Mineral Block	
Thickness	2"	2"
Temperature Rating	1900°F.	1900°F.
Shell Thickness	1/4"	1/4"
Burners	1	1
Mfgr.	North American	
Rating	1.05MM BTU/Hr.	1.85MM BTU/Hr.
Model		
Gas	NA 4422-6	NA 4422-7A
Oil	NA 5422-5	NA 5422-6
Dual	NA 6422-5	NA 6422-6
Blowers		
Underfire Air		
Mfgr.	American Fan	
Model	AF-9 W/1015 WHL	
HP/CFM	1/2 / 325	
Burner Blowers		
Mfgr.	North American	
Model	2308-14-1-1 (Gas)	2308-17-1-1.5
HP/SCFM	2316-17-2-2 (O&D)	2316-17-2-3
Gas	1/175	1.5/308
Oil	2/172	3/262
Dual	2/172	3/262
Combustion (w/o Energy Shrouds)		
Mfgr.	Chicago	
Model		SQA-12-1/4
HP/CFM		2/1625
Combustion (w/Energy Shrouds)		
Mfgr.	N/A	N/A
Model		
HP/CFM		
Cleanout Door	24" x 48"	
Aux. Cleanout Upper Chamber		24" x 24"
Temperature Controllers		
Mfgr.	API	API
Temperature Range	0-3000°F.	0-3000°F.
Weight	18,400 lbs.	14,250 lbs.
Total, Incinerator	32,750 lbs.	
Stack/Section	740 lbs.	

DEPARTMENT OF THE NAVY
SOUTHERN DIVISION
NAVAL FACILITIES ENGINEERING COMMAND
CHARLESTON, SOUTH CAROLINA

SPECIFICATION
NO. 06-83-0015

N62467-83-C-0015

APPROPRIATION:
O&MN

CONSTRUCT CLASSIFIED WASTE INCINERATOR

at the

NAVAL STATION
MAYPORT, FLORIDA

DESIGN BY

SOUTHERN DIVISION
NAVAL FACILITIES ENGINEERING COMMAND
CHARLESTON, SOUTH CAROLINA

SUBMITTED BY

William J. Hill
1 June 1983

SPECIFICATION PREPARED BY

R. Dumay	W. J. Hill	R. Byrd
Civil	Mechanical	Electrical

APPROVED BY

EFD Specification
Branch Head: L B Oimar, PE Design Director: _____

For Commander, NAVFAC: Joel Clay P.E. Date: 6/2/83

J.O. No.: 343P4890 W/R: 4890 SWIC: W. J. Hill EIC: ERB (405)

TABLE OF CONTENTS

NOTE: All work included in Divisions 1, 2, 3, 4, 5, 6, 7, 8, 9, 11, 15 and 16.

SECTION 01011

GENERAL PARAGRAPHS

1. INQUIRIES: All inquiries concerning any phase of this specification, prior to bid opening, shall be made to the Commanding Officer, Southern Division, Naval Facilities Engineering Command, Code 02, P. O. Box 10068, 2144 Melbourne Street, Charleston, South Carolina 29411; Telephone Area Code 803, number 743-3648. QUESTIONS REQUIRING INTERPRETATION OF DRAWINGS AND/OR SPECIFICATIONS MUST BE RECEIVED AT LEAST 15 DAYS BEFORE BID OPENING IN ORDER TO INSURE APPROPRIATE TIME TO FORMULATE A RESPONSE. INTERPRETATIONS OR MODIFICATIONS TO DRAWINGS AND/OR SPECIFICATIONS REQUIRED AS A RESULT OF QUESTIONS WILL BE MADE BY CONTRACT AMENDMENT ONLY. OTHERWISE, BIDDERS SHALL BASE THEIR BIDS ON THE DRAWINGS AND SPECIFICATIONS AS ISSUED. The Government specifications and forms mentioned, other information necessary, and non-Government publications may be examined on application to the Commanding Officer, Southern Division, Naval Facilities Engineering Command, Charleston, South Carolina 29411.

2. GENERAL INTENTION: It is the declared and acknowledged intention and meaning to provide and secure a classified waste incinerator, complete and ready for use.

3. GENERAL DESCRIPTION: The work includes providing a 20-foot X 20-foot masonry building to house the hydraulic ram loader for the incinerator, a 20-foot X 20-foot concrete pad foundation for the incinerator, providing incinerator and loading equipment, incinerator ash removal system, providing electrical, fuel oil, and water and drain service to the loader building and incinerator, sitework and paving.

4. LOCATION: The work shall be located at the Naval Station, Mayport, Florida approximately as shown. The exact location will be indicated by the Contracting Officer.

5. COMMENCEMENT, PROSECUTION, AND COMPLETION OF WORK: The Contractor will be required to commence work under the contract within 10 calendar days after the date of "Notice of Award", to prosecute said work diligently, and to complete the entire work ready for use within 260 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 the 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.

6. LIQUIDATED DAMAGES: In case of failure on the part of the Contractor to complete the work within the time fixed in the contract or extensions thereof, the Contractor shall pay to the Government as liquidated damages pursuant to Clauses entitled "Termination for Default-Damages for Delay - Time Extensions," and "Damages for Delay - Defense Materials System and Priorities" of the General Provisions the sum of $35.00 for each day of delay.

7. 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. The drawings included with this specification are half scale. Full size drawings may be acquired at the bidder's or contractor's expense. Information on obtaining full size drawings is available at the office of the Contracting Officer. Full size drawings may be inspected during regular working hours at the issuing office. Five copies of the contract specification, five sets of drawings and one set of full-size reproducibles will be furnished to the Contractor without charge.

NAVFAC DRAWING NO.	TITLE
5101699	Vicinity Map & Index
5101700	Location Map & Boring Log
5101701	Site Plan
5101702	Layout Plan & Sections
5101703	Foundation, Floor Plan & Sections
5101704	Roof Framing Plan & Elevation
5107629	Mechanical - Electrical

8. UTILITIES FOR CONSTRUCTION AND TESTING: The Contractor will be responsible for obtaining, either from available Government sources or local utility companies, all utilities required for construction and testing. The Contractor shall provide these utilities at his expense, paid for at the current utility rate delivered to the job site. The Contractor shall provide and maintain all temporary utility connections and distribution lines, and all meters required to measure the amount of each utility used.

9. SCHEDULE OF PRICES: A schedule of prices shall be furnished in accordance with clause entitled "Schedule of Prices" of the General Provisions.

10. MATERIALS AND EQUIPMENT TO BE SALVAGED: Clause entitled "Salvage Materials and Equipment" of the General Provisions is hereby cancelled. All existing materials and equipment which are required to be removed or disconnected to perform the work, but are not indicated or specified for use in the new work, shall become the property of the Contractor and shall be removed from Government property.

11. PHYSICAL DATA: Information and data furnished or referred to below are presented for the Contractor's information. However, it is expressly understood that the Government will not be responsible for any interpretation or conclusion drawn therefrom.

a. The physical conditions indicated on the drawings and in the specifications are the result of site investigations by surveys, soil borings.

b. Transportation facilities: Highway.

12. AS-BUILT RECORD OF MATERIALS USED IN BUILDINGS: A record of materials used, in accordance with Clause entitled "As-Built Record of Materials Used in Buildings" of the General Provisions is not required.

13. CONTRACTOR'S INVOICE AND CONTRACT PERFORMANCE STATEMENT: Requests for payment and performance statement shall be submitted in accordance with Clause entitled "Contractor's Invoice and Contract Performance Statement" of The General Provisions.

13.1 Payment for Off-Site Material: The Navy will make every effort to review and process Contractor payment requests in an expeditious nature, thereby assuring earliest possible payment under the contract terms and provisions. The Government will make progress payments for this work on a monthly basis, subject to suitable arrangements for the submission of payment requests being agreed to between the Contractor and the Government. Payment will be made for material delivered on the site subject to the conditions set forth in subparagraph (b) of Clause entitled "Payments to Contractor" of The General Provisions. Payments may also be made for materials stored off construction sites, but in reasonable proximity thereto upon specific request from the Contractor. As a condition precedent to such payments, the Contracting Officer must be satisfied that:

(a) The materials are stored in reasonable proximity to the construction site, so that transportation and attendant hazards are minimized.

(b) The Contractor demonstrates clear title (Paid invoices) to such material.

(c) The materials for which progress payments are requested are adequately insured and protected from theft and the elements through appropriate security measures.

(d) The materials for which progress payments are requested are not susceptible to deterioration or physical damage in storage or in transit to the job site (e.g., items such as steel, machinery, pipe, and fittings, electrical cable, etc., would be acceptable for progress payments; items such as sheetrock, glass, insulation, wall coverings, etc., would not).

(e) Payments will not be made for materials in transit.

14. SECURITY REQUIREMENTS shall be in accordance with Clause entitled "Security Requirements" of The General Provisions.

15. PROGRESS CHARTS AND EQUIPMENT DELIVERY SCHEDULE:

15.1 Progress Charts: The Contractor shall, within 15 days after receipt of Notice of Award, prepare and submit to the Contracting Officer for approval a practicable construction schedule in accordance with Clause entitled "Progress Charts and Requirements for Overtime Work" of The General Provisions except as modified herein. The schedule shall be in the form of a progress chart on Form 6ND-SOUTHDIV-4355-1.

15.2 Equipment Delivery Schedule: The Contractor shall, within 60 days after date of award, submit to the Contracting Officer for approval, a schedule showing the procurement plans for materials, plant and equipment. The data shall be submitted in the format prescribed by the Contracting Officer and shall include but not be limited to the following information:

a. Description.

b. Date of purchase order.

c. Promised shipping date.

d. Name of manufacturer or supplier.

e. Date delivery is expected.

f. Date material or equipment is required according to current progress schedule or network.

The Contractor shall update the progress chart and equipment delivery schedule at monthly intervals or at intervals directed by the Contracting Officer. The revised documents shall reflect any changes occurring since the last updating. The Contractor shall also submit copies of purchase orders and confirmation of delivery dates as directed by the Contracting Officer. Updated progress charts and equipment schedules shall be submitted with each invoice for progress payment (See Clause entitled "Progress Charts and Requirements for Overtime Work" of The General Provisions.)

15.3 Network System: Optionally, the Contractor may use the "CPM" (Critical Path Method), the "PERT" (Program Evaluation and Reporting Technique), or, subject to approval of the Contracting Officer, some other system which will give similar and equal information and control to that provided by the named systems, in lieu of the progress charts specified above. The use of one of these methods shall be subject to the terms of Clause entitled "Progress Charts and Requirements for Overtime Work" of The General Provisions.

16. SAFETY REQUIREMENTS: A copy of the Department of the Army Corps of Engineers, "Safety and Health Requirements Manual", referenced in Clause entitled "Accident Prevention" of The General Provisions, may be examined at the office where bids are being received. (Copies of this publication may be obtained upon application, accompanied by money order, coupon, or cash to the Superintendent of Documents, Government Printing Office, Washington, D. C. 20401). Prior to commencement of the work, the Contractor shall meet in conference with representatives of the Contracting Officer to discuss and develop mutual understandings relative to administration of the safety program.

17. INTERFERENCE WITH STATION OPERATIONS: Clause entitled "Order of Work" of The General Provisions is hereby amended as follows: Delete the last sentence and substitute therefor "Permission to interrupt any station utility, communication, operational or traffic service or pattern shall be requested in writing at least 10 working days prior to the desired date of interruption. The Contractor shall receive approval in writing from the Contracting Officer before the requested interruption may be put into effect.

*** END OF SECTION ***

SECTION 01012

ADDITIONAL GENERAL PARAGRAPHS

1. RECORD DRAWINGS: The Contractor shall maintain at the job site two sets of full size contract drawings, marking them in red to show all variations between the construction actually provided and that indicated or specified in the contract documents, including buried or concealed construction. Where a choice of materials or methods is permitted herein, or where variations in scope or character of work from that of the original contract are authorized, the drawings shall be marked to define the construction actually provided. The representations of such changes shall conform to standard drafting practice and shall include such supplementary notes, legends, and details as necessary to clearly portray the as-built construction. On completion of the work, both sets of marked-up drawings shall be delivered to the Contracting Officer, and shall be subject to his approval before acceptance.

2. METHODS AND SCHEDULES OF PROCEDURES: The work shall be executed in a manner and at such times that will cause the least practicable disturbance to the occupants of the buildings and normal activities of the station. The Contractor shall notify the Contracting Officer at least two weeks in advance of the time he is ready to install the new incinerator. The new incinerator shall not be installed until the foundation and concrete slab have been approved by the Contracting Officer. Before starting any work, the sequence of operations and the methods of conducting the work shall have been approved by the Contracting Officer.

3. SUBCONTRACTORS AND PERSONNEL: Promptly after 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. The list shall include the names of the key personnel of the Contractor and subcontractors, together with their home addresses and telephone numbers, for use in event of any emergency. As changes occur and additional information becomes available, the Contractor shall amplify, correct, and change the information contained in previous lists.

4. DRUG ABUSE BY CONTRACT EMPLOYEES. It has been determined that the illegal possession and use of drugs and paraphernalia by civilian and contract employees in the military setting contributes directly to widespread military drug abuse and undermines command efforts to eliminate drug abuse among military personnel. Every effort will be made to deter and detect drug offenses by civilian and contract employees on military installations. Measures to be taken to identify drug offenses on military installations, and to prevent introduction of illegal drugs and paraphernalia include routine, random inspections of vehicles on entry or exit, with drug detection dog teams, when available; and random inspection of personal possessions on entry or exit. Where there is probable cause to believe that a civilian or contract employee

on a military installation has been engaged in use, possession or trafficking of drugs, that employee may be restricted or detained for the period necessary until the employee can be removed from the installation or can be turned over to local law enforcement authorities having jurisdiction, when appropriate. In any event, civilians or contract employees suspected of committing a drug offense on a military installation may be removed therefrom at the earliest opportunity. When illegal drugs are discovered in the course of an inspection or search of a vehicle operated by a civilian or contract employee, the employee and vehicle may be detained for a reasonable period of time necessary to turn the employee and the vehicle over to appropriate civil law enforcement officials, and action may be taken to suspend, revoke or deny installation driving privileges. Implicit with the acceptance of this contract is the contractor's agreement to comply with all federal statutes, laws and regulations, including those regulations issued by the Commander of the military installation. Refer to clause entitled "MATERIAL AND WORKMANSHIP (1964 JUN)", subclause "(b)" and clause entitled "STATION REGULATIONS (6-72)" of the "General Provisions (Construction Contract)".

5. STORM PROTECTION: Should warnings of wind of gale force or stronger be issued, the Contractor shall take every practicable precaution to minimize danger to persons, to the work, and to adjacent property. These precautions shall include closing all openings, removing all loose materials, tools and equipment from exposed locations, and removing or securing scaffolding and other temporary work.

6. LAYDOWN/STORAGE AREAS: To Clause entitled "CLEANING UP (1965 JAN)" of the General Provisions add the following: "The job site and laydown, storage and work areas shall be maintained in a neat, orderly condition on a continuing basis and shall comply with the standards of cleanliness and appearance regulating the Station. The continued availability of all laydown, storage and work areas to the Contractor will be at the convenience of the Government and subject to strict compliance with Station cleanliness and appearance standards.".

7. LOCATION OF UNDERGROUND FACILITIES: 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 herein, 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 Clause entitled "Differing Site Conditions" of the General Provisions.

7.1 Existing Telephone Lines and TV Cables: Upon proper notification, local telephone and television cable companies will identify and, if necessary, relocate these services to prevent their damage. Prior to beginning excavation, the Contractor shall properly notify these companies and make all such arrangements.

8. COOPERATION WITH OTHER CONTRACTORS: Attention is invited to the fact that other contractors may be engaged in similar and supporting work requiring close cooperation. The Contractor shall cooperate and schedule his work to avoid conflict with and interruption of the work of others insofar as practicable. In the case of conflicts with other contractors that cannot be resolved satisfactorily, the matter shall be referred to the Contracting Officer for decision, and such decision shall be final, subject to right of appeal in accordance with terms of the contract.

*** END OF SECTION ***

SECTION 01401

QUALITY CONTROL

1. QUALITY CONTROL REQUIREMENTS: This contract will be administered under Clause entitled "Contractor Inspection System" of the General Provisions.

2. DEFINITIONS:

2.1 Certified Test Reports: Certified test reports are 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.

2.2 Certified Inspection Reports: Certified inspection reports are those signed by approved inspectors attesting that the items inspected meet the specification requirements other than those exceptions included in the report.

2.3 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.

3. TESTS: All testing shall be divided into three categories as follows:

a. Field Tests, made at, or in the vicinity of the job site in connection with the actual construction including but not limited to concrete batch plants, asphalt batch plants, and similar establishments directly involved in the construction process.

b. Factory Tests, made at the point of manufacture of various products which are shipped to the job site as a unit, including but not limited to such items as transformers, boilers, air conditioning equipment, and electrical equipment.

c. Certified Tests, made by approved testing agencies on material and equipment which is to be incorporated into the structure under the contract. These tests are those such as are performed by Factory Mutual, Underwriters' Laboratories, Inc., and others.

3.1 Field Tests:

3.1.1 Field Tests by the Contractor: The Contractor shall perform all field testing specifically required of him in the contract specifications. He shall furnish all equipment, instruments, qualified personnel, and facilities necessary to perform all tests required by the contract documents. Testing services shall be performed by the Contractor or acquired by the Contractor through a qualified commercial testing laboratory. If a commercial testing laboratory is retained to perform tests under this contract, all test reports shall be certified by a representative of the testing laboratory who is authorized to sign certified test reports for the laboratory. Test reports shall include the acceptable value for each specification item, the actual test results obtained, and the test methods used. 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. The Contractor shall arrange for immediate and direct delivery of the signed original of all reports, certifications, and other documentation to the Contracting Officer.

3.1.2 Field Tests by the Government: Field tests conducted by the Government will be made in accordance with the provisions of Clause entitled "Inspection and Acceptance" of the General Provisions.

3.2 Factory Tests: The Contracting Officer will arrange for factory tests when Government control of such tests is required.

3.3 Manufacturer's Certified Tests: Certified tests on materials to be incorporated into the work will be acceptable, provided they are performed by the manufacturer or by Government approved agencies or laboratories, show that the materials conform to the specification, and that the tests and certifications meet the requirements of the paragraph entitled "Certificates and Certifications" below.

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

a. Laboratories performing work in connection with concrete, steel and bituminous materials must conform to American Society for Testing and Materials (ASTM) Designation E 329-77.

b. Laboratories performing work not in connection with concrete, steel or bituminous materials must conform to sections 3 and 4 of ASTM Designation E 329-77.

4. INSPECTION: All inspection shall be divided into two categories as follows:

a. Field Inspection is that inspection in the vicinity of the job site which, when performed properly, will result in the complete compliance of all work-in-place with the contract drawings and specifications.

b. Factory Inspection is that inspection at the point of manufacture of the various products which are shipped to the job site, including but not limited to such items as transformers, boilers, air conditioning equipment, and electrical equipment.

4.1 Contractor Field Inspection: The Contractor or his designated representative shall inspect all work under this contract.

4.2 Government Field Inspection: The Government will perform inspection in accordance with Clause entitled "Government Inspectors" of the General Provisions.

4.3 Factory Inspection: The Contracting Officer will arrange for factory inspection when Government control is required.

5. SUBMITTALS: Submittals shall be prepared in accordance with 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) (material) 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.

5.1 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 form is not required, any other format must contain the same information as shown on the sample.

5.2 Shop Drawings: Shop drawings submittals shall be in accordance with the requirements of the General Provisions Clause entitled "Shop Drawings".

5.3 Manufacturer's Data: Manufacturer's data, such as catalog cuts, technical data sheets, and descriptive literature, shall be in accordance with the General Provisions Clauses entitled "Catalog Data" and "Proposed Material Submittals Required of the Contractor".

5.4 Samples: Samples shall be prepared and submitted in accordance with Clause entitled "Samples" of the General Provisions. The Contractor shall examine the samples and satisfy himself that they comply with the contract requirements. The samples shall be identified as to their intended use, and shall be accompanied by a letter of certification from the Contractor stating that the samples comply with the contract drawings and specifications.

5.5 Certified Test Reports: Before delivery of materials and equipment, certified copies of the reports of all tests listed in the technical sections shall be submitted and approved. The testing shall have been performed in a laboratory meeting the requirements specified herein. 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.

5.6 Formwork, Falsework, and Erection Procedures Certification: When the Contractor is required to submit a design or certification for formwork, falsework or erection procedures, daily inspection reports must indicate that the work has been inspected for conformance to the design or certification. A specific statement for these items rather than a general statement is required.

6. CERTIFICATES AND CERTIFICATIONS: Manufacturer's certification may be furnished by the Contractor, on items of materials and equipment incorporated into the work, only when this method will assure full compliance with the provisions of the contract, as determined by the Contracting Officer. Pre-printed 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.

7. RECORD OF INSPECTIONS: Pursuant to Clause entitled "Contractor Inspection Systems" of the General Provisions, the Contractor shall maintain, on a day-to-day basis, a record of all inspections and field tests performed that day. The "Daily Report to Inspector" Form NAVFAC 4330/34 (copy attached) shall be submitted to the Contracting Officer by 10:00 AM on the working day following the day the work was performed. Additional forms are available from the Contracting Officer.

8. 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.

SAMPLE FORM (REDUCED FROM 15½" X 10⅝")

SUBMITTAL STATUS LOG

"SEE INSTRUCTIONS ON REVERSE BEFORE FILLING IN"

PAGE _____ OF _____

CONTRACT NUMBER	SHORT TITLE	LOCATION	DESTRUCTION

SUBMITTAL TRANSMITTAL NO.	DESCRIPTION OF ITEMS	SPECIFICATION SECTION REQUIRING SUBMITTAL	SUBMITTAL REQUIRES					CONTRACTOR APPVD	GOVT APPROVED	CONTRACTOR ACTION		DATE FORWARDED TO ROCC	ROCC ACTION		DATE			REMARKS
			SHOP DRWG.	CATALOG DATA	SAMPLE	CERTIFICATES	TEST DATA			INSERT ACTION CODE	DATE OF ACTION		INSERT ACTION CODE	DATE OF ACTION	RECEIVED FROM SUBC	DATE FORWARD RECEIVED ON SITE	APPROVED BY CONTRACTOR	
(a)	(b)	(c)	(d)					(e)		(f)		(g)	(h)		(i)	(j)	(k)	(l)

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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 column (f) for those items requiring ROICC action (action code "D"), THE REASON FOR FORWARDING TO THE ROICC should be entered in the column (l), the remarks column; e.g., Government approval required; waiver requested because of variance, substitution, etc.

5. 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 ROICC for action
E - Forwarded to ROICC for record purpose

DAILY REPORT TO INSPECTOR

NAVFAC 4330/34 (Rev 7-81)

SN 0105-LF-003-3170

DATE

CONTRACT NO.	TITLE AND LOCATION	REPORT NO.

CONTRACTOR *(Prime or Subcontractor)*	NAME OF SUPERINTENDENT OR FOREMAN

WEATHER – A.M.	TEMPERATURE – A.M. °F
WEATHER – P.M.	TEMPERATURE – P.M. °F

PRIME CONTRACTOR / SUBCONTRACTOR WORKFORCE *(If space provided below is inadequate, use additional sheets)*				LOCATION AND DESCRIPTION OF WORK PERFORMED
NUMBER	TRADE	HOURS	EMPLOYER	

TOTAL WORK HOURS ON JOB SITE THIS DATE	
CUMULATIVE TOTAL OF WORK HOURS FROM PREVIOUS REPORT	
TOTAL WORK HOURS FROM START OF CONSTRUCTION	

WERE THERE ANY LOST TIME ACCIDENTS THIS DATE?

☐ YES ☐ NO

IF "YES", A COPY OF THE COMPLETED OSHA REPORT IS REQUIRED

INSPECTION AND/OR TESTING PERFORMED TODAY – FOLLOW WITH REPORT	LOCATION AND/OR ELEMENT OF WORK	REMARKS RESULTS OF INSPECTIONS/TESTING

SPEC. PARA. OR DRAWING NO.	EQUIPMENT/MATERIAL RECEIVED TODAY TO BE INCORPORATED IN JOB *(Description, Sizes, Quantity)*	SUBMITTAL NO. OR CERTIFICATION	DATE APPROVED

SPEC. PARA. OR DRAWING NO.	LOCATION AND DESCRIPTION OF DEFICIENCIES *(Materials, Equipment, Safety, and/or Workmanship)* ACTION TAKEN OR TO BE TAKEN

DEFICIENCIES CORRECTED THIS DATE	REFERENCE	
	REPORT NO.	COMPLIANCE NOTICE NO.

CONSTRUCTION AND PLANT EQUIPMENT LEFT ON JOB SITE UNTIL USE IS COMPLETED

DESCRIPTION	DATE FIRST ON JOB *(First time only)*	HOURS WORKED THIS DATE	HOURS IDLED	DATE OF FINAL REMOVAL FROM JOB SITE

CONSTRUCTION AND PLANT EQUIPMENT NOT LEFT ON JOB SITE PERMANENTLY
(This will include pickup trucks and mobile mounted items, such as compressor, that are also used for transportation to and from the job)

DESCRIPTION	HOURS WORKED	HOURS IDLED

REMARKS *(Include directions received from ROICC/AROICC, visitors, compliance notices received, errors and/or omission in P/S; pertinent information)*

CONTRACTOR/SUPERINTENDENT DATE

SECTION 01560

ENVIRONMENTAL PROTECTION

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 Environmental Protection Agency (EPA) Regulations:

40 CFR 112	Regulations on Oil Pollution Prevention
40 CFR 403	General Pretreatment Standards

1.2 Environmental Protection Plan: The Contractor shall be responsible for the preparation and submission of an environmental protection plan. After the contract is awarded, 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.

2. DEFINITIONS OF CONTAMINANTS:

2.1 Sediment: Soil and other debris that has been eroded and transported by runoff water.

2.2 Solid Waste: Rubbish, debris, garbage and other discarded solid materials resulting from industrial, commercial, and agricultural operations and from community activities.

2.3 Rubbish: A variety of combustible and noncombustible wastes such as paper, boxes, and glass and crockery, metal and lumber scrap, tin cans, and bones.

2.4 Debris: Includes both combustible and noncombustible wastes, such as ashes, waste materials that result from construction or maintenance and repair work, leaves, and tree trimmings.

2.5 Oily Substance: Includes petroleum products and bituminous materials.

2.6 Sanitary Wastes:

2.6.1 Sewage: That which is considered as domestic sanitary sewage.

2.6.2 Garbage: Refuse and scraps resulting from preparation, cooking, dispensing and consumption of food.

3. PROTECTION OF NATURAL RESOURCES:

3.1 General: It is intended that the natural resources within the project boundaries and outside 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.

3.2 Land Resources: Except in areas indicated to be cleared, the Contractor shall not remove, cut, deface, injure, or destroy trees or shrubs without special permission from the Contracting Officer. No ropes, cables, or guys shall be fastened to or attached to any existing nearby trees for anchorages unless specifically authorized. Where such special emergency use is permitted, the Contractor shall be responsible for any damage resulting from such use.

3.2.1 Protection Plan: The Contractor shall submit a plan for protecting existing trees which are to remain and which may be injured, bruised, defaced or otherwise damaged by construction operations. Rocks that are displaced into uncleared areas shall be removed. Monuments, markers, and works of art shall be protected before beginning operations. A preconstruction survey including photographs shall be accomplished by the Contractor and a report of survey furnished when required by the Contracting Officer.

3.2.2 Repair or Restoration: All trees or other landscape features scarred or damaged by the Contractor's equipment or operations shall be repaired and/or restored to their original condition at the Contractor's expense. The Contracting Officer shall approve the repair and/or restoration prior to its initiation.

3.2.3 Temporary Construction: The Contractor shall obliterate all signs of temporary construction facilities such as haul roads, work areas, structures, foundations of temporary structures, stockpiles of excess or waste materials, and all other vestiges of construction. Temporary roads, parking areas and similar temporary use areas shall be graded in conformance with surrounding areas, tilled and seeded. Seeding shall include topsoil and/or nutriment as necessary to establish a suitable stand of grass.

3.3 Water Resources: All work under this contract shall be performed in such a manner that any adverse environmental impact to water resources, where applicable, is reduced to a level that is acceptable to the Contracting Officer.

3.3.1 Oily Substances: At all times, special measures shall be taken to prevent oily substances from entering the ground, drainage areas, or local bodies of water. Environmental requirements for the prevention of oil spill are contained in 40 CFR 112. For oil spills which may be large enough to violate Federal, State or Local Regulations, the Contracting Officer shall be notified immediately.

3.4 Historical and Archaeological Resources: All items having any apparent historical or archaeological interest which are discovered in the course of any construction activities shall be carefully preserved and reported immediately to the Contracting Officer for determination of actions to be taken.

4. EROSION AND SEDIMENT CONTROL MEASURES:

4.1 Burn-off: Burn-off of ground cover will not be permitted.

4.2 Borrow Areas: Borrow areas, on Government property, shall be managed and controlled to prevent sediment from entering nearby streams or lakes. Restoration of the areas, including areas outside the borrow area disturbed by the borrow and haul operations, shall include grading, replacement of topsoil, and establishment of permanent vegetative cover. The vertical sides of the borrow pit shall be uniformily graded to a slope of 30 degrees or less. The bottom of borrow pits shall be uniformly graded to provide a flat bottom and shall be drained by outfall ditches or other suitable means.

4.3 Reduction of Exposure of Unprotected Erodible Soils: Earthwork brought to final grade shall immediately be finished as indicated and specified. Side slopes and backslopes shall be protected immediately upon completion of rough grading. All earthwork shall be planned and conducted in such a manner as to minimize the duration of exposure of unprotected soils.

5. CONTROL AND DISPOSAL OF SOLID, AND SANITARY WASTES:

5.1 General: Wastes shall be picked up and placed in containers which are emptied on a regular schedule. All handling and disposal shall be so conducted as to prevent contamination of the site and any other areas. On completion, the areas 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.

5.2 Disposal of Rubbish and Debris: The disposition shall be as follows:

5.2.1 Removal from Government Property: Contractor shall transport all waste off Government property and dispose of it in a manner that complies with federal, state and local requirements. The Contractor shall provide the Contracting Officer a copy of state and/or local permit or license which reflects such agency's approval and his compliance with their solid waste disposal regulations. The permit or license and the location of the disposal area shall be provided prior to transporting any material off Government property.

5.3 Garbage Disposal: Where the construction project is located in an area where garbage collection by the station is accomplished on a scheduled basis, the Contractor shall place garbage in an appropriate container and the station will provide pickup and disposal service. In areas where there is no scheduled garbage collection, the Contractor shall transport the garbage to a pickup point or disposal area. The preparation, cooking, and disposing of food are strictly prohibited on the project site.

5.4 Sewage, Odor, and Pest Control: Sewage shall be disposed of through connection to municipal, district, or station sanitary sewage systems. No substances shall be disposed of to a sewer system which will interfere with treatment plant operation, in accordance with 40 CFR 403. Where such systems are not available, chemical toilets or comparably effective units shall be used with wastes periodically emptied into municipal, district, or station sanitary sewage systems. Provisions shall be made for pest control and for elimination of odors.

6. DUST CONTROL: Dust shall be kept down at all times, including non-working hours, weekends and holidays. Soil at the site, haul roads and other areas disturbed by the Contractor's operations shall be sprinkled or treated with dust suppressors as necessary to control dust. No dry power brooming will be permitted. Vacuuming, wet mopping, wet sweeping, or wet power brooming shall be used instead. Air blowing will be permitted only for cleaning off nonparticulate debris, such as reinforcing bars. No sandblasting will be permitted unless the dust therefrom is confined. Only wet cutting of concrete blocks, concrete and asphalt will be permitted. No unnecessary shaking of bags will be permitted where concrete mortar and plaster milling is done.

7. NOISE: The maximum use of "low-noise-emission products" as certified by the Environmental Protection Agency shall be made when available. No blasting or use of explosives will be permitted without written permission of the Contracting Officer and then only during the designated times. Pile driving operations shall be confined to the period between 8 a.m. and 4 p.m., Monday through Friday.

*** 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 Military Standards (MIL. STD.):

MIL-STD-619B	Unified Soil Classification System for Roads, Airfields, Embankments and Foundations

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

C 136-81	Sieve or Screen Analysis of Fine and Coarse Aggregates.
D 423-66 (1972)	Liquid Limit of Soils.
D 424-59 (1971)	Plastic Limit and Plasticity Index of Soils.
D 1140-54 (R 1971)	Amount of Material in Soils Finer than the No. 200 (75-UM) Sieve
D 1556-64 (R 1974)	Density of Soil in Place by the Sand-Cone Method
D 1557-78	Moisture-Density Relations of Soils and Soil-Aggregate Mixtures using 10-lb. (4.54kg) Rammer and 18-in (457-mm) Drop.

1.1.3 American Water Works Association (AWWA) Publications:

C600-77	Installation of Gray and Ductile Cast-Iron Water Mains and Appurtenances

1.2 SUBMITTALS:

1.2.1 Certified Laboratory Test Reports: Before delivery of materials, certified copies of the reports of all tests specified herein shall be submitted and approved. The testing shall have been performed in a laboratory meeting the requirements specified in Section 01401, titled "Quality Control". The tests shall have been performed within three years of submittal of the reports for approval.

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

1.4 GENERAL REQUIREMENTS: Bids shall be based on the following:

a. That the surface elevations are as indicated.

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

c. That the character of the material to be removed is as indicated and/or described elsewhere herein.

In case the actual conditions differ substantially from those stated in a., b. and c. above, the provisions of the contract respecting an adjustment for changed conditions shall apply, subject to the requirement of notification thereunder being given.

d. That ground water elevations indicated are those existing at the time subsurface investigations were made and do not necessarily represent permanent ground water elevations at the time of construction.

PART 2 - PRODUCTS

2.1 MATERIALS:

2.1.1 Fill Underground Storage Tank Bedding: Shall consist of clean sand, stone or gravel and shall conform to the following requirements:

a. Bedding for underground fuel tank shall be Type I for fiberglass, Type I or II for other tank materials.

Sieve Size	Type I Percent Passing	Type II Percent Passing
1-1/2 inches	—	100
1 inch	—	90 - 100
3/8-inch	100	25 - 60
No. 4	95 - 100	5 - 40
No. 8	—	0 - 20
No. 16	45 - 80	—
No. 50	10 - 30	—
No. 100	0 - 10	—

2.1.2 Soil Materials: In general, shall be free from debris, roots, wood, scrap materials, and other vegetable matter and refuse. Maximum particle size shall be 3 inches.

2.1.2.1 Backfill and Fill: For structures and under spread footings, paving, concrete slabs on grade and trenches shall consist of materials classified as GW, GP, SW, or SP, by MIL-STD-619 and shall conform to the following: liquid limit shall not exceed 40 when tested in accordance with ASTM D 423; plasticity index shall not be greater than 15 when tested in accordance with ASTM D 424; no more than 20 percent by weight shall be finer than No. 200 sieve when tested in accordance with ASTM D 1140.

2.1.2.2 Topsoil: Shall be material of loose, friable sandy loam free of subsoil, refuse, stumps, rocks over one-inch, brush, weeds and other materials detrimental to plant growth.

2.1.3 Unsuitable Material: In addition to vegetable matter, sod, muck, roots and rubbish, highly plastic clay soils of the CH and MH descriptions, border-line soils of the SC-CH description, and organic soils of the OL and OH descriptions, as defined in MIL-STD-619, shall be considered as unsuitable material.

PART 3 - EXECUTION

3.1 SURFACE PREPARATION:

3.1.1 Clearing: All shrubs, brush and debris within areas to be excavated, graded or filled shall be removed, except as indicated otherwise. All materials resulting from the clearing shall become the property of the Contractor and removed from the Government property.

3.1.2 Stockpiling Topsoil: Strip material from the excavations and grading suitable for topsoil and stockpile in piles separate from other excavated material. Locate piles of topsoil so that the material can be used readily for the finished surface grading; topsoil shall be protected and maintained until needed. Any surplus of topsoil from excavations and grading shall be stockpiled where indicated or directed. When used for finished surface grading, spread topsoil uniformly to a minimum depth of 3-inches over the areas designated to receive it.

3.2 EXCAVATION: Shall be carried to the contours and dimensions indicated or necessary. Excavations shall be kept free from water while construction therein is in progress. In the event it is necessary to remove unsuitable material in addition to that specified or indicated, the Contracting Officer shall be notified and an adjustment in the contract price made in accordance with the contract prior to removal. Excavations carried below the depths indicated, without specific directions, shall, except as otherwise specified, be backfilled to the proper grade with suitable material and compacted as specified hereinafter; all at the Contractor's expense.

3.2.1 Excavations for Structures and Spread Footings: If cut below the depths indicated without specific directions from the Contracting Officer, extend concrete to the bottom of the excavations; all additional work of this nature shall be at the Contractor's expense.

3.2.2 Excavation for Pipe Trenches: Excavate trenches for pipe lines along straight lines; width and depth of trenches shall be as indicated. A minimum of 8 inches between the outside of the pipe bell or outermost portion of the pipe or coupling and the sides of the trench or bracing shall be provided. Pipe, except pressure pipe, shall have its bottom quadrant for the full length of the barrel, embedded in undisturbed earth. Steel pipe bedding shall be in accordance with the applicable requirements of AWWA C600. Mechanical excavation shall be held at least 2 inches above final invert grade. The remainder of the excavation shall be shaped and graded to provide uniform bearing on compacted soil, immediately before the pipe is laid.

3.2.3 Excavations of Unsuitable Material Under Pavements and Concrete Slabs: All unsuitable material, occurring within a depth of 24 inches, measured from the final finish top or surface elevation of the slab, pavement or other structure, shall be removed. In-place material found to be suitable may remain in the area of the work, but shall be subject to the same quality standards as material to be provided under this specification. The Contracting Officer will determine the suitability of in-place as well as borrow material. On slopes, the area under the embankment shall be scarified after the removal of unsuitable material, and the first layer of embankment fill shall be securely keyed to the scarified material.

3.2.4 Shoring and Sheeting: Shore and sheet excavations with members of sizes and arrangement sufficient to prevent injury to persons, damage to structures, injurious caving or erosion. Remove shoring, sheeting and bracing as the excavations are backfilled; exercise care to prevent injurious caving during the removal of the shoring and/or sheeting.

3.3 BORROW MATERIALS: Obtain from sources off Government property. The source of borrow material shall be the Contractor's responsibility. The Contractor shall receive Government approval of the borrow source prior to use of borrow materials.

3.4 FILLING AND BACKFILLING:

3.4.1 Backfilling for Structures and Trenches: Place backfill in not more than 6 inches thick compacted lifts, except as specified otherwise, and each lift shall be compacted as specified hereinafter. Backfill adjacent to structural elements shall be placed, as far as practicable, as the adjacent structural elements have been completed and accepted. Backfilling against concrete shall be done only when directed by the Contracting Officer. Backfilling of trenches shall progress as rapidly as the construction, testing and acceptance of the work permits. In backfilling pipe trenches, compact fill in 6 inches thick compacted lifts to a depth of one foot over the top of the pipe; backfill and compact the remainder of the trench as specified hereinafter. For trenches excavated in paved areas, place the backfill in not more than 6-inch compacted lifts to the top of the trench.

3.4.2 Fill for Embankments and Under Spread Footings, Paving and Concrete Slabs on Grade: Place fill in no greater than 6 inches thick compacted lifts and each lift shall be compacted as specified hereinafter 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, it shall be aerated by means of blade graders, or harrows until the moisture content of the mixture is satisfactory. Finish surface of the layer by blading or rolling with a smooth roller, or a combination thereof, until it is smooth and free from waves and inequalities.

3.5 COMPACTION (IN-PLACE DENSITY): The subgrade shall have a density of not less than 95 percent of maximum laboratory density to a depth of 12-inches below the subgrade surface. The subgrade surface is defined as the top of the ground underlying the subbase course, base course or slab, as the case may be. If the density of the existing material is less than 95 percent, it shall be compacted to a depth of 12-inches to the minimum 95 percent density. Compact fill and/or backfill under concrete slabs, foundations and footings and upper 12-inches under paved areas to not less than 95 percent of maximum laboratory density; below 12-inches under paved areas to not less than 90 percent; under grassed areas to not less than 85 percent; and other backfill adjacent to and not supporting any structural elements to not less than 90 percent. The moisture content of the specified densities shall be within 2 percent more or less than the optimum.

3.5.1 Maximum Laboratory Density: Determine in accordance with ASTM D 1557, Method B or D.

3.6 FINISH OPERATIONS:

3.6.1 Grading: Perform all grading in the areas so indicated. Fill shall be brought to finished grades indicated within a tolerance of one-tenth of a foot and shall be graded to drain water away from structures. Existing grades which are to remain and which are disturbed by the Contractor's operations shall be graded to drain and to provide surfaces suitable for the proper use of mowing machines. Grades under areas to receive topsoil shall be brought to acceptable elevations.

3.6.2 Disposition of Surplus Material: Waste surplus material not required for filling, backfilling or grading and other spoil material by deposition within two miles of the site of work, as directed. Spread and level material as directed.

3.7 FIELD SAMPLING AND TESTING:

3.7.1 Sampling: All sampling shall be conducted by the Contractor at his expense. Take 50 lb. sample of granular fill from each material source for sieve analysis of aggregate.

3.7.2 Sample Identification: Each sample shall be contained in a clean container which shall be securely fastened to prevent loss of material. Tag each sample for identification. The tag shall contain the following information:

Contract No. _____.

Sample No. _____.

Date of Sample _____.

Sampler _____.

Source _____.

Intended Use _____.

For Testing _____.

3.7.3 Testing: All testing specified herein shall be conducted by the Contractor at his expense, and copies of test reports submitted to the Contracting Officer for approval.

3.7.3.1 Granular Fill Testing: Make gradation test on each sample in accordance with ASTM C 136.

3.7.3.2 Soil Materials: Test for liquid limit in accordance with ASTM D 423, plasticity index in accordance with ASTM D 424, material finer than No. 200 sieve in accordance with ASTM D 1140. One test shall be required from each source and each change in type of material. If a blend is necessary, one test shall be required for each soil used in the blend and one test for proposed blend.

3.7.3.3 In-Place Density Tests: Make tests under all slabs and in randomly selected locations in accordance with ASTM D 1556 as follow:

MATERIALS	TEST FREQUENCY
a. Fill and Backfill	1 per lift per 1000 sq. ft.
b. Subgrade	1 per lift per 2500 sq. ft.

*** END OF SECTION ***

SECTION 02250

SOIL TREATMENT FOR TERMITE CONTROL

1. SUBMITTALS:

1.1 Samples: The Contractor shall submit on request, or the Contracting Officer may draw at any time and without prior notice, from stocks at the site of the work, samples of chemical concentrates and/or of diluted chemical solutions or emulsions being used or presumed to be for use in this work. Should analysis, performed by the Government, indicate such samples to contain less than the amount of active ingredient claimed on the label or specified herein, then all work done with such chemicals shall be repeated, using chemicals conforming to this specification, and without additional cost to the Government.

1.2 Manufacturer's Instructions: Prior to beginning any work, copies each of the insecticide manufacturer's printed application instructions (label and labeling) shall be furnished the Contracting Officer.

1.3 Warranty: Before the Government will accept the soil treatment work required by this specification, the Contractor shall provide in writing and in an acceptable form, a five year warranty against infestations or re-infestations by subterranean termites of the building constructed under this contract. Such warranty shall obligate the Contractor or his designated representative to: (a) perform annual inspections of the building(s) or building addition(s); (b) provide promptly such treatment as may be necessary for the elimination and control of subterranean termite infestation: and (c) repair at the Contractor's expense any and all damage up to $25,000.00 per building or building addition resulting from such infestation.

1.3.1 Insurance: The said warranty shall be backed by a five year policy of insurance in the amount of $25,000.00 for each building constructed under this contract. The policy of insurance must: (a) be issued by a bona fide insurance company; (b) name the United States of America (Department of the Navy) as the insured party; and (c) provide for the repair of all subterranean termite damage to the building(s) or building addition(s) covered by the warranty up to the dollar limit specified above.

1.4 Certification: Upon final completion of the soil treatment, and as a condition for final acceptance, the Contractor shall furnish a written certificate stating:

(1) Chemical used had at least the minimum required concentration, brand name of chemical, and manufacturer thereof.

(2) Rate and method of application complied in every respect with the standards contained herein.

1.5 Report: Upon completion of this work, the Contractor shall submit to the Contracting Officer a report which includes the following information:

(1) Amount of trenched area treated, in linear feet, and square feet of treated surface area underlying concrete slabs on-grade and raised floor.

(2) Percent active ingredient (a.i.) in final solution of toxicant.

(3) Total gallons of final solution applied, and

(4) Total manhours expended under this contract to include (a) survey time, (b) labor, and (c) supervisory time, but not to include travel time.

2. DELIVERY AND STORAGE: Toxicants shall be delivered to project site in sealed and labeled containers as supplied by manufacturer or formulator. Labels shall bear manufacturer's warnings to be observed in handling and use of material. Labels shall bear evidence of registration under the Federal Insecticide, Fungicide, and Rodenticide Act.

3. MATERIALS: The toxicant used for control of subterranean termites shall be any insecticide labeled and EPA-registered for the purpose, and suitable for use under the conditions indicated.

4. REQUIREMENTS: The work includes the procurement of toxicant chemicals and their application to all soil and earth-type material which will be covered by or lie immediately adjacent to the buildings and structures so as to provide a lethal barrier to subterranean termites.

5. APPLICATION:

5.1 General: At the time soil treatment is to be applied, the soil to be treated shall be in a friable condition with a sufficiently low moisture content to allow uniform distribution of the soil treatment agent throughout the soil. Application shall not be made immediately after heavy rains. Toxicant shall be applied as a coarse spray and in such manner as to provide uniform distribution of the toxicant on the soil surface. Toxicant shall be applied at least 12 hours prior to placement of concrete which will be in contact with treated material. Toxicant shall be applied immediately prior to placement of vapor barrier. Where soil or fill material is disturbed after treatment and before placement of slabs or other covering structures, it shall be retreated as hereinafter specified for treatment. Treatment of the soil on the exterior sides of foundation walls, grade beams, and similar structures shall be coordinated with final grading and planting operations so as to avoid disturbance of the toxicant barriers by such operations. Manufacturer's warnings and precautions shall be observed in the handling and use of soil toxicants. Care shall be taken that these chemicals do not enter project water supply system, and that they do not endanger animals. All formulating, mixing and application work shall be done under the direct inspection of a DOD-certified Pesticide Applicator (PA) or other person designated by the Contracting Officer, with the concurrence of the Engineering Field Division Applied Biologist, as being qualified to perform such inspection.

5.2 Details of Application: Rates and methods of application shall be in strict accordance with the insecticide manufacturer's printed instructions on the label.

6. NOTIFICATION: The Contractor shall notify the Contracting Officer at least 48 hours prior to time of beginning treatment to allow coordination with the DOD certified PA to witness the mixing and treatemnt application.

7. QUALIFICATIONS: All work shall be done by a Contractor whose principal business is pest control and anti-termite soil treatment, and who is State certified in the category of Structural Pest Control. Evidence of certification, in the State of operation, shall be submitted to the Contracting Officer for approval prior to beginning any work.

*** END OF SECTION ***

2.2 Asphaltic Concrete:

2.2.1 Design Analysis: A job mix formula, prepared by an approved testing laboratory and including data as outlined in paragraph entitled "Asphaltic Concrete Wearing Course" is required for each mix and each change in mix or materials. Unless specified otherwise, Government approval of the job mix formulas is required prior to their usage. The job mix formula shall include the specific gravities of aggregates and bitumen.

2.2.2 Field Control: The Contractor shall submit certified test results from an approved testing laboratory showing the asphaltic concrete produced daily complies with the approved job mix formula. Either full time plant inspection or periodic checks shall be acceptable.

2.3 Certified Test Reports: Before delivery of materials certified copies of the reports of all tests specified herein shall be submitted and approved. The testing shall have been performed in a laboratory meeting the requirements specified in the Quality Control Section of Division 1. The tests shall have been performed within three years of submittal of the reports for approval. Test reports shall be accompanied by notarized certificates from the manufacturer certifying that the tested material is of the same type and quality as that proposed to be supplied.

3. GENERAL REQUIREMENTS: The work includes the construction of a 6-inch thick (compacted measurement) base course and the surfacing of same, after priming with a 1-1/2 inch thick asphaltic concrete wearing course. The Contractor's options shown hereinafter apply only to Asphaltic Concrete Wearing Course.

4. MATERIALS AND CONSTRUCTION PROCEDURES:

4.1 Subbase: Subbase shall be as specified in Section 02200, "Earthwork".

4.2 Limerock Base Course: Base shall be of compacted thickness and at the locations indicated. Limerock shall be Ocala Type and shall be composed of not less than 95 percent of carbonates of calcium and magnesium. Organic matter shall not exceed 0.5 percent. All limerock shall pass a 2-1/2 inch mesh sieve, and shall be graded uniformly down to dust. Equipment used in hauling, placing and compacting shall be maintained in satisfactory working condition. The base course shall be compacted through the full depth to not less than 100 percent of maximum laboratory density determined in accordance with ASTM D 1557, Method D. In place density shall be determined in accordance with ASTM D 1556. After compaction the base course shall not vary more than 3/8-inch when tested with a 10 foot straight edge. The finished thickness of the base course shall average at least the compacted thickness indicated and shall not vary from the required amount by more than 1/2-inch at any joint. Any areas not meeting the above requirements shall be rejected and corrected by the Contractor at no additional cost to the Government.

SECTION 02680

BITUMINOUS PAVING AND BASE COURSE

1. APPLICABLE PUBLICATIONS: The following publications of the issues listed below, but referred to hereinafter by basic designation only, form a part of this specification to the extent required by the references thereto:

1.1 Military Standards:

MIL-STD-620A(1) Test Methods for Bituminous Paving Materials.

1.2 American Society for Testing and Materials (ASTM):

C 136-76	Sieve or Screen Analysis of Fine and Coarse Aggregate.
D 242-70	Mineral Filler for Bituminous Paving Mixtures.
D 692-71	Specification for Coarse Aggregate for Bituminous Paving Mixtures.
D 946-74	Asphalt Cement for Use in Pavement Construction.
D 1073-63(1975)	Fine Aggregate for Bituminous Paving Mixtures.
D 1188-71	Bulk Specific Gravity of Compacted Bituminous Mixtures Using Paraffin-Coated Specimens.
D 1556-64(1974)	Density of Soil in Place by the Sand-Cone Method.
D 1557-70	Moisture-Density Relations of Soils using 10 lb. Rammer and 18 in. drop.
D 2027-76	Liquid Asphalt (Medium-Curing Type).
D 3381-76	Viscosity-Graded Asphalt Cement for use in Pavement Construction.

1.3 Florida Department of Transportation:

Standard Specifications for Road and Bridge Construction, (1977) with Supplement thereto dated.

2. SUBMITTALS:

2.1 Bituminous Prime Coats: A manufacturer's certificate is required for each shipment of prime coat bituminous materials.

4.3 Bituminous Prime Coat: Prime coat shall consist of the application of not more than 0.12 gallon per square yard nor less than 0.08 gallon per square yard of MC-30 or MC-70, liquid asphalt conforming to ASTM D 2027, to the completed and accepted limerock base course after it has been approved for priming. The temperature of application and weather conditions for applying shall be approved. No traffic will be permitted on the primed area until the prime coat has cured adequately. Bids shall be based on the application of 0.10 gallon per square yard at 60 degrees F.

4.4 Asphaltic Concrete Wearing Course: The work includes furnishing and placing 1-1/2-inch thick (compacted measurement) of hot mix asphaltic concrete wearing course. The materials used shall conform to the following specifications:

Coarse Aggregate (Maximum Los Angeles Abrasion Loss 40-percent): ASTM D 692, except as modified herein.

Fine aggregate: ASTM D 1073, except as modified herein.

Mineral Filler: ASTM D 242.

Asphalt Cement: ASTM D 946, 85-100 penetration range or ASTM D 3381, viscosity grade AC-20.

The mix shall be produced in an approved plant from an approved job mix formula based on the following.

a. Gradation:

SIEVE	
3/4-inch	100
1/2-inch	86-100
3/8-inch	------
No. 4	55-80
No. 10	40-66
No. 40	22-40
No. 80	12-26
No. 200	4-9

b. Bituminous Content: 5.5 to 8.5-percent (to be based on approved job mix formula).

4.4.1 Physical Properties: The mixture shall have the following physical properties:

a. Stability: Not less than 1000 pounds.

b. Flow: Not more than 0.20-inch or less than 0.08-inch.

c. Percent Total Voids: Not less than 3 nor more than 5.

d. Percent Voids Filled with Asphalt: Not less than 75 nor more than 85.

The above physical properties shall be determined in accordance with MIL-STD-620, modified as follows:

a. Seventy-five blows of the hammer shall be applied to each flat face of the specimen.

b. The temperature of the mixture immediately prior to compaction shall be 250 degrees F plus or minus 10 degrees.

c. The head of the hammer and the molds used in preparing the specimens shall be at a temperature of approximately 250 degrees F.

d. After compaction, the specimens used for determination of specific gravity shall be air-cooled to approximately the same temperature as the water to be used.

4.4.2 Spreading and Compacting: The wearing course shall be accurately spread with a bituminous spreader at a temperature of not less than 250 degrees F nor more than 300 degrees F and shall be rolled, while hot, with a steel wheel roller weighing not less than 10-tons, and a pneumatic tired roller to a density of at least 96-percent of that attained in a laboratory specimen of the same mixture prepared in accordance with MIL-STD-620, Method 100. The density of in place material shall be determined from the bulk specific gravity obtained in accordance with the requirements of ASTM D 1188. In areas where the use of machine-spreading is impractical, the mixture shall be spread by hand. The mixture shall be dumped on approved dump boards or on adjacent approved area outside the area to be paved and shall be distributed into place from the dump boards or from the approved area by means of hot shovels. The mixture shall be spread with hot rakes in a uniformly loose layer of a thickness that, when compacted, will conform to the required grade and thickness. During hand spreading, each shovelful of mixture shall be carefully placed by turning the shovel over in a manner that will prevent segregation. In no case shall the mixture be placed by throwing or broadcasting from a shovel. The loads shall not be dumped any faster than can be properly handled by the shovelers and rakers. The finished surface shall not vary more than 1/8-inch when tested with a 10 foot straight edge.

4.4.3 Contractor's Option: At the option of the Contractor, those applicable sections of the Florida Department of Transportation Standard Specifications for Bituminous Plant Mix, type S-1 shall govern in lieu of this specification for asphaltic concrete wearing course. The selected option shall not be changed during the course of the work.

5. FIELD TESTS AND INSPECTION:

5.1 Sampling and Testing: Samples shall be supplied by the Contractor at the expense of the Contractor. All testing will be conducted by the Contracting Officer. All materials and material sources will be approved by the Contracting Officer not less than 14 days prior to the use of such materials in the work. Initial tests will be paid for by the Government. Additional tests required, due to failure of the work to conform to requirements, shall be paid for by the Contractor. Asphalt cores shall be extracted by the Contractor for testing by the Government; the cores shall be four inches in diameter, unless otherwise instructed. The Contractor shall replace the pavement where cores are removed.

5.2 Testing: Tests required to provide adequate Quality Control are as follows:

a. Sieve Analysis: (ASTM C 136) Composite and each blend.

b. CBR: (Only where specified hereinbefore) Composite.

c. Maximum Density Determination: Composite.

d. Atterberg Limits: Composite and Each Blend.

e. Percentage of each material in blend or stabilization.

Generally, one test of each of items a thru e from each source and each change in material or blend is required.

f. Surface Tests: The completed base and wearing courses shall be tested for uniformity in grade as specified hereinbefore by using a 10 foot straightedge.

g. In-place Density and Thickness: At least one density and thickness test shall be made for each 100 square yards of base and wearing course.

*** END OF SECTION ***

SECTION 02821

GRASSING

1. APPLICABLE PUBLICATIONS: The following publications of the issues listed below, but referred to thereafter by basic designation only, form a part of this specification to the extent indicated by reference thereto.

1.1 Federal Specifications:

JJJ-S-181B Seed, Agricultural.

2. Submittals: Government approval will be required for the following prior to incorporation in the work and six copies each of all documentation shall be submitted.

2.1 Certificate of Conformance will be required for the following:

1. Grass seed shall be certified by registered, certified seed association or a registered testing laboratory not more than ten months prior to seeding.
2. Fertilizer
3. Lime

2.2 Request for Final Acceptance: The Contractor shall submit to the Contracting Officer two copies of a written request for final acceptance of the grassing work. The request shall be submitted at least ten days prior to the anticipated date of acceptance. The condition of the grass will be noted, and the Contractor will be notified if maintenance is to continue.

3. DELIVERY AND STORAGE: All seed used shall be labeled in accordance with U.S. Department of Agriculture Rules and Regulations under the Federal Seed Act in effect on the date of invitation for bids. All seed shall be furnished in sealed standard containers, unless exception is granted in writing by the Contracting Officer. Seed which have become wet, moldy, or otherwise damaged in transit or in storage shall not be used. Fertilizer shall be delivered to the site in the original, unopened containers, each bearing the manufacturer's guaranteed analysis. Any fertilizer which becomes caked or otherwise damaged, making it unsuitable for use, shall not be used. Seed, fertilizer and other grassing materials shall be stored under cover and protected from damage which would make them unacceptable for use.

4. MATERIALS

4.1 Topsoil: If the quantity of existing stored or excavated topsoil is inadequate for planting, sufficient additional topsoil shall be furnished. Topsoil furnished shall be a natural, fertile, friable soil, possessing characteristics of representative productive soils in the vicinity. It shall be obtained from naturally well-drained areas. Topsoil shall be without admixture of subsoil and free from Johnson grass (Sorghum Halepense), nut grass (Cyperus Rotundus) and objectionable weeds and toxic substances.

4.2 Lime: Lime shall be ground limestone (Dolomite) containing not less than 85 percent of total carbonates, and shall be ground to such a fineness that 50-percent will pass a 100-mesh sieve and 90-percent will pass a 20-mesh sieve.

4.3 Fertilizer: Commercial, fertilizer shall be 5-10-10 formulation of which 60-percent of the nitrogen is in the urea-formaldehyde form and shall conform to the applicable State Fertilizer laws. It shall be granulated so that 80-percent is held on a 16-mesh screen, uniform in composition, dry and free-flowing.

4.4 Seed: Grass seed shall conform to Federal Specification JJJ-S-181 and shall satisfy the following requirements:

Seed	Min. % Pure Seed	Min. % Germination and Hard Seed	Max. % Weed Seed
Common Bermuda	95	80	0.5
Annual Ryegrass	95	90	0.5

Seed failing to meet the purity or germination requirements by no more than twenty-five percent may be used, but the quantity shall be increased to yield the required rate of pure live seed. Seed failing to meet the weed seed requirements shall not be used.

5. REQUIREMENTS: All areas within the limits of work not indicated for development otherwise, and all other areas disturbed by the Contractor's operations, shall be grassed.

6. ESTABLISHMENT OF TURF:

6.1 Grading: Areas to be grassed shall be graded to remove depressions, undulations, and irregularities in the surface before grassing.

6.2 Placing Topsoil: Areas to be grassed shall have a minimum topsoil cover of 4 inches. Topsoil shall not be placed when the subgrade is excessive wet, extremely dry or in a condition otherwise detrimental to the proposed planting or to proper grading.

6.3 Tillage: The area to be grassed shall be thoroughly tilled to a depth of 4 inches using a plow and disc harrow or rotary tilling machinery until a suitable seed bed has been prepared and no clods or clumps remain larger than 1-1/2 inches in diameter.

6.4 Applying Lime: The pH of the soil shall be determined. If the pH is below 5.0, sufficient lime shall be added to provide a pH between 5.5 and 6.5. The lime shall be thoroughly incorporated into the top three to four inches of the soil. Lime and fertilizer may be applied in one operation.

6.5 Applying Fertilizer: Fertilizer shall be applied at the rate of 20 pounds per 1,000 square feet and shall be thoroughly incorporated into the top three to four inches of soil.

6.6 Planting Seeds: Immediately before seed are sown and after fertilizer is applied, the ground shall be scarified as necessary and shall be raked until the surface is smooth, friable, and of uniformly fine texture. Areas to be grassed shall be seeded evenly with a mechanical spreader, raked lightly, rolled with a 200-pound roller, and watered with a fine spray.

6.6.1 Seeding Rate: Seed shall be applied at the following rate:

Seed	Rate of Application pounds per 1,000 sq. ft.
Common Bermuda	8
Ryegrass	2

6.7 Winter Cover: All areas to be grassed shall be protected against erosion at all times. For protection during winter months Italian rye grass shall be planted at the rate of four pounds per 1,000 square feet on all areas which are not protected by permanent grass. The Contracting Officer will determine if the permanent grass has developed sufficiently to provide adequate protection.

6.8 Clean-up: All excess soil, excess grass materials, stones, and other waste shall be removed from the site daily and not allowed to accumulate. All paved areas shall be kept clean at all times.

6.9 Maintenance: Maintenance shall begin immediately following the last operation of grassing and continue until final acceptance. Maintenance shall include watering, mowing, replanting, and all other work necessary to produce a uniform stand of grass. Grassing will be considered for final acceptance when the permanent grass is healthy and growing on 97-percent of the area with no bare areas wider than 12-inches.

*** 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:

301-81	Specifications for Structural Concrete for Buildings
315-80	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 185-79	Welded Steel Wire Fabric for Concrete Reinforcement
A 615-82	Deformed and Plain Billet-Steel Bars for Concrete Reinforcement
C 33-81	Concrete Aggregates
C 94-81	Ready-Mixed Concrete
C 150-81	Portland Cement
C 171-69 (R 1980)	Sheet Materials for Curing Concrete
C 260-77	Air-Entraining Admixtures for Concrete
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

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. Submit equipment anchor bolt plan showing location, types, sizes and detailed installation instructions.

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

1.2.3 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
d. Precast Sill

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: Minimum 28 day compressive strength shall be 3,000 psi. Slump shall be between 2-4 inches.

2.1.1 Air-Entrained Concrete: Provide for all concrete. 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.

2.1.1.1 Proportioning of air-entrained concrete shall be by weight as follows:

a. Cement factor, bags (94 pounds) of cement per cubic yard of concrete, freshly mixed-6.30

b. Maximum water per bag (94 pounds) of cement (gallons)-5.25

c. Fine aggregate range in percent of total aggregate by weight-33 to 41

d. Approximate weights of saturated surface-dry aggregates per bag (94 pounds) of cement:

Fine aggregate (pounds) - 174
Course aggregate (pounds) - 297

e. The air content of freshly mixed air-entrained concrete shall be between 4 and 6 percent of total volume of concrete.

2.2 MATERIALS:

2.2.1 Cement: ASTM C 150, Type I or II for all concrete. All cement 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, with maximum aggregate size of one inch.

2.2.4 Admixtures:

2.2.4.1 Air-entraining: ASTM C 260.

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.

2.2.6.2 Welded Wire Fabric: ASTM A 185, 6 by 6 - W2.9 by W2.9, unless otherwise indicated.

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 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.

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.

2.2.11 Equipment Anchor Bolts: As specified in Section 05500, "Metal Fabrications".

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 non-staining form coating compound, or two coats of nitro-cellulose lacquer.

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, wire fabric, 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 all slabs and pads of the building. 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: Anchors and bolts, including but not limited to those for machine and equipment bases; frames or edgings, hangers and inserts, door bucks, pipe sleeves; pipes passing through walls, metal ties, conduits, drains, and all other materials in connection with concrete construction shall, where practicable, be placed and secured in position when the concrete is placed. Anchor bolts for machines shall be set to templates, shall be plumbed carefully and checked for location and elevation with an instrument, and shall be held in position rigidly to prevent displacement while concrete is being placed.

3.2.6 Expansion Joints: Make joints 1/2-inch wide except as indicated otherwise. Fill expansion joints 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 MIXING, TRANSPORTING, AND PLACING CONCRETE: In accordance with ACI 301, Chapters 7 & 8, except as modified herein.

3.3.1 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.

3.3.2 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.

3.3.3 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, and water. 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.

3.3.4 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.

3.3.5 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.

3.3.6 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 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, or liquid chemical compound except as specified otherwise herein. Use liquid chemical curing compounds on incinerator floor. 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 Chemical Compound Curing: Provide for surfaces for which a sealer-hardener finish is specified, and, at the Contractor's option, provide in lieu of impervious sheeting curing for other surfaces. 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.

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

3.6.5 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 Splash Blocks: Provide at outlets of downspouts emptying at grade. Splash blocks shall be of precast concrete, 24 inches long, 12 inches wide, and 6 inches thick, unless otherwise shown, with countersunk dishes finished smooth and sloped to drain away from the building. Compact the earth to provide firm bases for the blocks.

3.7.2 Concrete Sills: Concrete sills shall be precast concrete. All exposed surfaces shall be smooth and true, with sharp edges. Precast concrete shall be damp-cured for not less than 7 days and allowed to dry out before being moved. Steel reinforcement of two No. 3 bars or of zinc-coated welded wire fabric of equivalent cross-sectional area shall be provided in copings and sills. Suitable provisions shall be made for anchoring the sections to the walls, and each section shall be set in a full bed of Portland cement mortar. All vertical joints shall be grouted solidly except for a 3/4-inch depth at front, back and top surfaces; the front and back, shall be tuck-pointed, and the top surface shall be filled with a non-staining and non-shrinking calking compound. Sills shall be provided with seats, washes, lugs, and drips, where indicated and/or necessary to provide proper drainage.

*** END OF SECTION ***

SECTION 03420

PRECAST PRESTRESSED CONCRETE

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 American Concrete Institute (ACI) Publications:

ACI 211.1-81	Selecting Proportions for Normal and Heavy Weight Concrete
ACI 214-77	Evaluation of Compression Test Results of Field Concrete
ACI 309-72	Recommended Practice for Consolidation of Concrete
ACI 318-77	Building Code Requirements for Reinforced Concrete

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

A 185-79	Welded Steel Wire Fabric for Concrete Reinforcement
A 416-80	Uncoated Seven-Wire Stress-Relieved Strand for Prestressed Concrete
A 421-80	Uncoated Stresss Relieved Wire for Prestressed Concrete
A 615-82	Deformed and Plain Billet-Steel Bar for Concrete Reinforcement
C 31-69 (R 1980)	Making and Curing Concrete Test Specimens in the Field
C 33-81	Concrete Aggregates
C 42-77	Obtaining and Testing of Drilled Cores and Sawed Beams of Concrete
C 143-78	Slump of Portland Cement Concrete
C 150-81	Portland Cement

C 173-78	Air Content of Freshly Mixed Concrete by the Volumetric Method
C 231-81	Air Content of Freshly Mixed Concrete by the Pressure Method
C 260-77	Air-Entraining Admixtures for Concrete
C 494-81	Chemical Admixtures for Concrete

1.3 American Welding Society (AWS) Publications:

AWS D1.1-82	Structural Welding Code
AWS D1.4.-79	Structural Welding Code Reinforcing Steel

1.4 Prestressed Concrete Institute (PCI) Publication:

MNL-116-77	Manual for Quality Conctrol for Plants and Production of Precast Prestressed Concrete Products

2. CEMENT TESTS: The Contractor shall furnish mill certificates attesting to the quality of the cement.

3. PLANT QUALIFICATIONS: Precast prestressed concrete shall be the product of a manufacturer having capacity and facilities for producing materials of the quality and finish specified herein, and of the quantity indicated, without delay to progress of work. The manufacturer shall have an established quality control program in effective operation at his plant, attested to by a current certification of the plant, in the PCI "Certification Program for Quality Control".

4. SAMPLING AND TESTING:

4.1 General: Samples and tests are to be made by and at the Contractor's expense. The tests shall be performed on calibrated equipment, as required by MNL-116, by an independent commercial testing laboratory or at a PCI Certified Plant. Compressive strength tests made prior to detensioning of prestressing strand may be performed in the precaster's quality control laboratory. Certified test reports shall include all test data and results.

4.2 Concrete Tests: Plastic concrete, as delivered to the casting site, shall be sampled and tested as indicated below and in the paragraph entitled "Evaluation and Acceptance of Concrete" of ACI 318. A minimum of four cylinders shall be made during each concreting cycle of the same mix. Statistical evaluation shall be in accordance with ACI 214.

4.2.1 Slump: In accordance with ASTM C 143.

4.2.2 Detensioning Compression Tests: Cylinders shall be cured under the same conditions as the concrete to be checked. Test cylinders shall be cast in accordance with ASTM C 31 and shall be cured in the same or similar environment as the member containing the concrete from which the cylinders were taken. Detensioning shall not take place and forms shall not be stripped until the test cylinders show that the concrete has reached the required strength.

4.2.3 Air Content: Tests shall be made at the same time that specimens for compression tests are made. Tests shall be made in accordance with ASTM C 173 or ASTM C 231.

4.3 Compressive Strength Test Results: If the compressive strength tests fail to meet the above requirements, core testing shall be made in accordance with ASTM C 42. If the core tests prove unsatisfactory, load tests shall be made in accordance with ACI 318. Units failing to meet the requirements of the load tests shall not be used. Core tests and load tests shall be performed at the expense of the Contractor.

5. SUBMITTALS:

5.1 Shop Drawings: Shop drawings indicating details of construction and erection shall be submitted to the Contracting Officer for record in accordance with the requirements of Division 1. Fabrication of the units shall be for the design load conditions and spans indicated and for additional loads imposed by openings or support of the work of other trades. Any revision to the design indicated to adapt them to the manufacturer's method of operation, including handling, shall be shown on the shop drawings, and appropriate design calculations shall be submitted to the Contracting Officer for approval. Shop drawings and design calculations shall bear the seal of a Registered Professional Engineer. The drawings shall show the precast unit manufacturer's recommended details and materials for the work required by Paragraph, ERECTION, herein and the following:

a. Marking of the units for erection.

b. Connections for work of other trades.

c. Connections to supporting construction as required by the design.

d. Location and sizes of all openings to be cast in the members.

e. Joints between units and between units and other construction.

f. Reinforcing, including prestressing steel details.

g. Minimum concrete compressive strengths at initial prestress and 28 days and the initial prestress to be applied.

5.2 Certified Test Reports: Before delivery of materials and equipment, certified copies of the reports of tests specified herein shall be submitted to the Contracting Officer for approval, along with manufacturer's certification that the tested material and equipment are of the same type, quality, and manufacture as that proposed to be supplied.

5.3 Prestressing Steel: Strand supplier's certificate attesting to the ultimate strength and typical stress strain curves shall be submitted to the Contracting Officer for approval.

6. GENERAL REQUIREMENTS: All work shall be as specified herein. Where conflicts between referenced publications exist, ACI 318 shall govern. Precast prestressed units shall be the product of a manufacturer specializing in the production of precast prestressed concrete units.

6.1 Contractor-Furnished Mix Design: The Contractor shall prepare, and submit for approval, a concrete mix design for each type of concrete required. The strength of concrete at 28 days and the maximum size concrete aggregate shall be as follows:

Strength	Maximum Aggregate Size
5000 psi	1 inch

The design shall be prepared in accordance with ACI 318. The concrete may be proportioned from additional data derived from ACI 211.1 and ACI 214 for an assumed coefficient of variation of 15 percent and a probability of one test in ten falling below the specified strength, f'c, provided that the mix design reflects actual concrete plant standard deviations and the resulting production concrete conforms to the specified requirements. The mix-design shall be based on current materials previously evaluated by the concrete producer whose established methods of statistical quality control is in conformance with ACI 318. In the absence of such data, the Contractor shall sample and test the aggregates for the design of concrete. An air-entraining agent shall be added at the mixer to produce 6 percent of air by volume.

6.2 Miscellaneous Connections: Anchors, dowels, bolts, steel welding inserts, and connecting plates indicated and/or necessary in connection with the fabrication and erection of precast prestressed concrete members shall be held in position rigidly to prevent displacement while concrete is being placed. On-site and off-site welding shall be in accordance with AWS D1.1 and AWS 01.4, as applicable.

7. MATERIALS: Materials shall conform to the specifications and to the other requirements specified herein.

7.1 Portland Cement: ASTM C 150, Type I, or Type III. Cement used shall be obtained from a single mill. Type III cement may be used, when approved, at no increase in cost to the Government.

7.2 Water: Shall be potable without harmful amounts of chloride ion.

7.3 Aggregates for Normal Weight Concrete: ASTM C 33.

7.4 Admixtures, Including Air Entraining: ASTM C 260 (air entraining); ASTM C 494 (chemical). All admixtures shall have prior approval of the Contracting Officer, shall be from a single manufacturer, and shall be certified by the manufacturer to be free of chlorides. All admixtures shall be added at the mixer.

7.5 Reinforcing Bars: ASTM A 615, Grade 60, sized and located as indicated. Welded splices shall be in accordance with AWS D12.1.

7.6 Welded Wire Fabric Reinforcement: ASTM A 185.

7.7 Prestressing Steel:

7.7.1 High Tensile Stress-Relieved Wire Strand: ASTM A 416 (Nominal 250 ksi or 270 ksi); or be manufactured in accordance with this specification if provided in a larger size and/or higher strength. The wire shall be free of substances that would prevent bond to the concrete. Criteria pertaining to low-relaxation strand shall be as detailed in the ASTM A 416 Supplement.

7.7.2 High Tensile Stress-Relieved Wire: ASTM A 421, and Supplement 1.

7.8 Elastomeric Bearing Pads: Elastomeric bearing pads shall conform to the following:

7.8.1 Pads 1/2-inch and less in thickness shall be all elastomer. The total out-to-out thickness of a pad shall not be less than the thickness shown on the plans, nor more than 1/4-inch greater than that thickness. Variation of total thickness within an individual pad shall not exceed 1/8-inch.

7.8.2 The length and width of a pad shall not vary more than 1/8-inch from the dimensions shown on the plans. Pads of all elastomer may be cut from large sheets. Cutting shall be performed in such a manner as to avoid heating of the material, to produce a smooth edge with no tears or other jagged areas, and to cause as little damage to the material as possible. Corners and edges of molded pads may be rounded at the option of the Contractor. Radius at corners shall not exceed 3/8-inch and radius of edges shall not exceed 1/8-inch.

7.8.3 The sole polymer in the elastomeric compound shall be neoprene and shall not be less than 60 percent by volume of the total compound.

7.9 Caulking and Sealants: See Section 07920, Caulking and Sealants.

8. FABRICATION:

8.1 Forms: Forms shall be well braced and stiffened against deformation, and shall be accurately constructed. The forms shall be such as to produce a smooth dense surface. A bond-breaking substance may be applied to the forms before pretensioning steel is placed; if so, it should be done in accordance with PCI MNL-116. Form ties shall be either the threaded or snap-off type, so that no form wires or metal pieces will be within 3/4 inches of the surface.

8.2 Tolerances: Member dimensions and camber shall be within the tolerances described in PCI MNL-116.

8.3 Placing of Reinforcement:

8.3.1 Steel reinforcement shall be fabricated as shown on shop drawings and placed in position in the forms within the tolerances specified in ACI 318. Reinforcement shall be adequately secured so as to remain in the proper position during placement of the concrete. Bars that are to be used as connecting bars between precast-prestressed and cast-in-place construction shall have the extension exposed. Mortar from precasting operations adhering to protruding bars shall be removed.

8.3.2 Splicing of steel connections and of nonprestressed reinforcement at connection of members shall be in accordance with ACI 318. Wire fabric and bars shall be held in proper position until the welding is completed. Welding of prestressing steel is not permitted, nor shall any welding be done anywhere in the vicinity of prestressing strand.

8.4 Inserts: All inserts shall be firmly positioned so as not to become displaced during the placing of concrete. Bearing plates shall be located with special accuracy.

8.5 Measuring and Mixing of Concrete: PCI MNL-116.

8.6 Placement of Concrete: Concrete shall not be deposited in the forms until the reinforcement, anchorages, and forms have been inspected and approved. Conveying of the concrete to the casting site shall be as rapid as practicable. The method of conveying the concrete shall not use a greater slump than that required for placing. Depositing a large quantity at any point and running it or working it along the forms shall not be permitted. Special care shall be taken to fill all parts of the forms, to work the coarse aggregate back from the face, and to force the concrete under and around the prestressing strands and reinforcing bars without displacing them.

8.7 Consolidation of Concrete: All concrete shall be consolidated in tie forms in accordancance with ACI 309. For external form vibration, forms must be of a design adequate to prevent distortion or failure.

8.8 Curing: Curing shall be accomplished in accordance with PCI MNL-116. The casting bed for concrete members cured by steam shall be enclosed completely with a suitable enclosure to minimize moistured heat losses. Curing methods shall be maintained until the specified strength for detensioning has been reached.

8.9 Prestressing:

8.9.1 General: Anchorages for tensioning the prestressing strand shall be of an approved type. The tension to which the strand is to be prestressed shall be established by the jack pressure reading on a calibrated gage of approved type, and verified by measurement of strand elongation. Means shall be provided for measuring the elongation of the strand to at least the nearest 1/8inch. When the gage reading and elongation measurement disagree by more than 5 percent, the cause of the discrepancy shall be found and corrected.

8.9.2 Strands for precast-prestressed members shall be given an initial stress equal to approximately 10 percent of the design load, after which the alignment shall be checked for conformity to the drawings. The total prestressing force shall then be applied gradually in accordance with the approved prestressing sequence.

8.9.3 Detensioning: Transfer of prestress shall not be made until the concrete strength has reach a minimum of 3500 psi. Transfer of prestress may be accomplished by gradual release of the tensioning jacks or by burning of strands in accordance with the approved detensioning sequence. Where the burning method is used, the sequence of cutting strands shall be such as to prevent severe unbalance of the loading. Prior to transfer of prestress, forms shall be loosened, or removed if necessary, to allow free movement of the casting. Shock release of the strands will not be permitted.

8.10 Finishing: Honeycombing and chipped corners shall be cleaned and patched in accordance with PCI MNL-116. No honeycombing or other void extending to the prestressing steel shall be patched without approval of a qualified structural engineer and the Contracting Officer.

8.10.1 Grade B Finish: All air pockets and holes over 1/4-inch in diameter shall be filled with a sand-cement paste. All form offsets or fins over 1/8-inch shall be ground smooth.

8.10.2 Unformed Surfaces: Unformed surfaces of prestressed concrete products shall be finished as follows:

Slabs . . . . . Screeded

8.11 Cracks in Precast-Prestressed Concrete: Precast-prestressed concrete containing hair cracks which are visible but not measurable by ordinary means may be accepted. Precast concrete containing cracks of width measurable by ordinary means (0.02-inch wide and over) shall require the approval of a qualified structural engineer and the Contracting Officer.

9. ERECTION:

9.1 General: Erection of precast prestressed members shall be in accordance with the approved shop drawings. Lifting, transporting, and placing of such members shall be in accordance with PCI MNL-116. Precast-prestressed members shall not be shipped from the plant site or erected until test cylinders show that the concrete has attained the required 28-day strength.

9.2 Welding: Welding of connections and reinforcing splices in precast-prestressed members shall be in accordance with AWS D1.4. Splicing of prestressing strands within the precast members will not be permitted. Unless flexible connections are provided members shall not be permanently connected until 21 days after transfer of prestress.

9.3 Bearing Surfaces: Bearing surfaces shall be not more than 1/8-inch per foot out of level, and free from irregularities. Irregularities in bearing surfaces shall be leveled with a stiff cement mortar. Mortar shall be allowed to harden before installing the units. Units shall be installed at right angles to bearings, drawn up tight without forcing or distortion, and with sides plumb, as per approved shop drawing details.

9.4 Camber: Differential camber between adjacent units shall be within the limits specified in PCI MNL-116. Slab ends shall be aligned. Underside of slabs shall present true ceiling surface.

9.5 Openings: All openings not indicated on the shop drawings shall be job cut by the various trades requiring them. All holes less than 12 inches in diameter through prestressed members are to be made by drilling with a diamond tipped core drill in the field, by the various trades requiring them. Prestressing steel shall not be cut unless so indicated on the shop drawings. However, no field holes or cuts may be made in the prestress members without prior approval of a qualified structural engineer and the Contracting Officer.

9.6 Grouting:

9.6.1 Keyways between unit and other spaces shall be cleaned and filled solidly with grout. Grout seeping through to surfaces in spaces below shall be removed before hardening.

9.6.2 Grout shall consist of a mixture of cementatious materials and aggregate as specified hereinafter; water shall be added in sufficient quantity to produce a stiff fluid mixture. Fine grout shall be provided in grout spaces less than 2 inches in any horizontal dimension or in which clearance between reinforcing and masonry is less than 3/4-inch. Coarse grout shall be provided in grout spaces 2 inches or greater in any horizontal dimensions or in which clearance between members is not less than 3/4inch.

9.6.2.1 Fine grout shall be mixed in proportions of one part Portland cement, 1/4 part lime paste, and 3 parts sand.

9.6.2.2 Coarse grout shall be mixed in proportions of one part Portland cement, 1/4 part lime paste, 3 parts sand, and 3 parts coarse aggregate, 100 percent passing a 3/8inch sieve.

9.7 Caulking and Sealants: Seals, gaskets, sealant, and sealant backup shall be placed in vertical and horizontal joints between units in accordance with drawing details and as specified in Section 07920, Caulking and Sealants.

*** END OF SECTION ***

SECTION 04200

UNIT MASONRY

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 American Society for Testing and Materials (ASTM):

A 82-79	Cold-Drawn Steel Wire for Concrete Reinforcement
A 90-81	Weight of Coating on Zinc-Coated (Galvanized) Iron or Steel Articles
A 153-80	Zinc Coating (Hot-Dip) on Iron and Steel Hardware
A 615-82	Deformed and Plain Billet-Steel Bars for Concrete Reinforcement
C 90-75(1981)	Hollow Load-Bearing Concrete Masonry Units
C 91-78	Masonry Cement
C 150-81	Portland Cement
C 207-79	Hydrated Lime for Masonry Purposes
C 270-80	Mortar for Unit Masonry
C 595-81	Blended Hydraulic Cements

2. SUBMITTALS:

2.1 Certified Test Reports: Submit certified copies of the reports of all tests specified herein. Test reports shall be accompanied by notarized certificates from the manufacturer certifying that the tested material and equipment is of the same type, quality, manufacture and make as that proposed to be supplied.

2.2 Manufacturer's Catalog Data: Complete descriptive literature of masonry units and joint reinforcement.

2.3 Mill Certificates: Certificates for cement, quicklime, and hydrated lime.

2.4 Samples: Required samples shall be submitted sufficiently in advance of time for their installation for investigation and re-submittal of new samples if the preceding sample is found to be non-conforming to the contract requirements. Samples of the following shall be submitted in sizes and quantities stated:

a. Block: Minimum of five to twenty, as necessary to show full color range to be used in the work.

b. Wall and horizontal joint reinforcement: Two each, minimum length of 16-inches.

3. DELIVERY AND STORAGE: Cement, lime and other cementitious materials shall be delivered to the site and stored in unbroken bags, barrels, or other approved containers, plainly marked and labeled with the manufacturer's names and brands. Mortar materials shall be stored in dry, weathertight sheds or enclosures, and shall be stored and handled in a manner which will prevent the inclusion of foreign materials and damage by water or dampness. Masonry units shall be handled with care to avoid chipping and breakage. Materials stored on newly constructed floors shall be stacked in such manner that the uniformly distributed loading does not exceed 50 psf. Masonry materials shall be properly protected from contact with the earth and exposure to the weather, and shall be kept dry until used. Materials containing frost or ice, and cement and lime which have been wetted by rain or other water prior to incorporation in mortar, shall not be used.

4. MATERIALS: Masonry work of the types indicated shall be provided. The source of supply for materials which will affect the appearance of the finished work shall not be changed after the work has started.

4.1 Concrete Masonry Units: Units shall be of modular dimensions, and shall be either air, water or steam cured. Units shall be stored before use a minimum of 28 days for air cured units; 10 days for steam or water cured units; and 3 days for units cured with steam at a pressure of 120 to 150 psi and at a temperature of 350 to 365 degrees F. for at least 5 hours. Surfaces of units which are to be left exposed in the finished work, or which are to be painted, shall be relatively smooth with a uniform texture.

4.1.1 Hollow Load-Bearing Units: ASTM C 90, made with light weight or normal weight aggregates, Grade N-I.

4.1.2 Special Shapes: Closures, jamb units, and the like shall be provided as necessary to complete the work, and shall conform to the applicable portions of the specifications for the units with which they are used.

4.2 Cement: Type I Portland cement conforming to ASTM C 150, or Type IP blended hydraulic cement, conforming to ASTM C 595.

4.3 Lime Paste: Made with pulverized quicklime, or with hydrated lime, which shall be allowed to soak not less than 72 hours before use; except that hydrated lime, processed by the steam method, shall be allowed to soak not less than 24 hours, and shall be made by adding the lime to the water. In lieu of hydrated-lime paste for use in mortar, the hydrated lime may be added in the dry form.

4.3.1 Hydrated Lime: ASTM C 207, Type S.

4.4 Sand: ASTM C 144.

4.5 Water: Clean, potable, and free from substances which could adversely affect the mortar.

4.6 Reinforcing Steel Rods: ASTM A 615, Grade 60.

4.7 Horizontal Joint Reinforcement: ASTM A 82, fabricated from cold drawn steel wire. The wire shall be zinc-coated after fabrication by the hot-dip process in accordance with ASTM A 153. Reinforcement shall consist of two or more parallel longitudinal wires, not less than 0.1875-inch in diameter, weld connected with cross wires, not less than 0.1483-inch diameter at minimum 16 inches o.c. The out-to-out spacing of the longitudinal wires shall be 1-1/2 to 1-3/4 inches less than the actual width of the masonry. The distance between welded contacts of cross wires with each longitudinal wire shall not exceed 6-inches for smooth wire and 16-inches for deformed wire. Joint reinforcement shall be provided in flat sections, not less than 10 feet in length, except that corner reinforcements and other special shapes may be less in length.

4.8 Anchors and Ties: Items shall be of approved designs, and shall be of copper-clad steel, zinc-coated steel, or of non-corrosive metal having the equivalent total strength of steel types. Zinc-coated items shall be coated by the hot-dip process after fabrication to provide a minimum of 1.25 ounces of zinc per square foot of surface when tested in accordance with ASTM A 90.

4.9 Miscellaneous Flashing: As specified in Section 07600, "Flashing and Sheetmetal".

5. GENERAL REQUIREMENTS: Masonry work shall be coordinated with the work of other trades.

5.1 Erection Conditions: Masonry shall not be laid when the air temperature is below 40 degrees F. on a falling thermometer, or when it appears probable that temperatures below 40 degrees F. will be encountered before the mortar has set, unless adequate means are provided for protecting the work from freezing. Protection shall consist of heating and maintaining the temperature of the masonry materials at not less than 40 degrees F., but not more than 160 degrees F., and maintaining an air temperature above 40 degrees F. on both sides of the masonry for not less than 72 hours. Work will not be permitted with or

on frozen materials. Masonry work may be started at 34 degrees F. on a rising thermometer. Scaffolding shall be inspected regularly, and shall be amply strong, well braced and securely tied in position. Overloading of scaffolding will not be permitted. Tops of exposed walls and partitions shall be covered with a waterproof membrane, well secured in place, when work is not in progress.

5.2 Workmanship: Masonry walls shall be carried up level and plumb all around. One section of the walls (other than reinforced walls) shall not be carried up in advance of the others, unless specifically approved. Unfinished work shall be stepped back for joining with new work. Toothing will not be permitted, except where specified or specifically approved. Masonry units shall be handled with care to avoid chipping, cracking and spalling of faces and edges. Drilling, cutting, fitting and patching to accommodate the work of others, shall be performed by masonry mechanics. Masonry shall be cut with masonry saws in exposed work, where directed.

5.2.1 Openings and Accessories: Door and window frames, anchors, pipes, and conduits shall be built in carefully and neatly as the masonry work progresses. Ties and anchors shall be placed accurately as shown or herein specified, as the work progresses. Grouting of ties or anchors into hardened mortar or grout will not be permitted. Spaces around metal door frames shall be filled solidly with mortar. Sleeves and miscellaneous metalwork specified elsewhere shall be placed in position as the work progresses.

6. ERECTION:

6.1 Mortar and Grout Mixing: Materials shall be measured in approved containers, which will insure that the specified proportions of materials will be controlled and accurately maintained during the progress of the work. Measuring materials with shovels will not be permitted. Unless specified otherwise, mortar and grout shall be mixed in proportions by volume. The aggregates shall be introduced and mixed in such a manner that the materials will be distributed uniformly throughout the mass. A sufficient amount of water shall be added gradually and the mass further mixed, not less than 3 minutes nor more than 5 minutes, until a mix of the plasticity necessary for the purposes intended, is obtained. The materials shall be machine-mixed in approved mixers, of the type in which the quantity of water can be controlled accurately and uniformly. Hand mixing may be used, only when specifically approved. Mortar boxes, pans, and/or mixer drums shall be kept clean and free of debris or dried mortar. The mix shall be used before the initial setting of the cement has taken place; the mortar and grout may be retempered as frequently as needed, up to 2-1/2 hours after mixing. Anti-freeze compounds, salts, or any other substance used to lower the freezing point of the mix, will not be permitted.

6.1.1 Mortar: The color of cement and sand used in mortar for exposed work shall produce, without the admixture of any coloring matter, a mortar of uniform shade which will match the color of Masonry Units.

6.1.1.1 Mortar for Foundation Walls: ASTM C 270, Type M, consisting of one part cement, 1/4 part hydrated lime or lime paste and 3 to 3-3/4 parts sand.

6.1.1.2 Mortar for Other Work: ASTM C 270, Type S, consisting of one part cement, 1/4 to 1/2 part hydrated lime or lime paste, and 3-3/4 to 4-1/2 parts sand. Prepackaged mortar mix may be used provided the mix has the same cement-to-lime proportion as that specified herein for ASTM C 270 Type S mortar. Air content of the prepackaged mix shall not exceed 16 percent when tested in accordance with ASTM C 91, and the mix shall not contain any noncementitious fillers. Mortar made with a prepackaged mix shall consist of one part mix to not more than three parts sand.

6.1.2 Grout: Grout shall consist of a mixture of cementitious materials and aggregate as specified hereinbelow; water shall be added in sufficient quantity to produce a fluid mixture with a slump of 8 to 10-inches. Slump shall be verified by at least one slump test for each truck load of grout delivered by truck mixer; and by at least one test each day for all grout placed that day, if mixed at the project site. Fine grout shall be provided in grout spaces less than 2-inches in any horizontal dimension or in which clearance between reinforcing and masonry is less than 3/4-inch. Coarse grout shall be provided in grout spaces 2-inches or greater in all horizontal dimensions and in which clearance between reinforcing and masonry is at least 3/4-inch.

6.1.2.1 Fine Grout: Fine grout shall be mixed in proportions of one part cement, 1/4 part hydrated lime or lime paste and 3 parts sand.

6.1.2.2 Coarse Grout: Coarse grout shall be mixed in proportions of one part cement, 1/4 part hydrated lime or lime paste, 3 parts sand, and 3 parts pea gravel passing a 3/8-inch sieve.

6.2 Mortar Joints: Joints shall be uniform in thickness and the average thickness of any three consecutive joints shall be 3/8 to 1/2-inch, to be adjusted and approved as initial placement of masonry units commences. Story poles or gage rods shall be made and approved prior to starting the work and shall be used throughout the work. Changes in coursing or bonding after the work is started will not be permitted. Exposed joints shall be tooled slightly concave with a round or other approved jointer, when the mortar is thumbprint hard. The jointer shall be slightly larger than the width of the joint, so that complete contact is made along the edges of the units, compressing and sealing the surface of the joint. Tools which cause discoloration shall not be used. Horizontal joints shall be tooled first. Joints shall be brushed to remove all loose and excess mortar. All horizontal joints shall be level. Vertical joints shall be plumb and in alignment from top to bottom of wall within a tolerance of plus or minus 1/2-inch.

6.3 Concrete Masonry Unit Work: The first course of concrete masonry units shall be laid in a full bed of mortar for the full width of the unit; the succeeding courses shall be laid with broken joints. The bed joints of concrete masonry unit shall be formed by applying the mortar to the entire top surfaces of the inner and outer face shells, and the head joints shall be formed by applying the mortar for a width of about one-inch to the ends of the adjoining units laid previously. The mortar for joints shall be smooth, not furrowed, and shall be of such thickness that it will be forced out of the joints as the units are being placed in position. Where anchors, bolts and ties occur within the cells of the units, such cells shall be filled with mortar or grout as the work progresses. Metal lath shall be placed under cells before they are filled. Concrete masonry units shall not be dampened before or during laying.

6.3.1 Exposed Concrete Units: Concrete masonry units for exposed walls and partitions shall be selected for undamaged edges and ends of the exposed surfaces. It is not intended that all units within any one wall or partition be perfect without slight cracks and small chips, but rather that discretion be used in selecting the units with closer matching faces and least imperfections for exposure to view. Special attention shall be given to placing the units plumb, parallel and with a properly tooled joint. Exposed surfaces shall be kept clean and free of blemishes. Bond pattern shall be as indicated and specified. Upon completion, and after grouting and pointing, exposed surfaces shall present a reasonably uniform appearance not unpleasing to the eye and suitable to receive decorative finish. Masonry units which exceed imperfections allowed by ASTM C 90 shall not be used in walls and partitions exposed to view.

6.3.2 Reinforced Concrete Masonry Unit Walls: Walls shall be laid in such a manner as to preserve the unobstructed vertical continuity of cores to be filled. Cross webs adjacent to vertical cores that are to be filled with grout shall be fully embedded in mortar, to prevent leakage of grout. Mortar fins protruding from joints shall be removed before grout is placed; the minimum clear dimensions of vertical cores shall be 2-inches by 3-inches. Reinforcing shall be positioned accurately as indicated. As masonry work progresses, vertical reinforcing shall be rigidly secured in place at vertical intervals not to exceed 160 bar diameters. Horizontal reinforcing shall be embedded in grout as grouting proceeds. The minimum clear distance between masonry and vertical reinforcement shall be not less than 1/2-inch. Unless indicated or specified otherwise, splices shall be formed by lapping bars not less than 20 bar diameters and wire tying them together.

6.4 Concrete Masonry Unit Bond Beams: Lintels and bond beams shall be formed of units having the cells filled solidly with grout or concrete, and provided with not less than two No. 5 reinforcing bars, unless indicated otherwise. Reinforcing shall overlap a minimum of 24 bar diameters at splices. Concrete masonry units used for bond beams shall be of special shapes, and exposed work shall be of the same material and texture as the adjoining masonry units. Last course shall be continuous bond beam.

6.5 Bonding: Corners and intersections of load-bearing masonry walls shall be bonded in each course with a true masonry bond.

6.5.1 Masonry to Concrete: Masonry walls abutting concrete members shall be anchored to the concrete with reinforcing dowels as indicated.

6.6 Welded Wire Tie Reinforcement: Welded wire tie reinforcement shall be provided where indicated and in the first two courses above and below openings. Reinforcement shall be continuous. Reinforcement above and below openings shall extend not less than 24-inches beyond each side of openings. Reinforcement shall be provided in the longest available lengths, utilizing the minimum number of splices. Splices shall overlap not less than 12-inches. Welded "L"-shaped assemblies, not less than 40 by 48-inches, and "T"-shaped assemblies, not less than 32 by 32-inches, both of the same size members and the same construction as the straight reinforcement, shall be provided at corners and intersections of walls. Reinforcement shall be embedded in the mortar joints in such manner that all parts will be protected by mortar.

6.7 Grout Placement: Sills and other surfaces to be left exposed shall be protected from grout droppings. Grout falling on such surfaces shall be removed immediately. Grout shall contain sufficient water to be of pouring consistency and sufficiently fluid to flow into joints and around reinforcing without leaving voids. Grout shall be well stirred before placing to avoid segregation of the aggregate and shall be placed by pumping; or pouring from chutes, buckets with spouts, or other spouted containers. The maximum height of grout pour shall be 4 feet. Grout shall be rodded or agitated thoroughly to eliminate voids, but with caution not to displace masonry from its original position nor to stain exposed surfaces. Masonry displaced by grouting shall be removed and laid in realignment with fresh mortar. Pours shall be kept at 1-1/2 inches below the top of masonry units in the top course, except for the finish course. Each pouring of grout shall be rerodded or otherwise reagitated one to 1-1/2 hours after placing.

6.8 Cleaning: During construction, care shall be taken continuously to keep the exposed faces clean of mortar and other stains. When mortar joints reach thumbprint hardness and are tooled, the exposed work shall be brushed with a soft fiber brush to remove adhering mortar, and a wood paddle shall be used to remove more tenacious material. Bases of walls shall be protected from splash stains by covering the adjacent ground with sand, sawdust, or polyethylene. At the completion of the masonry work, holes in exposed masonry shall be pointed, and defective joints shall be cut out and tuck pointed solidly with mortar which has been retempered one to two hours after original mixing. Exposed masonry surfaces shall be scrubbed with warm water and soap, and rinsed thoroughly with clear water. Work which may be damaged, stained, or discolored, shall be protected during the cleaning process, and any work damaged, stained, or discolored shall be restored to its original condition or replaced.

*** END OF SECTION

SECTION 05500

METAL FABRICATIONS

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.):

FF-H-111C	Hardware, Builders, Shelf and Miscellaneous
FF-S-325 & Int. Am-3	Shield, Expansion; Nail, Expansion; and Nail, Drive Screw (Devices, Anchoring, Masonry)

1.1.2 Military Specifications (Mil. Spec):

DOD-P-21035A & Am-1	Paint, High Zinc Dust Content, Galvanizing Repair (Metric)

1.1.3 American Institute of Steel Construction (AISC) Publication:

Manual of Steel Construction, 8th Edition, November 1980 "Specifications for the Design, Fabrication and Erection of Structural Steel for Buildings"

1.1.4 American National Standards Institute (ANSI) Standards:

A14.3-74	Safety Requirements for Fixed Ladders
B18.2.1-81	Square and Hex Bolts and Screws
B18.5-78	Round Head Bolts

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

A 36-81a	Structural Steel
A 53-81	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 153-80	Zinc Coating (Hot-Dip) on Iron and Steel Hardware
A 386-78	Zinc-Coating (Hot-Dip) on Assembled Steel Products
A 525-81	Steel Sheets, Zinc-Coated (Galvanized), by the Hot-Dip Process, General Requirements
B 26-80	Aluminum-Alloy, Sand Castings

1.1.6 American Welding Society (AWS) Publication:

D1.1-81	Structural Welding Code, Steel

1.1.7 Corps of Engineers Publication:

CRD-C588-76	Nonshrink Grout

1.2 SUBMITTALS:

1.2.1 Certificates of Compliance: Submit manufacturer's certificates for the following:

a. Carbon Steel
b. Steel Pipe and Tubing
c. Nonshrink Grout
d. High Strength Bolts & Nuts

1.2.2 Shop Drawings: Submit shop drawings along with catalog cuts, templates, and erection and installation details, as appropriate, for all miscellaneous metal items listed below. Submittals shall be complete in detail; shall indicate thickness, type, grade, class of metal, and dimensions; and shall show construction details, reinforcement, anchorage, and installation with relation to the building construction.

a. Handrails
b. Ladders
c. Structural Steel Door Guards
d. Dock Bumper
e. Threshold

1.3 QUALIFICATION OF WELDERS: Welding shall be performed by certified welders qualified in accordance with AWS D1.1 using procedures, materials, and equipment of the type required for the work.

1.4 DELIVERY, STORAGE AND HANDLING: Deliver, store and handle all miscellaneous metal items in a manner to protect them from corrosion, deformation, and other types of damage. Store all miscellaneous items in an enclosed area free from contact with soil and weather. All damaged items shall be replaced by the Contractor.

PART 2 - PRODUCTS AND EXECUTION

2.1 CONFORMANCE TO REQUIREMENTS: Products shall conform to the requirements specified for the particular item; and where these requirements are not specified in detail, the materials shall be suitable for the intended usage of the item. The products listed below shall conform to the respective specifications and other requirements specified herein.

2.1.1 Aluminum: Aluminum components shall be in standard mill finish. Aluminum surfaces to be placed in contact with concrete or masonry construction shall be given a heavy coat of an alkali-resistant bituminous paint before installation.

2.1.2 Steel and Iron: If not specified otherwise, use standard mill finished structural steel shapes or bar iron in compliance with AISC Specifications for Design, Fabrication and Erection of Structural Steel for Buildings.

2.1.3 Structural Carbon Steel: Riveted, bolted or welded work shall conform to ASTM A 36.

2.1.4 Steel Pipe: Steel pipe for structural use shall conform to ASTM A 53, Type E or S, Grade B.

2.1.5 Hardware: Hardware provided as an integral part of miscellaneous metal items shall conform to Fed. Spec. FF-H-111.

2.1.6 Anchors and Fasteners: Anchors and fasteners, where exposed, shall be of the same material, color, and finish as the metal to which applied.

2.1.6.1 Expansion Shields: Expansion shields shall conform to Fed. Spec. FF-S-325, of group, type, class, and style best suited for the purpose. Shields shall be recessed not less than 2-1/2 inches into concrete or masonry. Devices of Groups IV, V, VI, and VII shall not be used in sizes greater than 3/8-inch unless so indicated.

2.1.6.2 Lag Screws And Bolts: Lag screws and bolts shall conform to ANSI B18.2.1, type and grade best suited for the purpose.

2.1.6.3 Toggle Bolts: Toggle bolts shall conform to ANSI B18.2.1 and ANSI B18.5.

2.1.6.4 Equipment Anchor Bolts: Anchor bolts shall meet requirements of the manufacturer of item of equipment to be installed. Anchor bolts and washers shall be high-strength steel conforming to ASTM A325 Type 1 or 2.

2.1.7 Extruded Aluminum Alloy: ASTM B 26.

2.1.8 Dock Bumpers: Dock bumpers shall consist of multiple plies of rubber and fabric (cut from truck tire tread) mounted on two 7/8 inch diameter bars welded to 3/8 inch thick mounting plates and/or angles at each end. Rubber shall project one inch beyond end plates or angles. Bumpers shall be mounted using a minimum of two 3/4 inch diameter anchor bolts at each end. All steel shall be galvanized as specified herein.

2.2 ANCHORAGE: Provide anchorage where necessary for fastening miscellaneous metal items securely in place. Anchorage not otherwise specified or indicated shall include expansion shields for concrete; toggle bolts and through bolts for masonry; machine and carriage bolts for steel.

2.3 FABRICATION: Verify all measurements and take field measurements necessary before fabrication. Welding to or on structural steel shall be in accordance with AWS D1.1. Items specified to be galvanized, when practicable, shall be hot-dip processed after fabrication. Galvanizing shall be in accordance with ASTM A 123, ASTM A 153, ASTM A 386, and ASTM A 525, as applicable. Exposed fastenings shall be compatible materials, shall match in color and finish, and shall harmonize with the material to which fastenings are applied. Include materials and parts necessary to complete each item, even though such work is not definitely shown or specified. Provide all bolts, anchors, supports, braces, connections and other items necessary for completion of the miscellaneous metalwork. The necessary rebates, lugs, and brackets shall be provided so that the work can be assembled in a neat and substantial manner. Holes for bolts and screws shall be drilled or punched. Poor matching of holes shall be cause for rejection. Fastenings shall be concealed where practicable. Thickness of metal and details of assembly and supports shall give ample strength and stiffness. Joints exposed to the weather shall be formed to exclude water.

2.4 WORKMANSHIP: Miscellaneous metalwork shall be fabricated in accordance with approved drawings, cuts, details, and samples. Drilling and punching shall produce clean true lines and surfaces. Welding shall be continuous along the entire area of contact unless otherwise indicated. Exposed welds shall be ground smooth. Exposed surfaces of work in place shall have a smooth finish, and exposed riveting shall be flush. Where tight fits are required, joints shall be milled to a close fit. Corner joints shall be coped or mitered, well formed, and in true alignment. Work shall be accurately set to established lines and elevations and securely fastened in place.

2.5 MISCELLANEOUS ITEMS:

2.5.1 Platform Guards: Edges of loading platform shall be steel shapes as indicated anchored in concrete with welded steel straps or end-weld stud anchors.

2.5.2 Handrails:

2.5.2.1 Steel Rails, Including Pipe Inserts: Steel rails, including pipe inserts in concrete, shall be standard weight steel pipe conforming to ASTM A 53. Pipe shall be 1-1/2-inch size. Pipe railings shall be galvanized.

2.5.2.1.1 Jointing of Posts, Rail, and Corners: Miter and weld joints by fitting post to top rail and intermediate rail to post, miter corners, groove weld joints, and grind smooth. Railing splices shall be butted and reinforced by a tight fitting interior sleeve not less than 6 inches long. Railings may be bent at corners in lieu of jointing, provided bends are made in suitable jigs and that the pipe is not crushed.

2.5.2.2 Installation: Install rails by means of steel pipe sleeve inserts set and anchored in the concrete as indicated. Insert posts into the steel pipe sleeves, leveled, plumbed, and aligned. Fill solid the annular space between pipe posts and pipe sleeve inserts with non-shrink grout conforming to CRD-C588. Secure ends of rails by means of standard steel pipe flange anchored to masonry walls by expansion shields and bolts.

2.5.2.3 Furnish removable sections as indicated on the drawings.

2.5.3 Ladders: Fabricate vertical ladders conforming to ANSI A14.3 of 3 inches by 3/8-inch steel bars for strings and 3/4-inch diameter steel rods for rungs. Rungs shall be 36 inches wide, spaced 10 inches apart, plug welded or shouldered and headed into strings. Install ladders so that the distance from the runs to the finished wall surface will be as indicated. Secure to the adjacent construction with heavy clip angles riveted or bolted to the string and secured to concrete with not less than two 1/2-inch diameter expansion bolts.

2.5.4 Structural Steel Door Guards: Structural steel door guards shall be of rolled shapes as shown on the drawings. Guards shall be secured to masonry with bent zinc-coated metal anchors spaced not more than 2.5 feet on centers. Guards shall extend 4 feet above concrete floor.

2.5.5 Thresholds: Thresholds shall be of aluminum not less than 1/4 inch thick and shall have nonslip upper surfaces to within 3 inches of jambs. Threshold shall be provided with continuous removable vinyl strip suitable for use with the weatherstripping specified for doors. Thresholds shall be fastened by expansion screws, two at each end and intermediate ones staggered not over 12 inches on centers. Thresholds shall be bedded in a mastic compound as they are set.

2.6 FINISHES:

2.6.1 Galvanizing: Hot-dip galvanize items specified to be zinc-coated, after fabrication where practicable. Galvanizing: ASTM A 123, ASTM A 153, ASTM A 386, and ASTM A 525, as applicable.

2.6.1.1 Galvanize all steel materials unless indicated otherwise.

2.6.1.2 Repair of Zinc-Coated Surfaces: Repair zinc coated surfaces damaged by welding or other means with galvanizing repair paint conforming to Mil. Spec. DOD-P-21035 or by the application of stick or thick paste material specifically designed for repair of galvanizing, as approved. Clean areas to be repaired and remove the slag from the welds. Surfaces to which stick or paste material is applied, shall be heated with a torch to a temperature sufficient to melt the metallics in stick or paste; spread the molten material uniformly over surfaces to be coated and wipe the excess material off.

*** END OF SECTION ***

SECTION 06100

ROUGH CARPENTRY

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.):

FF-B-588C & Am 1	Bolts, Toggle: and Expansion Sleeve, Screw
FF-N-105B & Am 4	Nails, Brads, Staples, and Spikes, Wire, Cut and Wrought
FF-P-395B	Pin, Drive, Guided; and Pin, Drive Powder Actuated
FF-S-325 & Int Am 3	Shield, Expansion; Nail Expansion; and Nail, Drive Screw (Devices, Anchoring; Masonry)
GGG-D-777B	Driver, Projectile Unit, Powder Actuated (High Velocity)

1.1.2 U. S. Department of Commerce Product Standards (PS):

20-70	American Softwood Lumber Standard

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

A 687-79	High-Strength Nonheaded Steel Bolts and Studs

1.1.4 American Wood Preservers' Bureau (AWPB) Publications:

LP-2, July 1975	Standard for Softwood Lumber, Timber, and Plywood Pressure Treated with Waterborne Preservatives for Above Ground Use
LP-4, July 1975	Standard for Softwood Lumber, Timber, and Plywood Pressure Treated with Volatile Hydrocarbon Solvent (LPG) - Penta Solution for Above Ground Use

1.1.5 American National Standards Institute (ANSI) Publications:

B18.2.1-81	Square and Hex Bolts and Screws
B18.2.2-72	Square and Hex Nuts
B18.5-78	Round Head Bolts
B18.6.1-81	Wood Screws

1.1.6 National Forest Products Association (NFPA) Publications:

1961 Edition	Manual for House Framing

1.1.7 Southern Cypress Manufacturers Association (SCMA) Publication:

Standard Specifications for Grades of Tidewater Red Cypress, April 1958 edition, reprinted July 1964

1.1.8 Southern Pine Inspection Bureau (SPIB) Publication:

Southern Pine Inspection Bureau Grading Rules March 15, 1977 edition, and Supplements I through 4

Uniform Building Code, 1976 Edition

1.2 SUBMITTALS:

1.2.1 Certificate of Preservative Treatment: Submit for approval certification by the preservative treatment company, stating the paintability, drying time, surface deposit, and moisture content of preservative treated lumber upon shipment from the treatment plant.

1.3 DELIVERY AND STORAGE: Materials shall be delivered to the site in an undamaged condition. Materials shall be carefully stored off the ground to provide proper ventilation, drainage, and protection against dampness. Defective and damaged materials shall be replaced.

1.4 GRADING: Unless otherwise specified, each piece of framing and board lumber shall be identified by the grade mark of a recognized association or independent inspection agency using the specific grading requirements of the association recognized as covering the species used. Such association or independent inspection agency shall be certified by the Board of Review, American Lumber Standards Committee, to grade the species used.

1.5 MARKING: Each piece of preservative treated lumber shall be labeled with a permanent mark indicating conformance with the applicable AWPB standard. The label shall be an approved AWPB quality mark or that of an approved independent inspection agency that maintains continuing control, testing, and inspection over the quality of the product.

1.6 SIZES OF LUMBER: Sizes and surfacing of lumber shall conform to PS 20 for dressed sizes of yard and structural lumber. All lumber shall be surfaced four sides. Sizes of framing lumber and board lumber indicated on the drawings and specified herein are given by nominal sizes, unless otherwise specified or indicated. Size references, unless otherwise specified, are nominal sizes, and actual sizes shall be within manufacturing tolerances allowed by the standard under which the product is produced.

1.7 MOISTURE CONTENT OF LUMBER: The moisture content of lumber at the time of delivery to the job site shall be as follows:

a. Framing lumber 2 inches and less in thickness — 19 percent maximum

b. Boards — 19 percent maximum

1.8 PRESERVATIVE TREATMENT OF LUMBER: Lumber shall be pressure preservative treated in accordance with AWPB LP-2 or LP-4. Treatment shall be applied to properly seasoned lumber only and treatment for lumber to receive paint or other finish shall be such as to cause no adverse affects on the ability of the surface to receive the finish specified. Wood treated with oil-borne preservatives shall be clean, free from surface oil, bloom and crystalline deposits, and shall be properly seasoned for use in building construction. Wood-treated with water-borne preservatives shall be air seasoned or kiln-dried after treatment to a maximum moisture content as noted hereinbefore. Surfaces of lumber that will be exposed shall not be incised. The exposed areas of treated wood that are cut or drilled after treatment shall be well brush coated with the preservative used in the treatment. All wood items shall be preservative treated.

1.8.1 Preservatives: Preservatives shall be pentachlorophenol or water-borne salts ACA, CCA - Type A, CCA - Type B, CZC or CuCZA listed in the table of the applicable AWPB standard governing the particular type of treatment.

1.8.2 Pressure Treatment: Treatment shall be in accordance with the applicable AWPD Standard. If Standard LP-2 is used, only one of the following salt formulations may be used: ACA; CCA - Type A; CCA - Type B; CZC; or CuCZA. If standard LP-4 is used, water repellents shall be added.

PART 2 - PRODUCTS

2.1 MATERIALS: Materials shall conform to the respective specifications and standards and to the other requirements specified herein.

2.1.1 Lumber: Framing lumber and board lumber shall be one of the species listed in the table below. Minimum grade of species shall be as listed.

Table of Grades for Framing and Board Lumber

Grading Rules	Species	Framing	Board Lumber
SPIB standard grading rules	Southern Pine	Standard Light Framing or No. 3 Structural Light Framing (Stud Grade for 2 x 4 size, 10 feet and shorter)	No. 2 Boards
SCMA standard specifications	Cypress	No. 2 Common	No. 2 Common

2.1.2 Rough Hardware: Unless otherwise indicated or specified, rough hardware shall be of the type and size necessary for the project requirements. Sizes, types, and spacing of fastenings of manufactured building materials shall be as recommended by the product manufacturer unless otherwise indicated or specified. Rough hardware exposed to the weather or embedded in or in contact with exterior masonry or concrete walls or slabs shall be zinc coated.

2.1.2.1 Bolts, Nuts, Studs, and Rivets: ANSI B18.2.1, ANSI B18.5, ANSI B18.2.2, and ASTM A 687.

2.1.2.2 Expansion Shields: Fed. Spec. FF-S-325. Except as shown otherwise, maximum size of devices in Groups IV, V, VI, and VII shall be 3/8 inch.

2.1.2.3 Lag Screws and Lag Bolts: ANSI B18.2.1

2.1.2.4 Toggle Bolts: Fed. Spec. FF-B-588.

2.1.2.5 Wood Screws: ANSI B18.6.1

2.1.2.6 Wire Nails and Staples: Fed. Spec. FF-N-105.

2.1.2.7 Powder-Actuated Fasteners: Fed. Spec. FF-P-395 or Fed Spec. GGG-D-777.

PART 3 - EXECUTION

3.1 INSTALLATION: Framing lumber and other rough carpentry shall be fitted closely, set accurately to the required lines and levels, and shall be secured in place in a rigid and substantial manner. All framing members not indicated or specified shall be provided as necessary for the proper completion of the work. Spiking and nailing not indicated or specified otherwise shall be in accordance with the Recommended Nailing Schedule contained in NFPA Manual for House Framing; bolting shall be done in an approved manner. Spikes, nails, and bolts shall be drawn up tight.

3.1.1 Wood Roof Nailers and Edge Strips: Shall be of the sizes and configurations indicated or specified and shall be anchored securely to contiguous construction.

3.1.2 Rough Wood Bucks: Shall be 2-inch nominal thickness. Wood bucks shall be set true and plumb. Bucks shall be anchored to concrete and masonry as indicated.

3.1.3 Wood Blocking: Shall be of proper sizes and shapes and provided at proper locations for the installation and attachment of fixtures and items indicated or specified.

3.1.4 Temporary Closures: They shall be provided with hinged doors and padlocks and installed during construction at exterior doorways and other openings that are not otherwise closed. Windows and other unprotected openings shall be covered with polyethylene or other approved material, stretched on wood frames.

*** END OF SECTION ***

SECTION 07535

ELASTOMERIC SHEET ROOFING SYSTEM

PART 1 - GENERAL

1.1 Scope: Work specified in this section includes providing single ply elastomeric roofing system mechanically attached or fully adhered without ballast, complete.

1.2 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.

1.2.1 Federal Specifications (Fed. Spec.):

HH-I-524C & AM 1	Insulation Board, Thermal (Polystyrene)
HH-I-1972/GEN	Insulation Board, Thermal, Faced, Polyurethane or Polyisocyanurate, including detailed Specifications HH-I-1972/2, 1972/3, 1972/5 and 1972/6

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

C 728-82	Perlite Thermal Insulation Board
D 41-78	Asphalt Primer used in Roofing, Dampproofing and Waterproofing
D 312-78	Asphalt Used in Roofing
D 2822-75 (R 1982)	Asphalt Roof Cement

1.3 QUALIFICATION OF APPLICATOR: The application of the sheet elastomeric roofing system shall be accomplished by an applicator who is approved by the elastomeric sheet roofing system manufacturer.

1.4 SUBMITTALS: Submit the following:

1.4.1 Evidence of Applicator Qualifications: Applicator's evidence of being approved by the elastomeric sheet roofing system manufacturer for the application of the elastomeric sheet roofing system.

1.4.2 Certificate of Conformance: Manufacturer's certification that materials are physically and chemically compatible with each other, that materials are in compliance with requirements of this specification, and that each material is suitable for the intended purpose. Materials not listed on the certificate will not be permitted in the work area.

1.4.3 Materials Manufacturer's Catalog and Specification Data: Data shall be complete with materials' descriptions and detailed application instructions, including standard installation detail drawings where applicable.

1.4.4 Samples: Samples of the materials listed below shall be of the same type and quality as those specified herein. Samples shall bear labels indicating the manufacturer's name, product identification, and lot number. Where materials are covered by a reference specification, the label shall bear the specification number, type, and class, as applicable.

a. Adhesives -- one pint

b. Elastomeric sheets -- one square yard of each type

c. Cleaner, activating solvent -- one pint

d. Fasteners -- 2 each type

e. Insulation -- 12 inch by 12 inch

1.5 DELIVERY, STORAGE, AND HANDLING:

1.5.1 Delivery: Manufactured roofing materials shall be delivered in manufacturer's original unopened containers or wrappings with labels intact and legible. Where materials are covered by a referenced specification number, the labels shall bear the specification number, type, and class of the contents. Deliver materials in sufficient quantity to allow the work to continue without interruptions.

1.5.2 Storage: Store and protect materials from damage and weather in accordance with the manufacturer's instructions, except as amended in this section. Keep materials clean and dry, and store them (except membrane) at a temperature between 60 and 80 degrees F. Use pallets to support, and canvas tarpaulins (not polyethylene) to cover, stored material top to bottom, on all sides, and top.

1.5.3 Handling: Use liquid components, including adhesives, within their shelf life period. When hazardous materials are involved, adhere to the special precautions of the manufacturer or as required by the GENERAL PROVISIONS, whichever is the most stringent. Promptly remove from the site materials contaminated by exposure to moisture.

1.5.4 Asphalt: Each container shall be plainly marked with the flash point (FP), equiviscous temperature (EVT), and finished blowing temperature (FBT), or this information shall be indicated on accompanying bills of lading.

1.6 ENVIRONMENTAL CONDITIONS: Application will not be permitted during high winds, inclement weather, or when air temperature is below 10 degrees F or when there is ice, frost, moisture, or visible dampness on the substrate surface.

1.7 WARRANTY: The Contractor shall furnish the elastomeric sheet manufacturer's standard warranty for the elastomeric sheet roofing system. The warranty shall run directly to the Government. In no event shall the warranty period be less than 5 years from the date of the Government's acceptance of the work. The warranty shall provide that if within the warranty period the elastomeric sheet roofing system becomes non-watertight, or splits, or tears, or separates at the seams, because of defective materials and workmanship, the repair and replacement of defective materials and correction of defective workmanship shall be the responsibility of the manufacturer. Should the manufacturer or his approved applicator fail to perform repairs within 72 hours of notification, the warranty will not be voided because of work being performed by others to repair the roofing regardless of the manufacturer's warranty to the contrary.

PART 2 - PRODUCTS

2.1 MATERIALS: Materials shall meet the following requirements:

2.1.1 Insulation: One inch thick.

a. Composite Board Insulation (Polystyrene): Constructed of polystyrene insulation board factory bonded between outer layers of perlite board insulation. Components of the composite board insulation shall be as follow:

(1) Polystyrene Insulation Board: Fed. Spec. HH-I-524, Type IV.

(2) Perlite Board: ASTM C 728.

b. Composite Board Insulation (Polyurethane or Polyisocyanurate): Fed. Spec. HH-I-1972, factory bonded to outer layers of perlite board.

2.1.2 Asphalt Primer: ASTM D 41.

2.1.3 Steep Asphalt: ASTM D 312, Type III.

2.1.4 Asphalt Roof Cement: ASTM D 2822, Type I for horizontal surfaces and Type II for vertical and sloped surfaces.

2.1.5 Elastomeric Sheet: Chlorosulfonated polyethylene (hypalon) 35-mil minimum thickness of largest available width and length. Sheet material shall be reinforced with polyester scrim or laminated backing. Color shall be white or gray. Acceptable products meeting this specification are:

a. HI-TUFF as manufactured by J.P. Stevens and Company, 26 Payson Avenue, Easthampton, Massachusetts 01027.

b. Tremply as manufactured by Tremco, Inc., 10701 Shaker Boulevard, Cleveland, Ohio 44104.

c. Uniroof as manufactured by Central States Associates, P. O. Box 65504, West Des Moines, Iowa 50265.

2.1.6 Primers: As recommended by the elastomeric sheet manufacturer's printed application instructions.

2.1.7 Adhesive: As recommended by the elastomeric sheet manufacturer's printed application instructions.

2.1.8 Lap Sealant, Primer, and Cleaner: As recommended by the elastomeric sheet manufacturer's printed application instructions.

2.1.9 Fasteners: As recommended by the elastomeric sheet manufacturer's printed application instructions.

PART 3 - EXECUTION

3.1 PREPARATION: Coordinate work with that of other trades to assure that components which are to be incorporated into the roofing system are available to prevent delays or interruptions as the work progresses. Examine surfaces to which the roofing system is to be applied to assure that their condition is satisfactory for its application. Inspect the surfaces immediately before application of roofing materials. Wood blocking at perimeters, curbs, and other penetrations must be installed prior to the start of roofing work. No voids greater than 1/4 inch are permitted. Complete the grouting and curing of deck slab before roofing is begun. Surfaces on or against which elastomeric sheets are to be applied shall be dry and free of oil, dirt, grease, sharp edges, and construction debris. Concrete surfaces shall be cured, and free of laitence and curing compounds. Correct deck defects prior to installing the roofing sheets.

3.2 WORK SEQUENCE: Arrange work to prevent use of newly constructed roofing for storage, walking surface, or equipment movement. Provide protection if access is necessary, and to protect new roofing surfaces and flashings from mechanical damage. Move material storage areas as work progresses to prevent damage to roofing system components; repair all damage.

3.3 APPLICATION: The application of insulation and all plies of roofing felts shall be completed in one operation. Upon completion of each day's work exposed edges and open ends of the work shall be protected by temporary water cut-offs, which shall be cut or removed when the work is resumed.

3.3.1 Application of Roof Insulation: Decks shall be completely covered with a vapor barrier, consisting of one layer of asphalt saturated and coated fibrous glass base sheet weighing not less than 25 pounds per 100 square feet. The asphalt base sheet shall be solidly mopped in place over asphalt primer. Asphalt primer shall be applied at the rate of one gallon per 100 square feet of surface. The application of asphalt primer shall be kept back approximately 4 inches from all joints between precast units. Felt strips, eight inches or more in width, shall be placed over all joints (four inches on each side) in asphalt roof cement and mopped solidly before the vapor barrier is applied. The asphalt base sheet vapor barrier shall be solidly mopped in place over the asphalt primer. The base sheets shall be lapped not less than four inches at sides and ends, and solidly mopped in with steep asphalt. Vapor barrier shall be laid at right angles to the direction of slope. Steep asphalt used in the installation of the vapor barrier shall be solidly mopped at the rate of at least 20 pounds per 100 square feet. Vapor barrier shall be placed free of wrinkles or buckles. Air bubbles shall be pressed out to obtain proper adhesion between surfaces. All roof insulating materials shall be kept dry before, during and after installation. The insulation shall be applied with the long joints continuous and with end joints staggered. Boards shall be firmly embedded in a solid steep asphalt mopping; only sufficient area to provide the complete embedment of one board shall be mopped at a time. Not less than 20 pounds of asphalt per 100 square feet of roof deck shall be used for mopping insulation in place.

3.3.1.1 Temperatures of Bitumen: Asphalt shall not be heated to nor above its flash-point (FP), nor 100 degrees F. above its equiviscous temperature (EVT). Application temperature shall be within $\pm$ 25 degrees F of the EVT, but not above the melting point of insulation material provided. Heating of asphalt above its finished blowing temperature (FBT) shall be avoided and strictly regulated; therefore, storage temperature of asphalt shall not exceed its FBT. Thermometers shall be used to check the temperatures during heating and application. Kettles shall be attended at all times during the heating process to insure that the maximum temperatures specified are not exceeded.

3.3.1.2 Wood Nailers: Nailers for retaining insulation on non-nailable decks and for nailing of roofing felts, are specified under Division 6.

3.3.2 Application of Sheet Roofing: Apply sheet elastomeric roofing in accordance with the elastomeric sheet manufacturer's printed application instructions and shall be mechanically fastened or fully adhered. Roofing shall not be ballasted.

3.3.3 Flashing: Provide elastomeric flashing as recommended by the elastomeric sheet manufacturer. Metal flashing is specified in Section 07600, "Flashing & Sheet Metal".

3.4 Clean-Up: Remove debris, scraps, containers and other rubbish and trash resulting from installation of the roofing system from job site each day.

3.5 INFORMATION CARD: Provide a typewritten card, framed under glass, in a weather-tight frame, for each roofing installation. This card shall contain information listed in attached Form 1. Furnish framed card and a duplicate card to the Contracting Officer.

FORM 1

ELASTOMERIC SHEET ROOFING SYSTEM COMPONENTS

1. Contract Number

2. Date Work Completed

3. NAVFAC Specification Number

4. Substrate

5. Slope of Substrate

6. Sheet Elastomeric Roofing Description:

Manufacturer & Type:

Type of attachment:

7. Other Material - Manufacturer & Type:

8. Deck type/slope:

9. Statement of Compliance or Exception:

Contractor's Signature Date:

Inspector's Signature Date:

*** END OF SECTION ***

SECTION 07600

FLASHING AND SHEET METAL

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.):

O-F-506C	Flux Soldering; Paste and Liquid
QQ-S-571E & Am 2	Solder; Tin Alloy; Lead-Tin Alloy; and Lead Alloy
QQ-S-775E (& Int Am 1)	Steel Sheets, Carbon, Zinc-coated

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

B 209-81	Aluminum-alloy Sheet and Plate

1.3 Sheet Metal and Air Conditioning Contractors National Association, Incorporated (SMACNA) Publications:

Architectural Sheet Metal Manual (1979 Edition).

2. SUBMITTALS:

2.1 Samples: Submit the following samples for approval:

(1) Gutters and Downspouts: Two sections, each 6-inches long.
(2) Fascia: One piece, 6-inches long, and one sample showing corner construction.
(3) Nails and Other Fastenings: Two each.

2.2 Certificates of Conformance or Compliance: Submit for approval certificates from the manufacturer attesting that materials meet the requirements specified herein.

3. DELIVERY, HANDLING, AND STORAGE: Materials shall be adequately packaged and protected during shipment and shall be inspected for damage, dampness, and wet-storage stains upon delivery to the job site. Damaged or permanently stained materials that cannot be restored to like-new condition shall be removed from the site and replaced. Carefully handle sheet metal items to avoid damage to surfaces, edges, and ends. Crated materials shall not be uncrated until ready for use. Store materials in dry, weather-tight, ventilated areas until immediately before installation.

4. MATERIALS: Materials shall conform to the respective specifications and to the requirements specified herein. Furnish sheet metal items in 8 to 10 foot lengths. Single pieces less than 8 feet long may be used to connect to factory fabricated inside and outside corners, and at ends of runs. Accessories and other items essential to complete the sheet metal installation shall be provided and shall be of the same materials as the items to which they are applied.

4.1 Aluminum Alloy Sheet and Plate: ASTM B 209, Alclad 3003, Alclad 3004, or Alclad 3005, embossed finish, clad on one side unless indicated otherwise; temper appropriate to end use.

4.2 Fasteners: Fasteners shall be the same metal or a metal compatible with the item fastened. Use aluminum fasteners with aluminum.

5. SHEET METAL: Provide flashing at roof edges and wherever indicated and necessary to make the work watertight. All sheet metal shall have mill finish unless specified otherwise herein. Tempers of metals shall be suitable for their respective forming conditions. Fabricate sheet metal items to the gage, thickness or weight shown in Table I and join multiple lengths of items together as shown in Table II.

6. INSTALLATION:

6.1 General: Surfaces to receive sheet metal must be plumb and true, clean, even, smooth, dry and free from defects and projections which might affect the application. Installation of items not shown in detail or not covered by specifications shall meet the applicable requirements of the SMACNA Architectural Sheet Metal Manual.

6.2 Workmanship: Install sheet metal work with lines, arrises, and angles sharp and true. Exposed surfaces shall be free from visible wave, warp, and buckle, and tool marks. Exposed edges shall be folded back neatly to form a 1/2-inch hem on the concealed side. Sheet metal exposed to the weather shall be watertight with provisions for expansion and contraction.

6.3 Nailing: Nailing of sheet metal shall be confined generally to sheet metal having a maximum width of 18 inches. Nailing of flashings shall be confined to one edge only. Nails shall be evenly spaced not over 3 inches on centers and approximately 1/2-inch from edge unless otherwise specified or indicated. Face nailing will not be permitted. Where sheet metal is applied to other than wood surfaces, detailed shop drawings shall include locations for sleepers and nailing strips required to properly secure the work. Sleepers and nailing strips are specified in Section ROUGH CARPENTRY.

6.4 Cleats: Provide cleats for sheet metal 18 inches and over in width. Space cleats evenly not over 12 inches on centers unless otherwise specified or indicated. Unless otherwise specified, cleats shall be not less than 2 inches wide by 3 inches long and of the same material and thickness as the sheet metal being installed. One end of the cleat shall be secured with two nails and the cleat folded back over the nailheads. The other end shall be locked into the seam.

6.5 Bolts, Rivets, and Screws: Install bolts, rivets, and screws where indicated or required. Provide compatible washers where required to protect surface of sheet metal and to provide a watertight connection.

6.6 Seams: Straight and uniform in width and height.

6.6.1 Flat-lock Seams: Finish not less than 3/4-inch wide.

6.6.2 Lap Seams: Overlap seams not less than 3 inches.

6.6.3 Loose-lock Expansion Seams: Not less than 3 inches wide, and shall provide minimum one inch movement within the joint. Joint shall be completely filled with the specified sealant, applied at not less than 1/8-inch thick bed. Sealants are specified in Section CALKING AND SEALANTS.

6.7 Mechanical Fastening: Aluminum 0.040-inch or less in thickness shall be butted with space and backed with formed flashing plate; or lock joined, mechanically fastened, and filled with sealant as recommended by the aluminum manufacturer.

6.7.1 Mechanical Fastening of Aluminum: No. 12 aluminum alloy sheet metal screws or other suitable aluminum alloy or stainless steel fasteners driven in holes made with a No. 26 drill, shall be used in securing side laps, end laps, and flashings. Maximum spacing for fasteners shall be 12 inches O.C. Where end lap fasteners are required to improve closure, they shall be located not more than 2 inches from the end of the overlapping sheet.

6.8 Protection from Contact of Dissimilar Materials: All Metal surfaces in contact with mortar, concrete, or other masonry materials shall be painted with alkali-resistant coatings such as heavy-bodied bituminous paint.

6.9 Provision for Expansion and Contraction: Provide for expansion and contraction joints at intersections of straight runs.

6.10 Roof Edge Fascias: Prefabricate in the shapes and sizes indicated and in lengths not less than 8 feet. Extend flange at least 4 inches onto roof deck. Provide prefabricated mitered corners for internal and external corners. Install fascias in accordance with sheet roofing manufacturers printed installation instructions and details.

6.10.1 Hook Strips: The lower edge of fascias shall be hooked at least 3/4-inch over a continuous hook strip of the same material bent outward at an angle of 45 degrees to form a drip. Nail hook strip at 6 inches maximum on centers.

6.11 Gutters: The hung type of shape indicated and supported on underside by brackets that permit free thermal movement of the gutter. Provide gutters in sizes indicated complete with mitered corners, end caps, outlets, brackets, and other accessories necessary for installation. Gutters shall be fabricated of aluminum. The outer edge of gutter shall be beaded or reinforced with a stiffening bar not less than 3/4 by 3/16-inch of material compatible with gutter. Gutters shall be fabricated in sections not less than 8 feet long. The sections shall be lapped a minimum of one inch in the direction of flow. Aluminum gutters shall be joined with riveted sealed joints. Install gutters below slope line of the roof. Support gutters on approved type adjustable hangers spaced not more than 30 inches on centers. Gutters shall be adjusted to slope uniformly to outlet. Hangers and fastenings shall be fabricated from metals compatible with the gutters.

6.12 Downspouts: The corrugated type, of the shapes and sizes indicated, and provided complete including elbows and offsets. Downspouts shall be provided in approximately 10-foot lengths; end joints shall telescope not less than 1/2-inches, and longitudinal joints shall be locked. Gutter outlets shall be provided with wire ball strainers of a standard type for each outlet. Strainers shall fit tightly into outlets and shall be of the same material used for gutters. Downspouts shall be kept not less than one inch away from walls and shall be fastened to the walls at top, bottom, and at not to exceed 4 foot centers intermediately between, with approved type leader straps; straps and fasteners shall be formed from metal compatible with the downspouts. Downspouts terminating in splash blocks shall be provided with elbow-type fittings.

7. PAINTING: Sheet metal work shall not be field painted except as required for the separation of dissimilar metals or for compliance with design requirements.

8. CLEANING: Clean all exposed sheet metal work at completion of installation. Grease and oil films, handling marks, contamination from steel wool, fittings and drilling debris shall be removed, and the work scrubbed clean. All exposed metal surfaces shall be free of dents, creases, waves and scratch marks.

9. REPAIRS TO FINISH: Scratches, abrasions, and minor surface defects of finish may be repaired in accordance with the manufacturer's printed instructions and as approved. Finish repaired surfaces shall be uniform and free from scratches, blemishes, and from variations of color and surface texture.

TABLE I. SHEET METAL WEIGHTS, THICKNESSES, AND GAGES

	Aluminum, Inch
Downspouts and leaders	.040
Downspout straps, 2-inch	.060
Fascias:	
Extrusions	.075
Sheets, corrugated	.032
Sheets, smooth	.050
Gutters:	
Gutter section	.040
Continuous cleat	.040
Hangers, dimensions	1"x.080"

TABLE II. SHEET METAL JOINTS.

Item Designation	TYPE OF JOINT Aluminum	Remarks
Fascia:		
Extrusions.	Butt with 1/2-inch space.	Use sheet flashing beneath and a cover plate.
Sheet, smooth	Butt with space	Use sheet flashing back-up plate.
Sheet, corrugated.	Butt with space	Use sheet flashing beneath and a cover plate or a combination unit.
Gutters.	One-inch flat locked, riveted, and sealed.	Aluminum producers recommended hard setting sealant for locked aluminum joints.

*** END OF SECTION ***

SECTION 07920

CALKING AND SEALANTS

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.):

TT-S-001543A	Sealing Compound, Silicone Rubber Base, For Calking, Sealing, and Glazing in Buildings and Structures

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

C 920-79	Elastomeric Joint Sealants

1.2 SUBMITTALS:

1.2.1 Certificates of Conformance or Compliance: Submit certificates from the manufacturers attesting that materials meet the specified requirements.

1.2.2 Manufacturers' Descriptive Data: Submit complete descriptive data for each type of material indicated below. Data for sealant and calking shall include application instructions, shelf life, mixing instructions for multicomponent sealants, and recommended cleaning solvents.

a. Calking and Sealing Compounds

b. Joint Primer

c. Backing Material

d. Bond Breaker

1.3 DELIVERY AND STORAGE: Deliver materials to the job site in the manufacturers' external shipping containers, unopened, with brand names, date of manufacture, and materials designation clearly marked thereon. Containers of elastomeric sealant shall be labeled as to type, class, grade, and use. Carefully handle and store all materials to prevent inclusion of foreign materials or subjection to sustained temperatures exceeding 90 degrees F. or less than 40 degrees F. Calking compounds, sealants and components more than six months old shall not be used.

PART 2 - PRODUCTS

2.1 SEALANTS:

2.1.1 Elastomeric Sealants: For joints in vertical surfaces, provide ASTM C 920, Type S or M, Grade NS, Class 25, Use NT. For joints in horizontal surfaces, provide ASTM C 920, Type S or M, Grade P, Class 25, Use T.

2.1.2 Silicone Rubber Base Sealant: Silicone rubber base sealant shall be class A single component cold-applied sealing compound conforming to Fed. Spec. TT-S-001543.

2.2 PRIMER FOR SEALANT: Non-staining, quick-drying type as recommended by the sealant manufacturer for the particular application, that will seal the surfaces in joint grooves and prevent absorption of the vehicle essential to the retention of elasticity by the sealing compound.

2.3 BACKING MATERIAL: Glass mat, closed-cell neoprene, butyl, polyurethane, expanded polyethylene, polyvinylchloride, or a compatible rubber gasket or tape recommended by the manufacturer of the compound. Materials shall be free from oil or other staining elements. Oakum and other types of absorptive materials shall not be used.

2.4 BOND BREAKER: Bond breaking materials shall be pressure-sensitive adhesive polyethylene tape, aluminum foil or wax paper. Bond breaking materials are not required where backing material with bond breaking characteristics is provided.

2.5 SOLVENTS AND CLEANERS: Solvents, cleaning agents and other accessory materials used in connection with sealing compounds shall be of type recommended by the compound manufacturer.

PART 3 - EXECUTION

3.1 GENERAL REQUIREMENTS: All joints about the perimeter of window and door frames, underside joints between precast concrete slabs, other exterior and interior openings, and elsewhere indicated and specified, shall be filled and calked with compound in a manner to provide weathertight sealing. Except as specified otherwise herein, preparation of surfaces, application and cleaning shall be in accordance with the manufacturer's printed instructions and details.

3.2 SURFACE PREPARATION: Surfaces shall be clean, dry to the touch, and free from frost, moisture, grease, oil, wax, lacquer, paint, and other foreign matter that would tend to destroy or impair adhesion. Depth of joints shall be approximately 1/2 their width, and shall never exceed the joint width. Where adequate grooves have not been provided, clean out grooves to a depth of 1/2 inch and grind to a minimum width of 1/4 inch without damage to the adjoining work. No grinding shall be required on metal surfaces.

3.3 APPLICATION:

3.3.1 Backing Material: Where joint cavities are constructed deeper than 1/2 their width, tightly pack the back or bottom with backstop material to provide a joint of the proper depth. Openings greater than 1/2 inch in depth shall be first filled to within 1/2 inch of the surface with backing material packed firmly in place. Install backstops dry and free of tears and holes. Backing material shall be installed in bottom of joints between precast concrete roof slabs prior to grouting of keyways.

3.3.2 Primer: Treat joints in concrete masonry units, wood, and other porous surfaces with primer in accordance with the sealant manufacturer's instructions. Apply primer to the joint surfaces to be sealed. Surfaces adjacent to joints shall not receive primer.

3.3.3 Bond Breaking Materials: Bond breaking materials shall be provided on the back or bottom of joint cavities to prevent the sealant from adhering to these surfaces. The materials shall be carefully applied to avoid contamination of adjoining surfaces or breaking bond with surfaces other than those covered by bond breaking materials.

3.3.4 Sealing Compounds: Apply sealing compounds with an approved type of calking gun, with nozzles of the sizes required to fit the several widths of joints. The compound shall be forced into the joint grooves with sufficient pressure to force out all air and to fill the grooves solidly. Upon completion of the calking, all unfilled joints shall be roughened and filled as specified and tooled smooth. All excess material shall be neatly removed.

3.4 PROTECTION AND CLEANING:

3.4.1 Protection: Protect areas adjacent to joints from compound smears. Masking tape may be used for this purpose if removed 5 to 10 minutes after the joint is filled.

3.4.2 Cleaning: Upon completion of compound application, remove all remaining smears and stains resulting therefrom and leave the work in a clean and neat condition. On non-porous building surfaces, excess uncured sealant shall be removed with a solvent moistened cloth. On porous surfaces, allow excess sealant to cure for 24 hours then remove by wire-brushing or sanding.

*** END OF SECTION ***

SECTION 08110

HOLLOW METAL DOORS AND FRAMES

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 Military Specification (Mil. Spec.):

DOD-P-21035A	Paint, High Zinc Dust Content, Galvanizing Repair (Metric)

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

A 526-80	Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process, Commercial Quality

1.1.3 American National Standards Institute, Inc. (ANSI) Publications:

A115.1-76	Door and Frame Preparation for Mortise Door Locks for 1-3/4-Inch Doors
A115.2-80	Door and Frame Preparation for Bored or Cylindrical Locks for 1-3/8-Inch and 1-3/4-Inch Doors
A115.4-76	Door and Frame Preparation for Lever Extension Flush Bolts
A115.5-73	Door and Frame Preparation for 190 Series Deadlock Strikes
A115.6-76	Door and Frame Preparation for Unit Door Locks
A115.7-76	Door and Frame Preparation for Floor Closer, Light Duty Center Hung, Single or Double Acting
A115.8-76	Door and Frame Preparation for Floor Closer, Center Hung, Single or Double Acting
A115.9-76	Door and Frame Preparation for Floor Closer, Offset Hung, Single Acting

A115.11-76	Door and Frame Preparation for Mortise Locks for 1-3/8-Inch Doors
A115.12-73	Door and Frame Preparation for Offset Intermediate Pivot
A115.13-74	Door and Frame Preparation for Tubular Deadlocks
A115.14-75	Preparation for Standard Steel Doors for Open Back Strikes

1.1.4 The Steel Door Institute (SDI) Publications:

100-80	Recommended Specifications - Standard Steel Doors and Frames
107-72	Hardware on Steel Doors (Reinforcement-Application)

1.2 SUBMITTALS:

1.2.1 Catalog Data: Submit manufacturer's descriptive literature for all doors and frames. Include data and details on door construction, panel (internal) reinforcement, and door edge construction.

1.2.2 Certificates of Conformance or Compliance: Submit manufacturer's certificates attesting that doors, frames, and accessories meet the requirements specified herein.

1.3 DELIVERY AND STORAGE: Deliver doors, frames, and accessories undamaged and with protective wrappings or packaging. Store doors and frames on platforms under cover in clean, dry, ventilated, and accessible locations, with 1/4-inch air space between doors. Remove damp or wet packaging immediately and wipe all affected surfaces dry. Replace damaged materials with new.

PART 2 - PRODUCTS

2.1 HEAVY DUTY DOORS: SDI-100, doors shall be Type II, Style 2, of size and design indicated. Plastic foam panel reinforcement shall be as specified herein. Fill exterior doors with mineral fiber insulation or plastic foam panel reinforcement. Exterior doors shall have top edge closed flush. Doors shall be 1-3/4 inches thick, unless otherwise indicated.

2.2 MOLDINGS FOR DOORS: Provide moldings around glazed panels for a rigid and secure installation. Provide nonremovable panel moldings on the outside of doors. Other moldings around side panels may be stationary or removable. At the Contractor's option, snap-on moldings may be used on the inside of glazed panels.

2.3 PLASTIC FOAM PANEL REINFORCEMENT: Provide plastic foam core panel reinforcement by one of the following methods:

a. A continuous rigid polyurethane plastic foam core, foamed-in-place or in board form bonded to the steel face sheets, and free of voids or other defects that could affect serviceability.

b. A rigid, molded polystyrene plastic foam bead board core bonded to the steel face sheets with a thermosetting adhesive.

2.4 HOLLOW METAL FRAMES: SDI-100, except as otherwise specified. Form frames for standard hollow metal doors to sizes and shapes indicated, with full-welded unit type construction at corners.

2.4.1 Welded-Type Frames: Miter or butt and face weld corner joints from the outside. Head and jamb rabbets shall have mechanically interlocked or welded joints with all contact edges closed tight. Dress welds flush and smooth.

2.4.2 Anchors: Provide anchors to secure the frame to adjoining construction. Provide steel anchors zinc-coated or painted with rust-inhibitive paint, not lighter than 18 gage.

2.4.2.1 Wall Anchors: Provide a minimum of three anchors for each jamb. Locate anchors opposite top and bottom hinges and midway between. Provide anchors of corrugated or perforated steel straps or 3/16-inch diameter steel wire, adjustable or "T" shaped.

2.4.2.2 Floor Anchors: Provide floor anchors at bottom of each jamb member. Provide fixed anchors, drilled for 3/8-inch diameter anchor bolts.

2.5 WEATHERSTRIPPING: For each exterior hollow metal frame provide one of the following types:

2.5.1 Metal Spring: Spring temper bronze, aluminum, or stainless steel not less than 0.006 inch thick, (cushion) type with hemmed edges. Fasten to foam with wafer-head, No. 4 drive screws 2 inches o.c.

2.5.2 Plastic Spring: High impact plastic, V (cushion) type, with pressure sensitive adhesive. Apply only to clean, dry, finish-painted frames above 55 degrees F.

2.5.3 Stop Applied: Extruded aluminum retainer not less than 0.070-inch wall thickness with vinyl, neoprene, or polyurethane insert. Aluminum shall be clear (natural) anodized. Fasten to frame with sheet metal screws not more than 6 inches o.c.

2.5.4 Integral Gasket: Black synthetic rubber gasket with tabs for factory fitting into factory slotted frames, or extruded neoprene foam gasket made to fit into a continuous groove formed in the frame. Insert gasket in groove after frame is finish painted.

2.6 HARDWARE PREPARATION: Reinforce, drill, and tap doors and frames to receive finish hardware. Prepare doors and frames for hardware in accordance with the applicable requirements of ANSI A115.1 through A115.14 and SDI-107. Drill and tap for surface-applied hardware at the project site. Build additional reinforcing for surface-applied hardware into the door at the factory. Locate hardware in accordance with the requirements of SDI-100, as applicable. Set lock strikes out to provide clearance for weatherstripping.

2.7 FINISHES: Fabricate doors and frames from galvanized steel, ASTM A 526, Coating Designation G60 or A60 (galvannealed). Repair damaged zinc-coated surfaces by the application of zinc dust paint conforming to MIL Spec. DOD-P-21035. Phosphate treat and factory prime zinc-coated surfaces as specified in SDI-100.

2.8 FABRICATION AND WORKMANSHIP: Finished doors and frames shall be strong and rigid, neat in appearance, and free from defects, waves, scratches, cuts, dents, ridges, holes, warp, and buckle. Molded members shall be clean cut, straight, and true, with joints coped or mitered, well formed, and in true alignment. Dress exposed welded and soldered joints smooth. Design door frame sections for use with the wall construction indicated. Corner joints shall be well formed and in true alignment. Conceal fastenings where practicable.

PART 3 - EXECUTION

3.1 INSTALLATION:

3.1.1 Hollow Metal Frames: Set frames accurately in position and plumb, align, and brace securely until permanent anchors are set. Anchor bottoms of frames securely to floors with expansion bolts or powder-actuated fasteners. Build in or secure wall anchors to adjoining construction. Backfill frames in masonry construction with mortar.

3.1.2 Hinged Doors: Calk metal-to-metal joints in exterior framing members as specified in Section 07920, "Sealants and Calking," and remove excess calking. Hang doors in accordance with clearances specified in SDI-100. After erection and glazing, clean and adjust hardware.

3.2 PROTECTION: Protect doors and frames from damage. Repair damaged doors and frames prior to completion and acceptance of the project or replace with new, as directed.

3.3 CLEANING: Upon completion, clean exposed surfaces of doors and frames thoroughly. Remove all mastic smears and other unsightly marks.

*** END OF SECTION ***

SECTION 08360

OVERHEAD METAL DOORS

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:

A 227-77	Steel Wire, Cold-Drawn for Mechanical Springs
A 229-77	Steel Wire, Oil-Tempered for Mechanical Springs
A 386-78	Zinc Coating (Hot-Dip) on Assembled Steel Products
A 525-81	Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process, General Requirements
E 330-79	Structural Performance of Exterior Windows, Curtain Walls, and Doors By Uniform Static Air Pressure Difference

1.1.2 American National Standards Institute (ANSI) Publication:

A216.1-77	Specifications for Sectional Overhead Type Doors

1.2 SUBMITTALS:

1.2.1 Manufacturer's Certificates of Conformance: Submit certificates attesting that the overhead doors conform to all requirements of this specification and of reference documents.

1.2.2 Catalog Data: Submit complete descriptive literature for Overhead Doors. Include data sufficient to show conformance to specified requirements and include both installation drawings and instructions. Installation drawings shall include actual conditions that will exist for the project.

1.3 DELIVERY AND STORAGE: Deliver doors to the job site wrapped in a protective covering with the brands and names clearly marked thereon. Store doors in dry locations with adequate ventilation, free from dust and water, and in such a manner to permit access for inspection and handling. Handle doors carefully to prevent damage to the faces, edges, and ends. Remove damaged items that cannot be restored to like-new condition and provide new items.

PART 2 - PRODUCTS

2.1 MATERIALS:

2.1.1 Hard-Drawn Springwire: ASTM A 227.

2.1.2 Oil-Tempered Springwire: ASTM A 229.

2.1.3 Steel Sheet: ASTM A 525.

2.2 DOORS: Shall conform to ANSI A216.1 Industrial Door. Metal overhead doors shall be composed of horizontal sections hinged together and operating in a system of tracks to completely close the door opening in its closed position and make the full width and height of the door opening available for use in its open position. A permanent label shall be provided on the door indicating the name and address of the manufacturer. Doors shall be of the low headroom type designed to slide up and back into a horizontal overhead position and requiring a maximum of 8 inches of headroom for 2-inch tracks and 12 inches of headroom for 3-inch tracks.

2.3 DESIGN REQUIREMENTS: Shall conform to ANSI A216.1 except as follows:

2.3.1 Wind Loads: Minimum design wind load of 30 pounds per square foot. Doors shall be designed to remain operable and undamaged after conclusion of tests conducted in accordance with ASTM E 330 using the design wind load.

2.4 FABRICATION:

2.4.1 Steel Overhead Doors: Door sections shall be formed of hot-dipped galvanized steel not lighter than 16-gage with flush surface without ribs or grooves or 20-gage with longitudinal integral reinforcing ribs or 24-gage with longitudinal integral reinforcing ribs and flat bottom V-grooves. Sections shall be not less than 2 inches in thickness. Meeting rails shall have interlocking joints to provide weathertight closure and to assure alignment for the full width of the door. Sections shall be of the height indicated or the manufacturer's standard, but in no case shall the height of an intermediate section exceed 24 inches. Bottom sections may be varied to suit door height, but shall not exceed 30 inches in height.

2.4.2 Tracks: Shall be formed of galvanized steel not lighter than 13-gage for 2-inch tracks and not lighter than 11-gage for 3-inch tracks. Vertical tracks shall be provided with continuous steel angle not lighter than 11-gage for installation to walls. Vertical track shall be inclined through use of adjustable brackets to provide means to obtain a weathertight closure at jambs. Horizontal track shall be reinforced with galvanized steel angle and shall be supported from ceiling construction with galvanized steel angle iron with cross bracing, as required, to provide a rigid installation.

2.4.3 Hardware: Provide hinges, brackets, rollers, locking devices, and all other hardware required for a complete installation. Roller brackets and hinges shall be of galvanized steel. All rollers shall be with ball bearings and case-hardened races. Provide reinforcing on doors where roller hinges are connected. Doors shall be provided with a positive locking device and cylinder lock with two keys.

2.4.4 Counterbalancing: Doors shall be counterbalanced by means of a tempered, helical-wound torsional spring mounted on a steel shaft. Springs shall be adjustable for proper tension and shall be connected to doors with cable with a safety factor of at least 7 to 1. The force required to operate manual chain hoist doors shall not exceed 35 pounds.

2.5 OPERATION: Doors shall be manual chain hoist operated.

2.5.1 Manual Chain Hoist Operation: Doors shall be provided with chain hoist actuated by an endless galvanized chain mounted on inside of building. Gear reduction shall be calculated to prevent racking of doors. Suitable gear reduction ratio shall be obtained by using a gear train. Provide chain cleat and pin for securing operator chain. Operator housing shall be steel with sheaves or drums of cast iron, cast aluminum, or malleable iron having machined grooves. Operator drums or sheaves shall be mounted on precision ball bearings, with provision for lubrication. Hoist shall be designed to allow for installation of power operators at a future date.

2.6 WEATHER SEALS: Exterior doors shall be provided with weatherproof joints between sections by means of tongue-and-groove joints, rabbitted joints, shiplap joints or wool pile, vinyl or rubber weatherstripping; a rubber, wool pile, or vinyl, adjustable weatherstrip at the top and jambs; and a compressible neoprene, rubber, wool pile, or vinyl weather seal attached to the bottom of the door.

2.7 FINISH: Concealed surfaces shall be provided with a galvanized finish. Exposed surfaces shall be provided with a shop-primed galvanized finish. Galvanizing shall conform to ASTM A 525, coating designation G60 or G90, for steel sheets, and to ASTM A 386 for assembled steel products. Prior to receiving primer, all surfaces shall be cleaned thoroughly and phosphate treated to assure maximum paint adherence. Primer shall be a metallic oxide or synthetic resin primer of the manufacturer's standard type and shall be applied by dipping or spraying.

PART 3 - EXECUTION

3.1 INSTALLATION: Doors shall be installed in accordance with approved installation drawings and instructions. Accurately locate all anchors and inserts for guides, brackets, and other work. Upon completion, doors shall be weathertight; free from warp, twist, or distortion; and lubricated and properly adjusted to operate freely.

3.2 TESTING: After installation is complete, operate doors to demonstrate proper installation and proper functioning. Correct all deficiencies.

*** END OF SECTION ***

SECTION 08520

ALUMINUM WINDOWS

1. APPLICABLE PUBLICATIONS: The following publications of the issues listed below, but referred to hereafter by basic designation only, form a part of this specification to the extent indicated by reference thereto:

1.1 Federal:

RR-W-365A Wire Fabric (Insect Screening)

1.2 Architectural Aluminum Manufacturers' Association (AAMA):

302.9-1977 Voluntary Specifications for Aluminum Prime Windows.

1.3 National Association of Architectural Metal Manufacturers (NAAMM):

Metal Finishes Manual (Finish Designation)-January 1978

2. SUBMITTALS:

2.1 Full Compliance Report: A full compliance test report from an accredited AAMA testing laboratory on the specific types of windows specified herein shall be furnished with the window sample. Test reports of all tests required by referenced documents applicable to the particular window types furnished for use shall be included.

2.2 Catalog Data: Manufacturer's descriptive literature shall be submitted and shall consist of detailed specifications and instructions for installation, adjustments, cleaning and maintenance.

3. DELIVERY AND STORAGE: Windows shall be delivered to the project site in an undamaged condition and in timely order for incorporation in the work. Care shall be exercised in handling and hoisting windows during transportation and at the work site. Windows shall be stored under cover inside a building if practicable; if building storage is not available, windows shall be stored uncovered in the open and not covered with tarps, polyethylene film, or other similar type coverings, as trapped moisture can stain glass and metal.

4. MATERIALS:

4.1 Aluminum Awning Windows: Type A-A2-HP, conforming to the applicable requirements of AAMA 302 for awning windows, and with the following modifications:

a. Windows shall be weatherstripped.

b. Continuous drips shall be provided over heads of top ventilators.

c. Operators: Ventilators shall be controlled simultaneously by underscreen panic-bar or push-bar operators. Each side arm to ventilators shall have provision for adjustment to provide even contact between sash and frame. All operating hardware, except ventilator arms, shall be concealed within the frame and sill; ventilator arms shall be concealed when unit is closed.

4.2 Screens: Insect screens shall be provided for all ventilating sections of windows. Screens shall be of a type standard with the window manufacturer, except as specified otherwise herein. They shall have frames of extruded aluminum not less than 0.050 inch thick, or of tubular aluminum construction not less than 0.032 inch thick. Screens shall fit closely around entire perimeter of each ventilator or opening, shall be rewirable, easily removable from inside building, and interchangeable for same size ventilators of similar type windows. Hardware, guides, stops, clips, bolts, and screws shall be furnished as necessary for a secure and insect-tight attachment to window. Finish of screen frames shall be as specified for windows. Screen hardware shall be manufacturer's standard type and finish, unless specified otherwise.

4.2.1 Type: Screens shall be stationary type, attached directly to the windows, and located on inside or outside as necessary. Sliding wickets or hinged wickets with friction catches, shall be provided in screens for out-opening vents without underscreen or through-screen operators. The wicket opening frames shall be of similar material and cross-section to the screen frames, and the framing bar shall run continuously between the two sides of the screen frames.

4.2.2 Construction of Aluminum Screens: Aluminum frame screens shall conform to the requirements of the specifications of the Architectural Aluminum Manufacturers' Association, except as modified herein. The frames shall have removable splines of aluminum or vinyl. Screening shall be 18 by 16 mesh, of cladded aluminum, conforming to Federal Specification RR-W-365, type VII. Screening shall be installed with weave parallel to frames and sufficiently tight to present a smooth appearance. Edges of screening shall be concealed in the spline channel.

5. REQUIREMENTS: The work includes aluminum windows with related accessories, and insect screens, and their installation, complete.

5.1 General: Windows shall as indicated and specified. Glass and glazing for windows and calking are specified under other appropriate sections herein.

5.2 Construction and Workmanship: Windows shall be constructed to produce the results hereinafter specified and to assure a neat appearance. Permanent joints shall be formed by welding or by mortise-and-tenon or screw fastening; if mortise-and-tenon, a double tenon shall be provided for each corner; if screw fastening is used, double screws for each corner shall be provided. Joints shall be of strength to maintain the structural value of members connected. Welded joints shall be solid, have excess metal removed, and dressed smooth on exposed and contact surfaces. The dressing shall be done so that no discoloration or roughness will show after finishing. Joints formed with mechanical fastenings shall be closely fitted and made permanently watertight by means of a butyl-based sealant. Frames and sash, including ventilators, shall be assembled at the manufacturer's plant, and shipped as a unit with hardware unattached.

5.3 Accessories: Windows shall be provided complete with all necessary hardware, fastenings, clips, fins, anchors, glazing beads, and other appurtenances necessary for their complete installation and for the operation of ventilators. Anchors shall be aluminum or steel. All steel anchors shall be hot-dipped zinc-coated. Anchors and fastenings shall be built into, bolted to, or anchored otherwise to the heads, jambs, and sills of openings and shall be fastened securely to the windows or frames. Anchors shall be the type recommended by the window manufacturer for the specific type of construction and shall be concealed. Screws, nuts, bolts, and other fasteners for ferrous material shall be cadmium or zinc-coated. Fasteners for non-ferrous materials shall be stainless steel, type 302.

5.4 Hardware: Except as specified otherwise herein, hardware shall conform to the applicable requirements of AAMA 302. Hardware shall be of suitable design, and shall have sufficient strength to perform the function for which it is used. Hardware shall be attached securely to the windows by threading into the hardware itself or by inserting thread carriers into the aluminum sections. Threading into the aluminum members directly is prohibited. Fastening of hardware shall be by means of stainless steel (type 302) screws; sheet metal screws shall not be used. Where screens are specified, the hardware shall be especially adapted to permit satisfactory operation of ventilators.

5.5 Provisions for Glazing: All sash shall be designed for glazing from the outside by the use of extruded aluminum glazing beads; beads shall be provided.

5.6 Joint Sealing: Metal-to-metal joints in window members, frames, mullions, and mullion covers shall be set in a two-part polysulphide base sealant or a silicone rubber sealant. Excess sealant shall be removed before it hardens.

5.7 Mullions shall be provided between multiple-window units where indicated, and where necessary. Mullions shall be designed to withstand a uniform wind load of 15 psf of window area without deflecting more than 1/175 of the span. Mullions shall be securely anchored to adjoining construction and window units in a manner to permit expansion and contraction and to form a weathertight joint.

5.8 Weatherstripping shall be provided for all aluminum windows and shall be factory-applied. All inside and outside contacts of ventilating sections shall be fitted with weatherstripping retained in the grooves extruded integrally with the ventilator sections to provide full-perimeter closure. The weatherstripping shall be vinyl or treated wool pile and shall be easily replaceable. Weatherstripping shall meet and cross at all corners to allow for shrinkage and prevent corner gaps.

5.9 Anodized Finish: After fabrication, all exposed surfaces of aluminum windows, including mullions and screen frames, shall receive a AA-M10-C22-A41 clear (natural) anodized finish conforming to the requirements of NAAMM "Metal Finish Manual".

5.10 Protective Coating: After cleaning and finishing, and prior to shipment, a clear, non-yellowing, colorless coating, such as methacrylate lacquer, shall be applied to all surfaces of aluminum. The coating shall be resistant to alkaline mortar and plaster. Before the application of coating, all fabrication and finishing compounds, dirt accumulations, or steel wool fibers shall be removed from aluminum surfaces. Coating applied to aluminum shall be applied in two sprayed-on coats to a total minimum thickness of 0.4 mil (maximum thickness of 0.6 mil).

6. INSTALLATION: Windows shall be installed and adjusted by experienced and qualified applicators, using only skilled window mechanics. Aluminum windows in masonry walls shall be set in prepared openings. Windows shall be set at the proper elevation, location, and reveal, plumb, square, level, in alignment, and shall be braced, strutted, and stayed properly to prevent distortion and misalignment. Ventilators and operating parts shall be protected against accumulation of cement, lime, and other building materials, by keeping ventilators tightly closed and wired fast to frame. Screws or bolts in sill members, joints at mullions, and contacts of windows with sills, built-in fins, or sub-frames shall be bedded in a two-part polysulphide base sealant or a silicone rubber sealant. Windows shall be installed in a manner that will prevent entrance of water.

6.1 Anchors and Fastenings: Ample provision shall be made for securing units to each other, to masonry, or to other adjoining or adjacent construction. Windows that are to be installed in direct contact with masonry and have head and jamb members designed to enter into masonry shall be set into the masonry not less than 7/16 inch. Where windows are set in prepared masonry openings, the necessary anchorage or fins shall be placed during progress of wall construction. Anchors and fastenings shall be built into, anchored or bolted to the jambs of openings, and shall be fastened securely to the windows or frames and to the adjoining construction. Unless indicated otherwise, anchors shall be spaced not more than 18 inches apart on jambs and sills. Anchors and fastenings shall have sufficient strength to hold the member firmly in position.

6.2 Protection of Aluminum from Dissimilar Materials: In addition to the protective coating specified hereinbefore, aluminum surfaces shall be prevented from direct contact with dissimilar materials. Aluminum shall be insulated from dissimilar materials including masonry, concrete, and wood, with at least one heavy brush coat of bituminous paint. Dissimilar metals used in locations where drainage from them passes over aluminum shall be suitably painted to prevent staining of the aluminum.

6.3 Adjustments: After windows have been installed and upon completion of glazing, all ventilators and hardware shall be adjusted to operate smoothly and to be weathertight when ventilators are closed and locked. Hardware and parts shall be lubricated as necessary. Adjustments shall be as follows:

a. Awning windows shall have arms to ventilators adjusted so that bottom edge of each ventilator makes continuous initial contact with frames when closed.

b. Weatherstripping shall make weathertight contact with frames when ventilators are closed and locked. The weatherstripping shall not cause binding of sash, or prevent closing and locking of the ventilator.

6.4 Cleaning: Metal surfaces of windows shall be cleaned on both the inside and outside, of all mortar, spots and other foreign matter to present a neat appearance and prevent fouling of weathering surfaces, weatherstripping, or the operation of hardware. Methods of cleaning shall be in accordance with the window manufacturer's recommendations. In addition, aluminum windows shall be washed off with soap and water and a stiff-fiber brush and thoroughly rinsed with clear water. Where aluminum windows have become stained or discolored, they shall be cleaned of all stain and discoloration. Stained and discolored windows that cannot be cleaned satisfactorily, and abraded windows, shall be replaced with new windows at no additional cost to the Government.

*** END OF SECTION ***

SECTION 08710

FINISH HARDWARE

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 National Standards Institute, Inc. (ANSI) Publication:

A156.1-1976 Butts and Hinges

A156.2-1976 Locks and Lock Trim

1.1.2 Builders Hardware Manufacturers Association (BHMA) Publications:

1201-1970 Auxiliary Hardware

1.2 SUBMITTALS:

1.2.1 Hardware List and Catalog Cuts: Within 15 days after award of contract and before any builders' hardware is delivered to job site, submit for approval a hardware list, listing each item of builders' hardware accompanied by manufacturers' catalog cuts for each different item of hardware.

1.2.2 Certified Test Reports: Submit concurrently with the hardware list, certified test reports for all items listed under Hardware Items indicating that each item meets the standard listed for that item. A copy of the listing of proposed hardware items in the current applicable BHMA directory of certified products may be submitted in lieu of test reports.

1.2.3 Keying System Submission: Before locks are delivered to job site, submit complete keying system to and have approved by the Contracting Officer.

1.3 DELIVERY AND MARKING: Deliver items of hardware to job site in their original individual containers, complete with necessary appurtenances including screws, keys, and instructions. Mark each individual container with manufacturer's name and catalog number as they appear in hardware schedule.

PART 2 - PRODUCTS

2.1 HARDWARE MANUFACTURERS AND MODIFICATIONS: Provide, as far as practicable, locks of one lock manufacturer's make, and hinges of one hinge manufacturer's make. Modifications to hardware that are necessary to conform to construction shown or specified shall be provided as required for the specified operative and functional features.

2.2 HARDWARE DESIGNATIONS: Hardware items covered by ANSI or BHMA standards are specified by BHMA designations. Items covered by Federal Specifications are specified by federal designations.

2.3 TEMPLATE HARDWARE: Hardware to be applied to metal and to doors shall be made to template. Promptly furnish template information or templates to metal door, and frame manufacturers in order to avoid delay in door and frame manufacturing. Effect proper coordination between manufacturers of different hardware items in order that each manufacturer may furnish templates which allow installation of hardware without interference to installation and operation of other hardware.

2.4 HARDWARE ITEMS: Hardware items shall conform to respective specifications and standards and to requirements specified herein.

2.4.1 Hinges: ANSI A156.1. Construct loose pin hinges for exterior doors so that pins will be nonremovable when door is closed. Nylon or oil impregnated bearing hinges may be provided in lieu of ball-bearing hinges. Hinges shall bear name or trademark of manufacturer. Provide types of hinges, sizes, finish, design options, and quantity per door for specific openings as specified herein under paragraph entitled "Hardware Sets."

2.4.2 Locks and Latches: ANSI A156.2, series 1000. Locks shall have interchangeable type cylinders or removable cores compatible with existing keying system. Locks and latchsets of the same series shall be the product of the same manufacturer. Lock cylinders shall have not less than 5 pin tumblers. Provide trim for locks and latchsets of wrought construction and of commercial plain design. Legibly mark on the lock and latches where it can be seen after installation the name of the manufacturer, or a trademark by which it can be readily identified. Provide series, grade(s) and function of locks and latchsets for specific openings as specified herein under paragraph entitled "Hardware Sets."

2.4.3 Chain Stop: BHMA 1201.

2.5 KEYING SYSTEM: Provide keyed cylinders to provide an extension of existing keying system. Design system to provide highest possible security consistent with type of system being used. Provide three keys in individual envelopes for each cylinder delivered. Envelopes shall have respective door identification numbers. Stamp each change key with change number and stamp set symbol, and stamp each master key with set symbol as applicable. In addition to change number, stamp keys "U.S. Property, Do Not Duplicate" and tag.

2.6 FASTENERS: Supply fasteners of proper type, quality, size, quantity, and finish with hardware. Supply fasteners exposed to weather of nonferrous metal or stainless steel and match finish of trim as closely as possible. Where hardware is of stainless steel, provide screws and fastenings also of stainless steel. Use fasteners of type necessary to accomplish a permanent installation.

2.7 FINISHES: Hardware shall have BHMA 630 finish (satin stainless steel) unless specified otherwise herein. Provide items not normally manufactured in stainless steel in BHMA 626 finish (satin chromium plated) over brass or bronze. BHMA finishes are defined in BHMA 1301.

PART 3 - EXECUTION

3.1 INSTALLATION OF HARDWARE: Install hardware following manufacturers' instructions. Except as indicated or specified otherwise, use fasteners furnished with hardware to fasten hardware in place. Use machine screws set in expansion shields for fastening hardware to solid concrete and masonry surfaces. Use through bolts where indicated or specified and where necessary for satisfactory installation.

3.2 ACCEPTANCE: After installation, protect hardware from paint, stains, blemishes, and other damage until acceptance of work. Submit notice of operation testing 7 days before scheduled, so that the testing can be witnessed. Hinges, locks, latches, bolts, holders, closers, and other items shall be adjusted to operate properly. Also demonstrate that tagged keys operate respective locks. After hardware is checked, deliver tagged keys to the Contracting Officer. Correct, repair, and finish as directed errors in cutting and fitting and damage to adjoining work.

3.3 LOCATION OF HARDWARE ON HINGED DOORS: Locate as follows, unless indicated or specified otherwise herein:

a. Locks: Locate knobs so that center line of strike is 40-5/16 inches (nominal) above bottom of door frame.

b. Hinges: Locate as follows:

Top Hinge	Not over 11-3/4 inches from inside of frame rabbet at head to center line of hinge
Bottom Hinge	Not over 13 inches above bottom of door frame to center line of hinge
Center Hinge	Midway between top and bottom hinges

3.4 HARDWARE SETS:

HS-1 Personnel Door

1-1/2 Pairs, Hinges: A 5112 (Temp.), 4-1/2 inches x 4-1/2 inches.

One Lockset: Series 1000, Grade 2, Function F13.

One Chain Stop: Type 1317.

*** END OF SECTION ***

SECTION 08800

GLAZING

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.):

DD-G-451D	Glass, Float or Plate, Sheet, Figured, (Flat, for Glazing, Mirrors and Other Uses)
DD-G-1403B & Am 1	Glass, Plate, (Float), Sheet, Figured, and Spandrel (Heat Strengthened and Fully Tempered)
TT-G-410E & Am 1	Glazing Compound, Sash (Metal) for Back Bedding and Face Glazing (Not for Channel or Stop Glazing)
TT-S-00227E & Am 3	Sealing Compound, Elastomeric Type, Multi-component (for Calking, Sealing, and Glazing in Buildings and Other Structures)
TT-S-00230C & Am 2	Sealing Compound, Elastomeric Type, Single Component (for Calking, Sealing, and Glazing in Buildings and Other Structures)
TT-S-001543A	Sealing Compound, Silicone Rubber Base (for Calking, Sealing, and Glazing in Buildings and Other Structures)
TT-S-001657	Sealing Compound Single Component, Butyl Rubber Based, Solvent Release Type (for Buildings and Other Types of Construction)

1.2 Consumer Products Safety Commission (CPSC) Standard:

16 CFR Part 1201	Safety Standard for Architectural Glazing Materials, January 1977

1.3 Flat Glass Marketing Association (FGMA) Publications:

Glazing Manual (1980 Edition)

Glazing Sealing Systems Manual (First Edition, 1970)

2. SUBMITTALS:

2.1 Certificates of Compliance: Submit certificates or provide labels or marking affixed to materials, attesting that identical materials have been successfully tested and meet requirements specified herein.

3. DELIVERY AND STORAGE: Deliver glazing compounds to the site in unopened containers, labeled plainly with manufacturers' names and brands. Store glass and setting materials in safe, dry locations and do not unpack until needed for installation. Handle and install materials in a manner that will protect them from damage.

4. ENVIRONMENTAL CONDITIONS: Do not start glazing work until the outdoor temperature is above 40 degrees F. and rising unless approved provisions are made to warm the glass and rabbet surfaces. Provide sufficient ventilation to prevent condensation of moisture on glazing work during installation. Do not perform glazing work during damp or rainy weather.

5. MATERIALS:

5.1 Glass: Fed. Spec. DD-G-451, unless specified otherwise. In all doors provide safety glazing material conforming to CPSC 16 CFR Part 1201.

5.1.1 Tempered Glass: Fed. Spec. DD-G-1403, Kind FT, Condition A, Type I, Class 1, 1q inch thick. Provide in door and windows.

5.2 Setting Materials: Provide setting materials of the types required for the applicable setting method specified in the FGMA Glazing Sealing Systems Manual, unless specified otherwise herein. Do not use metal sash putty, nonskinning compounds, nonresilient preformed sealers or impregnated preformed gaskets. Materials which will be exposed to view and unpainted shall be gray or neutral color.

5.2.1 Glazing Compound: Fed. Spec. TT-G-410. Use for face glazing metal sash.

5.2.2 Elastomeric Sealant: Fed. Spec. TT-S-00227, TT-S-00230, TT-S-001543, TT-S-001657, Type II, Class A or B. Use for channel or stop glazing metal sash.

5.2.3 Accessories: As required to provide a complete installation, including glazing points, clips, shims, angles, beads, and spacer strips. Provide noncorroding metal accessories. Provide primer-sealers and cleaners as recommended by the glass and sealant manufacturers.

6. INSTALLATION:

6.1 Precautions and Procedures: Determine the sizes to provide the required edge clearances by measuring the actual opening to receive the glass. Grind smooth all edges of glass that will be exposed in finish work. Leave labels in place until the installation is approved. Securely fix movable items or keep in a closed and locked position until glazing compound has thoroughly set.

6.2 Glass Setting: Items to be glazed shall be either shop or field glazed using glass of the quality and thickness specified or indicated. Preparation and glazing, unless otherwise specified or approved, shall conform to applicable recommendations in the FGMA Glazing Manual and Glazing Sealing Systems Manual. Aluminum windows may be glazed in conformance with one of the glazing methods described in the standards under which they are produced, except that face puttying with no bedding will not be permitted. Handle and install glazing materials in accordance with the manufacturer's instructions. Use beads or stops which are furnished with the items to be glazed to secure the glass in place.

6.3 Cleaning: Thoroughly clean glass surfaces and remove labels, paint spots, putty, and other defacement. Glass shall be clean at the time the work is accepted.

*** 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.

1.1.1 Federal Specifications (Fed. Spec.):

TT-E-487E	Enamel, Floor and Deck
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-E-1593B	Enamel, Silicone Alkyd Copolymer, Gloss (For Exterior and Interior Use)
TT-P-55B & Am 2	Paint, Polyvinyl Acetate Emulsion, Exterior
TT-P-645A	Primer, Paint, Zinc-chromate, Alkyd Type

1.1.2 Federal Commercial Item Description (Fed. CID):

A-A-1500	Latex (Water Reducible) Block Filler

1.1.3 Military Specifications (Mil. Spec.):

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

1.1.4 Federal Standard (Fed. Std.):

Fed. Std. 595A & Notice 4	Colors

1.2 SUBMITTALS: 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 of the same type, quality, manufacture, and make as that tested. The Government will take one pint samples from coatings being used on the job for testing by the Government.

1.3 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.

1.4 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.

1.5 SELECTION OF COLORS: Colors of finish coats shall be as selected by the Contracting Officer from Fed. Std. No. 595.

1.6 DESCRIPTION OF WORK: Do not coat surfaces of steel to be imbedded in concrete. Do not coat copper and aluminum except where specifically so stated. Do not coat new factory finished materials except those factory-finished surfaces which are damaged during installation. Restore damaged factory-finished surfaces to their original condition. Do not paint zinc-coated pipe or copper pipe under insulation.

1.6.1 Exterior and Interior Painting: Includes new surfaces of roll up and personnel doors, personnel door frame, door and platform guards, hand rails and ladder, concrete block and masonry.

1.6.2 Mechanical Painting: Includes the field coating of fuel oil pump, day tank, steel bracket, and fuel oil piping.

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 Latex Block Filler: Fed. CID A-A-1500 (see Appendix A).

2.1.2 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 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. 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.

3.2.1 Concrete and Masonry: Remove dirt, fungus, grease, and oil prior to application of coatings. Wash new surfaces with a solution composed of from 2 to 8 ounces of trisodium phosphate per gallon of hot water and then rinse thoroughly with fresh water. Remove glaze, all loose particles, and scale by wire brushing. Remove efflorescence by scraping, wire brushing, and washing with a 5- to 10-percent by weight aqueous solution of hydrochloric (muriatic) acid and then wash thoroughly with fresh water, removing all traces of the acid. Give all new surfaces to be painted with other than cement-water paint a neutralizing treatment consisting of 2 pounds of zinc sulphate in one gallon of warm water. Apply the neutralizer liberally and allow to dry, then rinse the surfaces thoroughly with clean water and allow to dry for not less than 48 hours before paint is applied.

3.2.2 New Unprimed Metal Surfaces: Solvent clean zinc-coated surfaces with mineral spirits and wipe dry with clean, dry cloths. Treat aluminum surfaces to be painted with a 10 percent aqueous solution of chromic acid at a temperature of not less than 140 degrees F for 3 to 5 minutes and rinse thoroughly with clean warm water. Immediately after cleaning and treating, apply pretreatment wash primer, Mil. Spec. DOD-P-15328, to a dry film thickness of 0.2 to 0.5 mil on zinc-coated and ferrous surfaces. Apply primer as soon as practicable after pretreatment has dried.

3.2.3 Hot Metal Surfaces: Clean new surfaces down to clean bare metal free of mill scale, rust, oil, oxides, dust, paint, and other contaminates. Apply new coatings before any oxidation or contamination begins.

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.

3.3.1 Equipment: Apply coatings carefully with good, clean brushes, except as specified otherwise.

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 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.

3.3.4 Special Requirements for Coating Concrete Masonry Surfaces With Polyvinyl Acetate Emulsion Paint (Fed. Spec. TT-P-55): Fed. Spec. TT-P-55 requires containers be marked for the formulation and mixing of fill coat. The fill coat shall conform to these markings except as specified herein.

3.3.4.1 Mixing of Fill Coat: The formula given in Fed. Spec. TT-P-55 for the content of the fill coat requires a definite amount of water to be added in preparation of the mixture. This requirement shall not apply. Deliver the sand, cement, and mixing liquids preproportioned and packaged so that field proportioning will not be required. Field mix the mixing liquid with the sand and cement; after this mixture is thoroughly blended, add water as necessary to produce a rich, creamy mixture of proper brushing consistency. Mix the fill coat materials by hand but do not vigorously agitate. After mixing, allow to set for 10 minutes to permit air to escape before applying. The fill coat mixture will gradually thicken with time; add small amounts of water, when necessary, to keep the mixture a rich brushing consistency. Do not begin mixing more than one hour before application.

3.3.4.2 Wetting of Surfaces: Before applying filler coat, thoroughly wet the masonry and concrete to control surface suction and provide a reserve of moisture to aid in curing the paint. A garden hose nozzle adjusted to a fine spray is adequate for the purpose. Do not dampen with a brush dipped in water. Dampen the masonry and concrete in one operation not more than one hour nor less than 30 minutes before painting. Apply the spray in such manner that each part is sprayed three or four times for about 10 seconds. Allow time between applications for the water to soak into the surface. If the surface tends to dry rapidly, as in hot weather, redampen slightly just in advance of painting. The surface shall be moist but without free water when paint is applied.

3.3.4.3 Application: Do not paint when the paint may be exposed to temperatures below 40 degrees F within 48 hours after application or when the temperature is over 95 degrees F. Rub the filler coat into the surface in such a manner as to fill all depressions, holes, voids, joints, and hollows. Apply the filler coat with stiff fiber bristle brushes with bristles not longer than 2-1/2 inches, using a circular motion. Give the surface a final stroke parallel to the course of block. Provide uniform coverage and laps well brushed out. Apply the first finish coat at a rate of not less than one gallon per 250 square feet; apply the second finish coat at the rate of not less than one gallon per 300 square feet. Brush apply finish coats, except that in locations inaccessible to a brush they may be applied by rollers. Spray application will not be permitted. Deliver all paint to the job site prior to application. Compute the amount of finish coat paint required and submit calculations for approval. Do not begin painting until this amount has been approved and delivered to the job site. Apply all delivered paint. Keep paint in tightly covered containers when not in use; keep stirred to maintain uniform color and consistency during application. At least 24 hours shall lapse between coats; do not start another coat until the preceding coat has become so hard that it cannot be marked with the brushes used. In hot weather, slightly moisten the prior coat before applying the succeeding coat. Covering is not necessary.

3.3.5 Paint Systems: New surfaces shall receive the following coatings conforming to the respective specifications listed. Apply 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.

3.3.5.1 Exterior Surfaces:

a. Concrete, and Concrete Masonry:

One coat of polyvinyl acetate fill coat, Fed. Spec. TT-P-55, modified on concrete masonry
Two coats of polyvinyl acetate paint, Fed. Spec. TT-P-55

b. Metal Surfaces including Interior Surfaces of Doors and Frames:

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

3.3.5.2 Interior Surfaces:

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
Two coats of alkyd enamel, Fed. Spec. TT-E-487

b. Concrete Surfaces, Except Floors and Ceilings:

One coat of alkyd enamel undercoat, Fed. Spec. TT-E-545
One coat of alkyd semigloss enamel, Fed. Spec. TT-E-509

c. Concrete Masonry:

One coat of latex block filler
One coat of alkyd enamel undercoat, Fed. Spec. TT-E-545
One coat of alkyd semigloss enamel, Fed. Spec. TT-E-509

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

One coat of primer, Fed. Spec. TT-P-645
Two coats of enamel, Fed. Spec. TT-E-1593, or of same coating as used for coating metal in same space

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

APPENDIX A
Salient Characteristics and Certification
Required for CID A-A-1500

Salient characteristics.

The filler shall be readily dispersible by hand stirring to form a homogeneous mixture. The filler shall brush easily and without pulling and shall not sag when applied at the rate of 50 square feet per gallon to vertical surfaces. The film shall be smooth and uniform and without pin holes or craters. The color shall be white or a tint as specified. The total solids shall be at least 60 percent by weight.

(1) Viscosity. The viscosity shall be between 110 and 125 K.U. (ASTM D 562).

(2) Drying time. The dry-to-touch time shall be within 1 hour and dry-hard time within 2 hours (ASTM D 1640).

(3) Adhesion. The filler shall not separate from the substrate at less than 150 psi when tested with an Elcometer adhesion tester.

(4) Appearance. There shall be no lifting, pinholes, craters, or other irregularities when an exterior 100% acrylic house paint (TT-P-19) is applied at a spreading rate of 300 square feet per gallon over the filler.

(5) Flexibility. The filler shall bend over 1/4 in mandrel without cracking, chipping, or flaking (ASTM D 1737).

(6) Fungus resistance. The maximum disfigurement rating shall be 9 (ASTM D 3273, D 3274).

(7) Permeability. The filler shall have a maximum permeance of 0.003 perms (ASTM D 96, (Procedure A).

(8) Accelerated storage stability. When the filler is exposed for 2 weeks at 50 ± 2 degrees C followed by 8 hours at 25 ± 1 degrees C, the increase in viscosity shall be less than 8 K.U. and when brushed to wallboard the coating shall be smooth and uniform.

(9) Freeze-thaw resistance. When exposed to three cycles consisting of 16 hours at minus 9± 1 degree C followed by 8 hours at 25 ± 1 degree C, the increase in viscosity shall be less than 8 K.U. and when brushed to wallboard the coating shall be smooth and uniform.

(10) Alkali resistance. The coating shall be unchanged after immersion for 14 days in 0.5 percent aqueous sodium hydroxide solution to such a depth that the coated surface is 4 mm above the solution level.

Appendix A

*** END OF SECTION ***

SECTION 11171

PACKAGED INCINERATORS

PART 1 - GENERAL

1.1 APPLICABLE PUBLICATIONS: The following publications of the issues listed below, but referred to thereafter by basic designation only, form a part of this specification to the extent indicated by the references thereto:

1.1.1 Federal Specifications (Fed. Spec.):

CC-M-1807	Motor, Alternating Current, Fractional and Integral Horsepower #500 HP and Smaller
GG-G-76E (1)	Gages, Pressure and Vacuum, Dial Indicating, (For Air, Steam, Oil, Water, Ammonia, and Chloro-fluoro Hydrocarbon Gases)
HH-I-558B & Am 3	Insulation, Blocks, Boards, Blankets, Felts, Sleeving (Pipe and Tube Covering), and Pipe Fitting Covering, Thermal (Mineral Fiber, Industrial Type)
HH-R-00191B	Refractory, Castable Mix and Plastic Mix
TT-E-496B & Am 2	Enamel, Heat-Resisting (400 Deg. F.), Black
VV-F-815D	Fuel Oil, Burner

1.1.2 Military Specifications (Mil. Spec.):

MIL-V-173C & Am 2	Varnish, Moisture and Fungus Resistant (For Treatment of Communications, Electronic, and Associated Equipment)
MIL-P-15024D & Supp 1	Plate, Tags and Bands for Identification of Equipment
MIL-G-17787B	Gage, Dial Indicating, Furnace Draft
MIL-F-18523C	Fan, Centrifugal, Draft Forced and Induced

1.1.3 Military Standards (MIL-STD):

MIL-STD-461B	Electromagnetic Interference Characteristics Requirements for Equipment

1.1.4 U. S. Department of Health, Education, and Welfare (HEW) Publication:

	Specifications for Incinerator Testing at Federal Facilities Interim Guide of Good Practice for Incineration at Federal Facilities

1.1.5 Air Moving and Conditioning Association (AMCA) Publications:

99-69	Standards Handbook
210-67	Test Code for Air Moving Devices

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

A36-81	Structural Steel
A319-71	Gray Iron Castings for Elevated Temperatures for Non-Pressure Containing Parts
A569-72	Steel, Carbon (0.15 Maximum Percent) Hot-Rolled Sheet and Strip, Commercial Quality
C64-72	Refractories for Incinerators and Boilers

1.1.7 American Welding Society (AWS) Publication:

B3.0-77	Standard Qualification Procedure

1.1.8 Factory Mutual System (FM) Publication:

	Factory Mutual Approval Guide, 1976

1.1.9 National Fire Protection Association (NFPA) Publications:

31-1978	Installation of Oil Burning Equipment
54-1980	National Fuel Gas Code
82-1977	Incinerators, Waste and Linen Handling Systems and Equipment
211-1977	Chimneys, Fireplaces, Vents, and Solid Fuel Burning Appliances

1.1.10 Underwriters' Laboratories (UL) Publication:

UL 50-1980	Standard for Cabinets and Boxes

1.1.11 National Electrical Manufacturer's Association (NEMA) Publications:

MG 1-78 (Rev. 1-78, Rev. 2-79, Rev. 3-80, Rev. 4-80, & Rev. 5-80)	Motors and Generators

1.1.12 American National Standard Institute (ANSI) Publication:

ANSI B31.1-1980 Power Piping

1.2 DELIVERY AND STORAGE: Ship equipment completely factory-assembled, except when physical size, arrangement, or configuration of equipment, or shipping limitations, make the shipment of completely assembled equipment impracticable, in which case assemble equipment and ship as shown on the approved shop drawings. When shop drawings are submitted without statements describing sectional shipments, it will be understood that no field assembly of the equipment will be required, and the Contractor is responsible for all cost encountered in the field for assembly of sections, accessories, or appurtenances not listed in the proposal as requiring field assembly.

1.3 SPECIAL TOOLS: If any part of equipment provided under this contract specification requires a special tool for assembly, adjustment, setting or maintenance thereof and such tool is not readily available on the commercial tool market, it shall be furnished with the equipment as standard accessories.

1.4 GENERAL REQUIREMENTS: Section 15011, "General Requirements, Mechanical," with the following additions and modifications, applies.

1.4.1 Submittals: Submittal requirements of Section 15011, "Mechanical General Requirements," apply to the following lists:

1.4.1.1 Qualifications of Manufacturer: Prior to installation, submit data for approval by Southern Division, Naval Facilities Engineering Command, Code 4032, showing that the Contractor or subcontractor has successfully constructed and installed incinerators burning waste with fuel and air control as specified herein. The data shall include the names and locations of at least three installations where the Contractor or subcontractor referred to above has installed such incinerators indicating the type, size, and the control features employed at these installations. Certify that these incinerators have performed satisfactorily in the manner intended for a period of not less than 2 years and that they have met pollution standards equal to, or better than required herein.

1.4.1.2 Manufacturers Data:

Incinerator
Single ram loader
Ash removal system
Fuel oil regulator
Controls

1.4.1.3 Certificates of Conformance:

Incinerator
Single ram loader

1.4.1.4 Shop Drawings:

Detail drawings of equipment installation.

1.4.1.5 Operation and Maintenance Manual:

Incinerator
Single ram loader
Ash removal system

1.5 DEFINITIONS (WASTE TYPE):

1.5.1 Type 0. A mixture of highly combustible waste such as paper, cardboard cartons, wood boxes, and floor sweepings from commercial and industrial activities. The mixture contains up to 10 percent by weight of plastic bags, coated paper, laminated paper, treated corrugated cardboard, oily rags, and plastic or rubber scraps. This type of waste contains 10 percent moisture and 5 percent non-combustible solids, and has a heating value of 8,500 BTU per pound as fired.

1.5.2 Type 1. A mixture of combustible waste such as paper, cardboard cartons, wood scrap, foliage, and floor sweepings from domestic, commercial, and industrial activities. The mixture contains up to 20 percent by weight of restaurant waste, but contains little or no treated paper, plastic, or rubber wastes. This type of waste contains 25 percent moisture and 10 percent incombustible solids, and has a heating value of 6,500 BTU per pound as fired.

1.5.3 Type 2. An approximately even mixture of rubbish and garbage by weight. This type of waste, common to apartment and residential occupancy, consists of up to 50 percent moisture and 7 percent incombustible solids, and has a heating value of 4,300 BTU per pound as fired.

1.5.4 Type 3. Garbage such as animal and vegetable wastes from restaurants, hotels, hospitals, markets, and similar installations. This type of waste contains up to 70 percent moisture and up to 5 percent imcombustible solids, and has a heating value of 2,500 BTU per pound as fired.

1.5.5 Type 4. Human and animal remains, such as organs, carcasses, and solid organic wastes from hospitals, laboratories, slaughterhouses, animal pounds, and similar sources, consisting of up to 85 percent moisture and 5 percent imcombustible solids, and having a heating value as low as 1,000 BTU per pound as fired.

1.6 THE DESIGNS AND DRAWINGS have been prepared utilizing details associated with specific components and items of equipment which may or may not be the ones finally selected and provided by the Contractor. Therefore, the Contractor shall make any necessary adjustments or any other facet of the work as required to match up to and accommodate the actual equipment finally selected and provided by the Contractor. Manufacturers' names and identification numbers are listed as a means of establishing a standard of type, function, and quality only, and shall not be construed as restrictive or proprietary. Similar items by other reputable manufacturers will be acceptable provided it is determined, to the satisfaction of Southern Division, Naval Facilities Engineering Command, Code 4032, to be equal and comparable in all respects to the items specified listed as follows:

Manufacturer:	ENVIRONMENTAL CONTROL PRODUCTS, INC., Charlotte, North Carolina
Incinerator:	Model 750 T
Mechanical Loader:	Model SR 28H
Ash Removal Equipment:	Drawing No. 2266D

PART 2 - PRODUCTS AND REQUIREMENTS

2.1 GENERAL: Incinerator shall be a packaged type controlled-air incinerator capable of burning classified waste (Type 0), shall be suitable for outdoor installation including totally enclosed electric motors, and corrosion and moisture protection, and shall be equipped for mechanical loading and operation. The incinerator shall operate under positive air pressure. Incinerator shall be provided complete with an ash removal system and comply with NFPA-82 except as modified herein.

2.2 CAPACITY: Capacity shall be not less than 575 pounds per hour. Any ash removal shall be an entire cleanout. No more than three ash cleanouts per week shall be required. Burnout and cooldown for ash removal shall be accomplished in not more than 72 hours after first ignition and in not more than 20 hours after any final load addition during the weekly time period specified herein.

2.3 INCINERATION OF CLASSIFIED MATERIAL: The incinerator shall reduce not less than 99.95 percent by weight of the paper component to white or off-white ash. All other materials containing classified information shall be oxidized or melted to preclude recovery of any information for intelligence purposes. No unburned paper or legible ash shall be greater than 5 millimeters by 5 millimeters. Screening of ash, manual stoking, manual agitation of any type, or opening of incinerator doors will not be allowed.

2.4 STACK EMISSIONS: The incinerator shall conform to Florida Department of Environmental Regulation Rules and Regulations governing air pollution sources (Chapter 17-2, Florida Administrative Code) which required an opacity limit of zero (0).

2.5 NOISE: Noise level at one foot from any incinerator component shall not exceed 85 decibels, A scale.

2.6 PRIMARY AND SECONDARY CHAMBERS: The incinerator shall consist of a primary combustion chamber for partial burning and conversion of the combustible material to gas and a secondary combustion chamber that shall consume combustible gases and entrained combustible particles. The incinerator shall be completely preassembled and mounted on a heavy steel frame. The packaged unit shall include a combustion air fan, primary and secondary burners, air distribution controls, and burner controls. The unit shall be ready for immediate mounting on a foundation and ready for attachment of fuel, electrical, and vent connections. Lifting eyes shall be provided.

2.6.1 Primary Chamber: The primary chamber shall be constructed of a steel casing supported by a steel frame and provided with insulation and refractory. The casing shall be not less than 12 gage sheet steel conforming to ASTM A569 and reinforced to withstand internal pressures without deflection or damage to refractory or other components of the incinerator. The frame and all reinforcing members shall be constructed of steel conforming to ASTM A36. The frame shall be free standing and support the weight of all components of the incinerator, including doors, burners, breeching, stack connections, and appurtenant assemblies without binding or warping. The frame and casing shall be all welded construction and shall be completed and erected prior to installation of the refractory and insulation. Welding shall be in accordance with ANSI B31.1 and AWS B3.0. All access doors and ports shall be provided with seals to prevent emission of smoke or admission of significant amounts of air during incinerator operation. Primary chamber shall have no grates, ash cleanout doors, or other openings which would permit leakage of waste fluids.

2.6.1.1 Insulation: Insulation shall be Class 5 block conforming to Fed. Spec. HH-I-558, shall not contain asbestos material, and shall be of such thickness to prevent damage to the foundation from excessive heat. The minimum thickness of insulation shall be 2-1/2 inches for walls to limit the temperature of the outer casing to 150 degrees F maximum in an ambient temperature of 60 degrees F when the unit is operating at full rated capacity. Insulating cement shall conform to ASTM C64.

2.6.1.2 Refractory: Refractory shall be heat-resistant clay conforming to Fed. Spec. HH-R-191, plastic or castable type, high duty class. The minimum thickness of plastic or castable refractory shall be 4-1/4 inches for walls and 2-1/2 inches for hearths. Refractory walls shall be attached to the casing with alloy steel or refractory anchors to form a monolithic structure which will resist heat and support the walls with a safety factor of 4. Bulging and destruction of refractory due to heat stress shall be prevented.

2.6.1.3 Doors: Doors shall be provided for the stoking, cleanout, and charging areas of the incinerator. Door frames shall be securely attached to the incinerator. Doors and door frames shall be constructed of cast iron conforming to ASTM A 319 or steel conforming to ASTM A 569 or ASTM A 36. Doors exposed to flame or direct heat of combustion gases shall be lined with the same type and thickness of refractory and insulation used in the combustion chamber. The refractory shall be firmly attached to the doors and shall not sag. The refractory shall have tapered edges to clear door frames during movement of swinging doors. Alloy steel hooked bars shall be welded to the door cover to anchor the refractory. Doors shall be safely operable by one person. The temperature of door handles shall permit operation of door without gloves or other protective devices. Charging doors shall be interlocked with burners and air supply so that burners and blowers disconnect if door opens. Door closure shall be gasketed with high-temperature resistant material which will withstand expected temperatures. Vertically operated doors shall be counterweighted to require a manual operating force of 30 pounds maximum. Guillotine type doors shall lift completely off the seals prior to movement. Full swing type doors shall be provided with an integral smaller feed door having a minimum rectangular clear opening of 24 inches by 24 inches or a minimum circular clear opening of 30 inches diameter. Doors shall be provided with hasps or brackets to permit locking. A lock and two keys shall be furnished for each door.

2.6.1.3.1 Mechanical Charging Doors: Mechanical charging doors shall be of the guillotine type or sweep type. An inner and outer door shall be provided. The inner or charging door shall open with operation of the single ram loader. The inner and outer doors shall be interlocked to prevent simultaneous opening during operation of the incinerator. The door to the combustion chamber of the incinerator shall be insulated and lined with refractory material and anchored as specified herein for refractory. The outer door shall be constructed of the same materials as the exterior casing of the incinerator. Doors shall be provided with means for manual operation.

2.6.1.3.2 Stoking and Cleanout Doors: Doors shall be tight fitting type. Cleanout doors shall provide access for total cleanout and visual inspection of the entire interior of the incinerator and shall not permit leakage of waste fluids.

2.6.1.4 Test Holes: Test holes shall be fitted with standard weight, 2-inch diameter, black steel pipe sleeve welded to the casing. The sleeve shall extend from the exterior of the casing to not less than one-half the thickness of the refractory lining. The refractory opening shall be formed from the end of the pipe sleeve to the interior wall surface to shield the end of the sleeve from reflected heat. The sleeve shall be fitted with a brass screw cap.

2.6.1.5 Draft Equipment: Draft equipment shall provide the correct amount of air to permit complete controlled combustion. The equipment shall include forced draft fans, draft gages, dampers, damper actuators, linkage, and appurtenances necessary to maintain a positive draft in order to provide optimum performance at all operating rates.

2.6.1.5.1 Air Ducts: Combustion air shall be introduced to the primary chamber below the waste material through perforated underfire air pipes or ducts. Overfire air shall be controlled with manually controlled air intake ports for completing combustion of combustible materials in gases, or for reducing operating temperatures. Ducts shall be constructed of sheet steel conforming to ASTM A569. All seams shall be air tight.

2.6.1.5.2 Fan: The fan shall be of the forced draft, multiblade forward curved centrifugal type conforming to Mil. Spec. MIL-F-18523. The fan shall comply with the standards of AMCA 99, applicable to centrifugal furnace fans, and shall be rated for flow rate, pressure, power, speed of rotation, and efficiency in accordance with AMCA 210.

2.6.1.5.3 Damper: A controller actuated damper shall regulate the air to the fan. The damper shall be constructed of black sheet steel conforming to ASTM A569, and shall be not less than 0.0625-inch thick. The damper shall operate without noise or flutter. Actuators shall be electric motor operated at 115 volts a.c.

2.6.2 Secondary Chamber: The secondary chamber shall have an exterior casing not less than 12 gage sheet steel conforming to ASTM A569. The refractory lining shall be of the same class, type, and thickness required for walls in the primary chamber. Insulation shall be of the same class and thickness as used in the main chamber, and shall limit the exterior surface temperature to 150 degrees F in an ambient of 70 degrees F. A minimum dwell time of 0.5 seconds shall be allowed for any condition within normal operating limits.

2.7 BURNERS: Oil burners shall be provided for the primary and secondary combustion chambers. The burners shall be designed for No. 2 fuel oil conforming to Fed. Spec. VV-F-815. Fuel Oil piping is covered in Section 15611. Each burner shall be a complete burner assembly including fuel and control systems, and accessories. The primary burner shall have an input capacity not less than 600,000 Btu per hour. The secondary burner shall have a minimum capacity of 1,100,000 Btu per hour and shall be able to maintain a minimum continuous temperature in the secondary chamber of 1600 degrees F. A minimum continuous temperature of 1,400 degrees F shall be maintained at the roof near the exit of the primary chamber. The burners shall be electrically spark-ignited and regulated by a variable set point indicator-controller adjustable from zero degrees F to 3000 degrees F to operate within the temperature limits recommended by the manufacturer. The controllers shall be actuated by a thermocouple or shielded bimetallic sensor. The mounting, flame shape, and characteristics of each burner shall be suitable for the incinerator chamber in which the burner is installed. Flame impingement on the incinerator wall will not be permitted. Each burner shall be provided with Factory Mutual listed and approved flame failure protection. The flame safeguard sensor shall be sighted to detect only the burner flame for which it is designed. Burners shall be furnished with all necessary appurtenances as recommended by the manufacturer for a complete installation. Burners shall be easily moved out of firing position for inspection, cleaning, adjustment, and maintenance. Thermocouples shall be located in the primary and secondary chambers and shall be suitable for a maximum temperature of 3000 degrees F.

2.8 CONTROLS AND INSTRUMENTS: The control equipment and instruments shall include burners and fan controls, time clocks, relays, operating switches, indicating lights, gages, motor starters, fuses, alarms, and circuit elements of the control system, and other controls and instruments necessary for proper operation. The control system shall be in accordance with NFPA 82, Requirements for Automatic (Recycling) System, or listed in the Factory Mutual Approval Guide. The controls and instruments shall be mounted on a single control panel unless a single panel is impractical. The control system shall provide on-off control. Temperature indicator controllers or other indicators shall provide a visual indication for safe loading of the incinerator and excessive high temperature conditions which may require control by the operator. Automatic control circuit systems and manual switches shall be interlocked or made failsafe to prevent hazardous conditions or air pollution.

2.8.1 Control Panel: The control panel shall be sheet steel, weathertight, and conform to UL 50. All controls, instruments, and other equipment shall be flush mounted at the factory and the assembly tested prior to shipment. A lock and two keys shall be furnished. All controls and instruments shall be identified with nameplates conforming to Mil. Spec. MIL-P-15024.

2.8.2 Draft Gages: Draft gages shall conform to Mil. Spec. MIL-G-17787 with a diaphragm or bellows actuating system and a circular scale. The gages shall have a zero adjustment screw. Suitable shut-off cocks shall be provided.

2.8.3 Pressure Gages: Pressure gages shall conform to Fed. Spec. GG-G-76 and be of pressure detecting class, single Bourdon tube style, suitable for detecting air pressure.

2.8.4 Thermocouples: Thermocouples shall indicate gas passage temperatures and shall control burner operation. Thermocouples shall be suitable for operation up to 3000 degrees F, and shall be accurate within 0.5 percent of the operating and indicating temperature range.

2.9 STACK: A sectional, circular cross section exhaust stack shall be provided. The type, size, and number of sections shall be in accordance with the requirements of the stack and refractory manufacturer to adequately support the refractory lining, permit expansion, and prevent cracking of the refractory. The size and height shall be adequate for the incinerator. The height shall be such as to meet local building and fire protection codes minimum 20 feet. The stack shall conform to NFPA 211. The casing shall be not less than the minimum thickness specified in NFPA 211. The refractory shall be not less than the thickness required in NFPA 211, and shall be secured to the casing by steel anchors. A corrosion-resistant steel spark arrestor not less than No.18 gage, and having one-half inch mesh wire screen shall be attached to the top of the stack. A corrosion-resistant steel weather cap shall be provided. The temperature of the casing shall not exceed 200 degrees F in an ambient temperature of 70 degrees F. Adequate support, without placing any of the load on the refractory walls of the incinerator, must be provided for any stack installed on top of the incinerator.

2.10 CONNECTORS: Connectors shall be provided to connect the incinerator to the stack unless the stack is attached directly to the incinerator. Connectors shall be in accordance with NFPA 211. The connector shall be located at a minimum clear vertical distance of eight feet above the floor.

2.11 LOADER: An automatic mechanical loading device compatible with the incinerator shall be provided. The loader shall flange directly to the feed opening of the incinerator. Construction shall be of heavy duty welded steel plate and structural shapes throughout conforming to ASTM A 36. The loader shall include a single hydraulic power pack driven by an electric motor conforming to CC-M-1807. Loader shall include a guillotine type fire door lined with same type and thickness refractory as the combustion chamber. The charging chamber shall have a capacity of not less than 1.0 cubic yard. Charging chamber access door shall be located on top of the loader and hinged. An automatic sprinkler device shall be provided located inside the loader and temperature actuated. The entire operation of the automatic loader shall be integrated with the control system. An indicating light shall indicate when the incinerator can be charged and when the incinerator cannot be loaded due to excess temperature. The light shall be mounted on the control box, visible to the operator. When the charging chamber door is closed and the light on indicating the incinerator can be charged, the following sequence shall take place when the loader is actuated in the charge mode: (1) fire door opens, (2) ram pushes material into the incinerator, (3) ram retracts, (4) fire door closes, (5) indicator light signals the loader is ready to be charged. When the loader is in the automatic mode of operation, the fire door and the charging chamber door shall not be allowed to open at the same time. A manual override system shall also be provided so that ram, fire door, or charging chamber door can be operated independently if required.

2.12 ASH REMOVAL SYSTEM: An ash removal system vacuum type with ash shredder shall be provided. Construction shall be steel conforming to ASTM A 36. Motors shall conform to NEMA MG 1. Ash remover shall be portable with lockable wheels. Tie-down retainer cables shall also be provided for storage. Protective coating as recommended by the manufacturer shall be applied for outside storage and use. Capacity shall be based on not less than one week's waste ash accumulation from the incinerator herein described.

PART 3 INSTALLATION:

3.1 GENERAL: The incinerator installation shall conform to NFPA 82, as applicable. Combustion air supply and ventilation shall be in accordance with NFPA 31 or NFPA 54, as applicable.

3.2 UTILITY SERVICES CONNECTIONS: Connections to the existing utility services for fuel, electric power, and water shall be located at a distance not less than 5 feet from the outside walls of the incinerator or the edges of the foundation. Existing lines shall be maintained in service except for periods when new lines are being connected. Shutdown of existing systems for connection will be made only at such times permitted by the Contracting Officer. The period of shutdown shall be the minimum practicable time required.

3.3 FOUNDATION: Concrete for the foundation shall conform to Section 03302, "Cast-In-Place Concrete." The foundation shall be of size and strength to support the incinerator. The foundation shall extend not less than 3 feet beyond the incinerator on all sides, and not less than 8 feet on the front or side where ashes are removed. Anchor bolts shall be set accurately and shall be of adequate length to install the incinerator. When embedded in concrete, anchor bolts shall be provided with plates welded on the head and shall be protected against damage until the equipment is installed.

3.4 FUEL SUPPLY: Oil burning equipment shall be installed to conform to the applicable requirements of NFPA 31.

3.5 ELECTRICAL SUPPLY: Electrical supply and equipment shall be as specified in Division 16, "Electrical."

3.6 STACK SUPPORT: Stack support shall be in accordance with paragraph 2.9 of this section, NFPA 82 and NFPA 211, as applicable. Adequate vertical and lateral supports for exterior chimneys shall withstand wind forces of 100 miles per hour.

3.7 LUBRICATION: Lubrication means shall be provided for all parts of the equipment normally requiring lubrication. Where the use of high pressure will damage grease seals or other parts, pressure release fittings shall be furnished.

3.8 TREATMENT AND PAINTING: The inner surfaces of the outer casing of the incinerator, the exterior surfaces of the outer casing, the control panel, and piping, except corrosion-resistant steel, shall be cleaned to base metal and painted at the factory. Cleaned surfaces shall be painted with two coats of enamel conforming to Fed. Spec. TT-E-496 having a total minimum dry film thickness of 8.0 mils. Inner surfaces do not require finish painting. Primers and enamels shall be products of the same manufacturer. Paint shall not be applied when the temperature is 50 degrees F or below, or above 90 degrees F.

3.9 IDENTIFICATION: An aluminum, brass, or corrosion-resistant steel nameplate shall be securely fastened to the equipment in a readily visible location by means of rivets or sheet metal screws. The nameplate shall contain data such as the manufacturer's name, model, or series number; electrical requirements; and serial number. The information shall be indented or embossed in the metal. The nameplate shall not be painted over.

3.10 FIELD TESTS AND INSPECTIONS:

3.10.1 Post Installation Adjustment: A representative of the incinerator manufacturer shall properly adjust and check all controls and safety interlocks prior to testing.

3.10.2 General: Upon delivery to the job site, equipment and materials shall receive a preliminary inspection by the Contracting Officer. The inspection will be continued during the installation, after installation, and during the tests. Necessary inspections shall be made to assure equipment and installation comply with all local, Government, and utility requirements for equipment, air pollution, and safety. All labor, equipment, apparatus, and materials, except waste materials, used for testing shall be furnished by the Contractor. All defects disclosed by the tests shall be rectified, and the tests repeated without additional cost to the Government. Two instruction manuals shall be available at all times during the tests. All tests shall be performed by the Contractor under the direct supervision of the start-up engineer employed by the Contractor. The Contracting Officer shall be present for all tests. Reports certifying that instrument readings indicated are actual, that computations required for testing are accurate, that acceptable methods were used, and that the units satisfactorily performed in accordance with requirements shall be furnished.

3.10.3 Tests:

3.10.3.1 Fuel Systems: Gages and other apparatus that may be damaged by the test pressure shall be removed from the system prior to testing. The required test pressure shall be maintained for not less than two hours to provide sufficient time for inspection of all joints and connections. All defects which develop during testing shall be corrected at no additional cost to the Government, and the piping system shall be retested until the system shows no defects or weakness, and all joints and connections do not leak.

3.10.3.1.1 Oil: Oil piping systems shall be tested with a hydrostatic pressure of one and one-half times the maximum working pressure. Oil shall be used for testing.

3.10.3.2 Performance: The incinerator shall be preheated for four hours to reach the firing temperature of 1800 degrees F. The waste charges shall be weighed and a record of the total charge weight shall be provided. The incinerator shall be charged with Government provided waste at the rated capacity in lb/hr for a period of four hours. The incinerator shall be operated in accordance with the manufacturer's written instructions. The waste shall be reduced to a fine ash residual. Normal burnout procedure shall be followed. After the incinerator has cooled, the residue shall be weighed. The weight of the residue shall not exceed 0.05 percent charred or burned classified paper material of the total charge weight.

3.10.3.2.1 Cleanout: The residue from burning classified material shall be hand sorted or screened into three categories: totally oxidized white or off-white ash, unburnable materials, and blackened, or partially burned paper fragments. Cleanout and sorting shall be witnessed by the Contracting Officer. Materials shall be weighed and inspected to verify that the requirements in paragraph entitled, Incineration of Classified Materials, are met. After cleanout, the incinerator shall be inspected for deterioration such as slagged or spalling refractory, warping of parts, and discolored exterior paint and will be rejected until these conditions are repaired and do not recur in retesting.

3.10.3.2.2 Emission: The emission rate shall be measured in accordance with the HEW specifications for Incinerator Testing at Federal Facilities, and shall meet the requirements specified herein.

3.10.3.3 Control: The incinerator shall be tested under actual firing conditions. The test shall verify that all controls function within the maximum and minimum limits for temperature or timing. Actual unsafe conditions such as high temperatures and flame failure shall be simulated by reducing the settings for the activation of limit and safety controls.

3.10.3.4 Shell Temperature: The incinerator shall be operated under normal load conditions for not less than four hours. After four hours, temperature readings of the outer shell, taken at not less than five random locations, shall not exceed the temperature limitation of paragraph entitled, Insulation. The shell temperature test may be performed during the performance test.

*** END OF SECTION ***

SECTION 15011

MECHANICAL GENERAL REQUIREMENTS

PART 1 - GENERAL

1.1 APPLICATION: This section applies to Section 11171, "Packaged Incinerator" and all sections of Division 15, "Mechanical" of this project except as specified otherwise in each individual section.

1.2 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.

1.2.1 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, 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.

1.2.2 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.

1.2.3 Standards Compliance: When materials or equipment must conform to the standards of organizations such as the American National Standards Institute (ANSI), American Society for Testing and Materials (ASTM), National Electrical Manufacturers Association (NEMA), and Underwriters Laboratories (UL), proof of such conformance shall be submitted to the Contracting Officer for approval. If an organization uses a label or listing to indicate compliance with a particular standard, the label or listing will be acceptable evidence, unless

otherwise specified in the individual sections. In lieu of the label or listing, the Contractor shall submit a certificate from a independent testing organization, which is competent to perform acceptable test and is approved by the Contracting Officer. The certificate shall state 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 standard. For materials and equipment whose compliance with organizational standards or specifications is not regulated by an organization using its own listing or label as proof of compliance, a certificate of compliance from the manufacturer shall be submitted for approval. The certificate shall identify the manufacturer, the product, and the referenced standard and shall simply state that the manufacturer certifies that the product conforms to all requirements of the project specification and of the referenced standards listed.

1.2.4 Certified Test Reports: Before delivery of materials and equipment, certified copies of all test reports specified in the individual sections shall be submitted for approval.

1.2.5 Certificates of Conformance or Compliance: Submit certification from the manufacturer 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 in the 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.

1.3 OPERATION AND MAINTENANCE MANUAL: As required in each individual technical section, furnish equipment operation and maintenance manuals. 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 manuals shall include the names, addresses, and telephone numbers of each subcontractor installing the equipment, and of the local representatives for the equipment. The manuals 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 the 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.

1.4 POSTED OPERATING INSTRUCTIONS: As required in each individual technical section, furnish approved equipment operating instructions for the use of the operation and maintenance personnel. The operating instructions shall include wiring diagrams, control diagrams, and control sequence. 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 the associated items of equipment and shall include 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 equipment item manufacturers. 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.

1.5 INSTRUCTION TO GOVERNMENT PERSONNEL: When specified in other sections, the Contractor shall furnish the services of competent instructors who will give full instruction to the designated personnel in the adjustment, operation, and maintenance, including pertinent safety requirements, of the equipment or system specified. Each instructor shall be thoroughly 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 man-days (8 hours) of instruction furnished shall be as specified in other sections. When more than 4 man-days of instruction are specified, approximately half of the time shall be used for classroom instruction. All other time shall be used for instruction with the equipment or system. When significant changes or modifications in the equipment or system are made under the term of the contract, additional instruction shall be provided to acquaint the operating personnel with the changes or modifications.

1.6 DELIVERY AND STORAGE: Equipment and materials shall be carefully handled, properly stored, and adequately protected to prevent damage before and during installation, in accordance with the manufacturer's recommendations and as approved by the Contracting Officer. Damaged or defective items, in the opinion of the Contracting Officer, shall be replaced.

SECTION 15401

PLUMBING

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.):

O-C-114B(2)	Calcium Hypochlorite, Technical
O-S-602E	Sodium Hypochlorite Solution
BB-C-120B	Chlorine, Technical, Liquid
HH-I-573B (& Int Am 1)	Insulation, Thermal, (Flexible Unicellular Sheet and Pipe Covering)
QQ-S-571E(2)	Solder; Tin Alloy; Lead-Tin Alloy; and Lead Alloy
WW-N-351C(1)	Nipples, Pipe, Threaded
WW-U-516B	Unions, Brass or Bronze, Threaded Pipe Connections, and Solder-Joint Tube Connections
WW-V-54D(3)	Valve, Gate, Bronze, (125, 150, and 200 pound, Threaded Ends, Flange Ends, Solder Ends, and Brazed Ends, For Land Use)
PPP-T-66E	Tape, Packaging, Vinyl Plastic Film

1.1.2 Military Specifications (Mil. Spec.):

MIL-A-24179A & Am 2	Adhesive, Flexible Unicellular-Plastic Thermal Insulation
MIL-T-27730A	Tape, Antisieze, Tetrafluoroethylene, with Dispenser

1.1.3 Military Standards (Mil. Std.):

MIL-STD-101B	Color Code For Pipelines and For Compressed Gas Cylinders

1.1.4 American National Standards Institute (ANSI) Publications:

B2.1-68	Pipe Threads (Except Dryseal)
B16.18-78	Cast Copper Alloy Solder-Joint Pressure Fittings
B31.1-77	Power Piping with Addenda

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

A 74-75	Cast Iron Soil Pipe and Fittings
B 88-78	Seamless Copper Water Tube
D 2564-79	Solvent Cements for Polyvinyl Chloride (PVC) Plastic Pipe and Fittings
D 2665-78	Poly(vinyl Chloride) (PVC) Plastic Drain, Waste and Vent Pipe and Fittings
E 84-80	Surface Burning Characteristics of Building Materials

1.1.6 National Association of Plumbing-Heating-Cooling Contractors (PHCC) Publication:

National Standard Plumbing Code - 1979

1.1.7 National Fire Protection Association (NFPA) Publication:

NFPA 255-79	Test Methods, Surface Burning Characteristics of Building Materials

1.1.8 Underwriters' Laboratories (UL) Publication:

723-77	Tests for Surface Burning Characteristics of Building Materials (Jul. 16, 1979)

1.1.9 Manufacturer's Standardization Society of the Valves and Fittings Industry (MSS) Publications:

SP-58-75	Pipe Hangers and Supports - Materials, Design and Manufacture
SP-69-76	Pipe Hangers and Supports - Selection and Application

1.1.10 Uni-Bell Plastic Pipe Association (UNI-B):

Handbook of PVC Pipe - Design & Construction, 1979 Edition

UNI-B-5 Installation of Polyvinyl Chloride (PVC) Sewer Pipe

1.2 GENERAL REQUIREMENTS: The plumbing requirements specified herein are for providing new plumbing systems and equipment within the building and beneath it to the existing main. The project drawings show the general requirements as to sizes, arrangement, extent of piping, and location of equipment. Unless otherwise indicated or specified herein, all work shall be accomplished in accordance with the PHCC National Standard Plumbing Code. Excavation and backfilling of trenches shall be as specified in Section 02200,"Earthwork." Threaded joints for metal pipe and fittings shall have pipe threads conforming to ANSI B2.1. Polytetrafluoroethylene tape shall conform to Mil. Spec. MIL-T-27730. Section 15011, "General Requirements, Mechanical," with the following additions and modifications, applies.

1.2.1 Submittals: Items for which the submittals requirements of this section apply are as follow:

1.2.1.1 Manufacturers' Data:

Pipe
Fittings
All Valves
All Piping Specialties
Hangers and Supports
Insulation

1.2.1.2 Standards' Compliance:

Valve Trim

PART 2 - PRODUCTS

2.1 DRAINAGE PIPING AND FITTINGS: Poly vinyl chloride (PVC), ASTM D 2665, Schedule 40. Solvent cement for jointing, ASTM D 2564.

2.2 All potable water piping, buried and above ground, shall be copper tubing, Type K, annealed, conforming to ASTM B 88 with flared brass, solder-type bronze, or wrought-copper fittings conforming to ANSI B16.18.

2.3 VALVES: Bronze body valves incorporating either copper-zinc alloy exceeding 16 percent zinc content or aluminum alloy for trim material will not be permitted.

2.3.1 Gate Valves: Valves used for shut-off valves shall be gate valves. Valves shall be bronze, with screwed or soldered ends, 125-pound conforming to Fed. Spec. WW-V-54, type and class suitable for intended purpose.

2.3.2 Hose Bibb Faucets: Brass body compression type faucet, straight body, spout with 3/4-inch external hose threads, inlet with internal pipe threads, flats on body for wrench grip, metal wheel handle secured to stem by machine screw, rough finish.

2.4 MISCELLANEOUS MATERIALS:

2.4.1 Nipples: Nipples shall conform to Fed. Spec. WW-N-351 and shall be the same material as the piping in which installed.

2.4.2 Unions: Unions shall be brass or bronze, with solder joint ends, conforming to Fed. Spec. WW-U-516 for use in copper tubing. Type, style, class to be suitable for intended use.

2.4.3 Solder: Fed. Spec. QQ-S-571, composition Sn50 for service temperatures up to 150 degrees F.

2.4.4 Pipe Hangers and Supports: The design and fabrication of pipe hangers, supports, and welding attachments shall conform to MSS SP-58 and ANSI B31.1. Hanger types and supports for bare and covered pipe shall conform to MSS SP-69 for the temperature range. Unless otherwise indicated, horizontal and vertical piping attachments shall conform to MSS SP-58. Continuous inserts and expansion bolts may be used.

2.4.5 Piping Isolators: Standard commercial products, consisting of metal-clad hair felt manufactured specifically for isolating pipe from hangers.

2.4.6 Piping Identification: Plastic tape and decals, Fed. Spec. PPP-T-66 pressure-sensitive adhesive type, identifying pipe lines in accordance with MIL-STD-101. Adhesive shall be suitable for the surface upon which applied, either insulation or metal pipe surfaces with and without finish as specified, so as to provide a permanent bond.

2.4.7 Buried Utility Warning and Identification Tape: Polyethylene plastic tape manufactured specifically for warning and identification of buried utility lines. Tape shall be of the type provided in rolls, 6 inches minimum width, color coded for the utility involved, with warning and identification imprinted in bold black letters continuously and repeatedly over entire tape length. Warning and identification for water lines shall be "CAUTION-BURIED WATER LINE BELOW" or similar. Warning and identification for drain and waste lines shall be similarly worded. Code and letter coloring shall be permanent, unaffected by moisture and other substances contained in trench backfill material.

2.4.8 Pipe Sleeves: Zinc-coated steel pipe in exterior walls below and above grade, in floor, or in roof slabs. Sleeves in partitions shall be sheet steel having a zinc coating weight of not less than 0.906 ounces per square foot.

2.5 Miscellaneous Fittings:

2.5.1 Floor Drain: Floor drain and P-trap with front cleanout plug in trap shall be constructed of acid resisting cast iron body with nickel-bronze grate. Size as indicated.

2.5.2 Valve Boxes: Each gate valve on buried piping shall be provided with an adjustable cast-iron or precast concrete valve box of a size suitable for the valve on which it is to be used. The head shall be round and the lid shall have the word "WATER" cast on it. The least diameter of the shaft of the box shall be 5-1/4 inches. Each cast-iron box shall be given a heavy coat of bituminous paint.

2.6 INSULATION:

2.6.1 Manufacturer's Stamp or Label: Every package or standard container of insulation, cements, adhesives, and coatings delivered to the project site for use must have the manufacturer's stamp or label attached giving name of manufacturer, brand, and description of material. Insulation packages and containers shall be marked "asbestos free."

2.6.2 Fire Resistance: Insulation, adhesives, and other accessories, except as specified herein, shall be noncombustible. The materials shall have a flame-spread of not more than 25 and a smoke-developed rating of not more than 50. Provide the above ratings in accordance with NFPA 255, ASTM E 84 or UL 723.

2.6.2.1 Materials Tests: Test factory-applied materials as assembled. Field-applied materials may be tested individually. Use no fugitive or corrosive treatments to impart flame resistance. UL label or satisfactory certified test report from an approved testing laboratory will be required to indicate that fire hazard ratings for materials proposed for use do not exceed those specified. Flame-proofing treatments subject to deterioration due to effects of moisture or high humidity are not acceptable.

2.6.2.2 Material with a Flame-Spread Rating of 25 or Less but Exempt from Smoke-Developed Rating:

Flexible unicellular insulation

2.6.3 Flexible Unicellular Insulation: Water supply piping inside building shall be insulated with 1/2 inch thick flexible unicellular insulation conforming to Fed. Spec. HH-I-573. Use an adhesive recommended by insulation manufacturer or conforming with Mil. Spec. MIL-A-24179 and apply in accordance with manufacturer's published instructions.

PART 3 - EXECUTION

3.1 INSTALLATION:

3.1.1 Connections to Existing Lines: Connections to existing lines shall be made in a manner approved by the Contracting Officer and shall be accomplished with a minimum interruption of service on the existing line. Where connections to existing lines are made under pressure, these connections shall be installed in accordance with the recommendations of a manufacturer of pipe of which the line being tapped is made, except as specified hereinafter.

3.1.2 Cleaning and Protection of Pipe, Fixtures, Materials, and Equipment: Before being placed in position, carefully clean pipe and fittings. Maintain all pipe in a clean condition. Close pipe openings with caps or plugs during installation. Tightly cover equipment and protect against dirt, water, and chemical or mechanical injury. Upon completion of all work, thoroughly clean, adjust, and operate the materials, and equipment.

3.1.3 Installation of Screw-Jointed Piping and Solder-Jointed Tubing: Cut screw-jointed piping and solder-jointed tubing accurately to required measurements and work into place without springing or forcing. Make proper provision for the expansion and contraction of all pipe and tubing lines. Free pipe and fittings from fins and burrs. Make screw joints with a lubricant or polytetrafluoroethylene tape applied on the male threads only; full cut threads and not more than three threads on the pipe shall remain exposed. Give all exposed ferrous pipe threads, after being installed and tested, one coat of red lead and oil paint. Cut all copper tubing with square ends, and remove all burrs and fins. Carefully handle and protect tubing and replace all tubing cut, dented, or otherwise damaged with new tubing. Clean end of tubing and fittings by wire brush or abrasive. Apply a non-corrosive rosin-type flux to the outside surface of tubing ends, and on the recess inside of fittings. Insert tubing to the full depth of the fitting, then solder with solder conforming to Fed. Spec. QQ-S-571 as herein specified and non-corrosive flux. Remove stems and washers of solder-joint type valves before soldering. Provide unions and union type connections and shut-off valves for all fixtures and equipment for ready disconnection. On ferrous pipe 3 inches in diameter and smaller, unions shall be 150-pound steam-working-pressure zinc-coated malleable iron ground-joint type. On ferrous pipe 3-1/2 inches in diameter and larger, unions shall be 125-pound steam-working-pressure forged steel flange type, with gaskets

of 1/16-inch-thick best-quality rubber or cloth inserted rubber. On sanitary piping, tucker connections may be used. Support pipe and tubing hung from ceilings by heavy adjustable hangers. All hangers and collars shall be of the sizes suitable for the weight of the pipe and tubing. Make all changes in sizes of pipe and tubing with reducing fittings. Provide dielectric fittings at transitions between ferrous and copper piping.

3.1.4 Installation of Plastic Piping: All pipe shall be cut accurately to measurements established by the Contractor and shall be worked into place without springing or forcing. Proper provision shall be made for the expansion and contraction of all pipelines. Pipe and fittings shall be free from fins and burrs. All pipe shall be cut with square ends and all fins and burrs removed. Installation shall be in accordance with UNI-B-5. Piping shall have solvent-cemented joints. Jointing to other pipe materials shall be in accordance with the recommendations of the plastic pipe manufacturer.

3.1.5 Water Valves: Install water valves in accessible places and locate as indicated.

3.1.6 Pipe Sleeves: Provide pipe sleeves where pipes and tubing pass through walls, floors, roofs, and partitions. Place sleeves during construction of the building and at no time shall jack hammers be used. Space between pipe, tubing, or insulation and the sleeve shall be not less than 1/4 inch. Securely hold sleeves in proper position and location before and during construction. All sleeves shall be of sufficient length to pass through entire thickness of walls, partitions, or slabs. Sleeves in floor slabs shall extend 2 inches above the finished floor. Firmly pack space between the pipe or tubing and the sleeve with oakum and calk on both ends of the sleeve with insulating cement. Sleeves are not required in floor slabs located on grade. Where PVC drain pipe passes under footings, they shall pass through cast iron sleeves. Cast iron shall conform to ASTM A-74.

3.1.7 Hangers and Supports: Furnish and install supports to carry adequately the weight of the line. Provide hangers and supports for piping in accordance with requirements and recommendations of MSS SP 69 but comply with spacing requirements of Table I below, for the materials named. The spacing in the table does not apply where there are concentrated loads between supports, such as flanges, fittings, valves, and similar accessories. In addition, provide all piping with sway bracing. Install hangers and supports so that thermal expansion and contraction of piping will occur in the directions desired and so as to permit adjustment after installation while supporting the load. Use wall brackets for supporting piping adjacent to walls or other vertical surfaces. Use bolted steel clamps for supporting vertical lines. Place supports as near as possible to concentrated loads and, when pacticable, immediately adjacent to changes in direction. Support horizontal piping so as to maintain alignment, prevent grade reversals, and prevent sagging in excess of 0.1 inch. Prevent vibration and undue strains on equipment by use of vibration dampeners.

TABLE I - MAXIMUM SPAN FOR PIPE

DIAMETER INCHES	COPPER TUBE TYPE K
1/2	3'-9"
3/4	4'-3"
1	5'-0"

3.1.8 General: Insulation materials shall not be applied until all systems tests have been satisfactorily completed and surfaces to be insulated have been cleaned and dried. Insulation shall be clean and dry when installed and during the application of any finish. Install materials neatly. Scrap pieces shall not be used where a full-length section will fit.

3.1.9 Flexible Unicellular Insulation: Bond cuts, butt joints, ends, and longitudinal joints with adhesive. Miter 90-degree turns and elbows, tees, and valve insulation. After adhesive cures, apply 2-inch wide pressure-sensitive adhesive vinyl tape over bonded cuts, joints, and ends. Secure longitudinal joints with vinyl tape on 9-inch centers. Where pipes penetrate fire walls, provide mineral-fiber insulation inserts and sheet-metal sleeves. Secure insulation to pipe with adhesive conforming to Mil. Spec. MIL-A-24179. Insulate flanges, unions, valves, and fittings in accordance with manufacturer's published instructions.

3.1.10 Identification Tags: On all valves, install brass or aluminum identification tags indicating function of the valve, size, and working pressure.

3.1.11 Identification of Piping: Identify all piping in accordance with MIL-STD-101, except that labels or tapes may be used in lieu of painting or stencilling. Spacing of identification marking on runs shall not exceed 50 feet. Material requirements for labels and tapes shall conform to Fed. Spec. PPP-T-66, and shall be general purpose type and colored class.

3.2 FIELD TESTS, INSPECTIONS, AND DISINFECTION: The Contractor shall provide everything required for the tests. The Contracting Officer will witness all field tests and conduct all field inspections. The Contractor shall give the Contracting Officer ample notice of the dates and times scheduled for tests. Any deficiencies found shall be rectified and work affected by such deficiencies shall be completely retested at no additional cost to the Government.

3.2.1 Inspection: Inspection shall continue during installation and testing. The right is reserved to inspect any equipment at the manufacturer's facility, during or after manufacture, and to require reasonable witness tests before shipment. Perform a final inspection of the equipment prior to installation to determine conformity to the type, class, grade, size, capacity, and other characteristics specified herein or indicated. Correct or replace all equipment rejected prior to installation.

3.2.2 Water Distribution Piping Test: Subject the entire system to a hydrostatic pressure test of 100 pounds per square inch with water for not less than 30 minutes in order to permit inspection of all joints with no evidence of leakage. Where a portion of the water distribution piping is to be concealed before completion, test this portion separately as specified for the entire system.

3.2.3 Drainage Test: Give an in-service test. Test the entire drain system and prove gas and water tight.

3.2.4 Disinfection of Water Distribution System: After pressure tests have been made, thoroughly flush the entire domestic water distribution system with water until all entrained dirt and mud have been removed, and sterilize by chlorinating material. The chlorinating material shall be either liquid chlorine conforming to Fed. Spec BB-C-120, or hypochlorite conforming to Fed. Spec. O-C-114, or Fed. Spec. O-S-602, Grade 1 (5 percent available chlorine) or Grade 2 (10 percent available chlorine.) The chlorinating materials shall provide a dosage of not less than 50 parts per million and shall be introduced into the system or part thereof in an approved manner. Retain the treated water in the pipe for 24 hours, or, fill the system or part thereof with a water-chlorine solution containing at least 200 parts per million of chlorine and allow to stand for 3 hours. Open and close all valves in the system being disinfected three times during the contact period. Then flush the system with clean potable water until the residual chlorine is reduced to less than 1.0 p/m. During the flushing period open and close all valves and faucets three times. From at least three divergent points in the system the Contracting Officer will take samples of water in properly sterilized containers for bacterial examination. Repeat the disinfecting until tests indicate that satisfactory bacteriological results have been obtained.

*** END OF SECTION ***

SECTION 15611

FUEL OIL HANDLING SYSTEM

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.):

UU-B-790A & Int Am 1	Building Paper, Vegetable Fiber, (Kraft, Waterproofed, Water Repellant and Fire Resistant)
WW-U-531E	Unions, Pipe, Steel or Malleable Iron; Threaded Connection, 150 lb and 250 lb
WW-P-521G	Pipe Fittings, Flange Fittings and Flanges, Steel and Malleable Iron, (Threaded and Butt Welded), 150 Pound

1.1.2 Military Specifications (Mil. Spec.):

MIL-T-462D	Tank, Liquid Storage, Metal, Fuel-oil, Horizontal
MIL-A-907D	Antiseize Compound, High Temperature (Navy)
MIL-T-5544B & Am 1	Thread Compound, Antiseize, Graphite-Petrolatum
MIL-P-15147C	Primer and Enamel, Coal Tar
MIL-G-17713B(YD)	Gage, Liquid Level Measuring, Tank
MIL-V-18434B	Valves, Gate, Globe, and Angle, Steel
MIL-V-18436D & Int Am 1	Valves, Check: Bronze, Cast-Iron and Steel Body
MIL-C-19902B	Cap, Vent, Fuel Storage Tank
MIL-T-22361 & Am 1	Thread Compound, Antiseize, Zinc Dust-Petrolatum
MIL-P-23236 & Am 5	Paint Coating Systems, Steel Ship Tank Fuel and Salt Water Ballast
MIL-T-52777A	Tanks, Storage, Underground, Glass Fiber Reinforced Plastic

1.1.3 American National Standards Institute (ANSI) Publications:

B16.5-77	Steel Pipe Flanges, and Flanged Fittings Including Ratings for Class 150, 300, 400, 600, 900, 1500 and 2500
B16.9-78	Factory-Made Wrought Steel Buttwelding Fittings
B16.11-80	Forged Steel Fittings, Socket-Welding and Threaded
B16.39-77	Malleable Iron Threaded Pipe Unions Class 150, 250, 300
B31.1-80	Power Piping
B31.4-79	Liquid Petroleum Transportation Piping Systems

1.1.4 American Society of Mechanical Engineers (ASME) Publications:

ASME Boiler and Pressure Code:

Section VIII - Pressure Vessels - 1977

Section IX - Welding Qualifications - 1978

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

A 53-80	Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless
A 120-80	Pipe, Steel, Black and Hot-Dipped Zinc-Coated (Galvanized) Welded and Seamless, For Ordinary Use

1.1.6 American Welding Society (AWS) Publication:

A5.8-76	Brazing Filler Metal

1.1.7 Manufacturer's Standard Society of the Valves and Fittings Industry (MSS) Publications:

SP-58-75	Pipe Hangers and Supports - Materials and Design
SP-69-76	Pipe Hangers and Supports - Selection and Application

1.1.8 National Fire Protection Association (NFPA) Publications:

NFPA 30-81	Flammable and Combustible Liquids Code
NFPA 31-78	Installation of Oil Burning Equipment

1.1.9 Steel Structures Painting Council (SSPC) Publications:

SSPC Paint 9-64	No. 9 White (or Colored) Vinyl Paint
SSPC-PS10.01-64T	Coal Tar Coating Systems No. 10.01 Hot-Applied Coal Tar Enamel

1.1.10 Steel Tank Institute (STI) Publication:

STI-P3	111 E. Wacker Drive Chicago, IL 60601

1.1.11 Underwriters' Laboratories (UL) Publications:

UL 58-76	Steel Underground Tanks for Flammable and Combustible Liquids
UL 842-80	Valves for Flammable Fluids

1.2 GENERAL DESCRIPTION: This section includes all fuel oil piping, fuel oil pumps, fuel oil storage tank, and related auxiliary equipment for a fuel oil handling system. General requirements include those specified in Section 15011, "Mechanical, General Requirements."

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

1.2.1.1 Manufacturer's Data:

Pipe
All Valve Fittings
All Piping Specialties
Storage Tank
Day Tank
Oil Pump

1.2.1.2 Certificates of Compliance:

Storage Tank

PART 2 - PRODUCTS

2.1 MATERIALS AND EQUIPMENT:

2.1.1 Steel Piping:

2.1.1.1 Pipe: ASTM A 120 or ASTM A 53 Schedule 40, black steel, seamless.

2.1.1.2 Threaded and Socket-Welding Fittings: ANSI B16.11 forged steel.

2.1.1.3 Butt-Welding Fittings: ANSI B16.9, 150 lb. Backing rings shall conform to ANSI B31.4 and be compatible with materials being welded.

2.1.1.4 Flanges and Flange Fittings: ANSI B16.5 steel flanges or convoluted steel flanges which meet the criteria of ASME Code Section VIII. Flange faces shall have integral grooves of rectangular cross section which afford containment for self-energizing gasket material.

2.1.2 Vent Piping: Zinc-coated steel conforming to ASTM A 120 standard weight, with zinc-coated malleable iron fittings conforming to Fed. Spec. WW-P-521.

2.1.3 Valves:

2.1.3.1 Steel Gate Valves: Mil. Spec. MIL-V-18434, Type I, oil service, Class 150.

2.1.3.2 Relief Valves: UL 842, steel or bronze bodies, corrosion-resistant valve seats, and positive closing so that no leakage will occur.

2.1.3.3 Check Valves: Mil. Spec. MIL-V-18436, Group C, Type I, Trim 3, Class 150.

2.1.4 Piping Accessories:

2.1.4.1 Flexible Hose: Flexible metal hose, corrugated type with braided wire sheath covering, close-pitch annular corrugations, rated for a working pressure of at least 125 psig, 8-inch minimum live length, flanged end connections, UL listed for flammable liquid service. Metal for hose and braided wire sheath shall be stainless steel, any type of ASTM 300 series.

2.1.4.2 Unions: ANSI B16.39, 150 lb.

2.1.4.2.1 Dielectric Unions: Union comprising steel female pipe thread end and copper solder-joint end conforming to dimensional, strength and pressure requirements of Fed. Spec. WW-U-531, Class 1. Steel parts shall be galvanized or plated. Union shall have a water-impervious insulation barrier capable of limiting galvanic current to one percent of the short-circuit current in a corresponding bimetallic joint. When dry, it shall also be able to withstand a 600-volt breakdown test.

2.1.4.3 Welding Filler Metal: ANSI B31.4 and compatible with the materials to be welded.

2.1.4.4 Brazing Filler Metal: AWS A5.8, silver base alloy, with melting point not less than 1,100 F.

2.1.4.5 Hangers and Supports: MSS-SP-58, types as required by MSS SP-69.

2.1.4.6 Fill Box: Lock-type design with cast-iron body and bronze inside lock cap, designed for flush mounting in concrete encasement, water-tight with drain holes in bottom. Furnish wrench for opening box.

2.1.4.7 Gaskets: Provide composition asbestos gaskets for all flanged and bolted connections.

2.1.5 Instruments: Tank gauges Mil. Spec. MIL-G-17713, buoyant force type with direct reading dial.

2.1.6 Protective Coating Systems for Buried Steel Tanks and Steel Piping:

2.1.6.1 Steel Tank Coating: Coat the exterior surfaces of steel tanks for installation underground with a protective coating conforming to SSPC-PS 10.01 except that only coal tar conforming to Mil. Spec. MIL-P-15147 shall be used. The coal tar coating shall be covered with reinforced protective paper conforming to Fed. Spec. UU-B-790, Type 1, Grade A, Style 4, with reinforcing averaging not less than 20 strands of fiber per foot and having a minimum tensile strength of 35 pounds per inch in both directions. Cover all surfaces of the tank. Secure paper in place by cementing it to itself with an approved adhesive and by tying it with marline at intervals of 2 feet. Wire shall not be used. Contractor shall submit written certification that the surface preparation, application procedure and materials for the coating conform to the specified requirements. Coating may be shop or field applied at the option of the Contractor.

2.1.6.2 Epoxy Coal-tar Coated Steel Tanks: Protective coating and corrosion control system shall meet the requirements of STI-P3.

2.1.6.3 Fiberglass Reinforced Plastic Coated Steel Tanks: Steel tanks may be provided with a 1/8-inch nominal fiberglass reinforced plastic coating.

2.1.6.4 Piping and Fittings: All piping and fittings installed below ground shall be given two coats of coal-tar enamel conforming to MIL-P-15147.

2.1.6.5 Protective Coating Systems: All protective coating systems, including FRP coated steel tanks, shall be inspected with a 10,000 volt holiday tester just prior to placement in ground and any holidays revealed shall be promptly repaired to a condition as good as the rest of the system.

2.1.7 Protection for Aboveground Steel Pipe: Protect all aboveground steel pipe against atmospheric corrosion by a prime coat, inorganic, zinc-rich primer in accordance with Mil. Spec. MIL-P-23236, Type I, Class 3, bond or tie coat in accordance with specifications of manufacturer of prime coat and 2 finish coats of vinyl paint in accordance with SSPC - Paint 9.

2.2 FUEL OIL PUMPING EQUIPMENT:

2.3 Fuel Oil Pump: Fuel oil pump shall be UL rated for fuel handling. Pump shall be direct driven positive displacement, angle pump with flexible coupling and guard, mounted on a steel base. Pump shall have mechanical seals suitable for No. 2 fuel oil, bronze rotors, casing and shaft. Pump shall be designed to pump 1/2 GPM of No. 2 fuel oil at 25 psi. Motor starter as indicated.

2.4 Day Tank: Day tank shall be 16 gage black iron with a 60 gallon capacity. Tank shall be approximately 22 inch diameter and 35 inches long. Tank shall be supplied with a flow switch for automatic filling of tank and all necessary appurtenances.

2.5 FUEL OIL STORAGE TANKS AND ACCESSORIES:

2.5.1 Fuel Oil Storage Tanks: Construct fuel oil tanks of steel, fiberglass reinforced plastic (FRP), or fiberglass reinforced plastic coated steel to comply with NFPA 30 and NFPA 31. Provide openings for fill, vent, pump suction, oil return, oil level gauge. Vent pipe as indicated shall connect to tapping at high end of tank and shall not extend more than one inch into tank.

2.5.2 Design, Construction and Testing of Fuel Oil Tanks:

a. Horizontal steel tanks, regardless of coating type, Mil. Spec. MIL-T-462 or UL 58 or STI P3.

b. FRP tanks Mil. Spec. MIL-T-52777.

2.5.3 Connections to Fuel Oil Tanks:

a. Goose-neck type vent caps or type conforming to Mil. Spec. MIL-C-19902.

b. Provide fill lines with removable single strainer and lock type fill boxes.

c. Pump suction lines with internal vertical pipes extending to within 6 inches of tank bottom with foot valve and strainer.

d. Design fuel oil supply and fuel oil return piping to allow for ample tank movement and pipe expansion.

e. Provide flexible hose connections for vibration isolation of oil burning equipment.

f. On FRP tanks provide a 12-inch by 12-inch by 1/4-inch aluminum plate laminated on inside bottom surface of tank directly below fill pipe and oil level gaging rod opening. On steel tanks weld a 12-inch by 12-inch by 1/4-inch steel striker plate.

g. Provide all pipe connections to steel tanks with dielectric fittings.

h. Provide all holddown straps for steel tanks with inert insulating dielectric material between strap and tank.

PART 3 - EXECUTION

3.1 INSTALLATION:

3.1.1 Incinerator Equipment: The Contractor shall provide incinerator equipment as described in Section 11171.

3.1.2 General Installation Requirements for Oil Piping: Install piping in out-of-the way locations, in a manner that will minimize cutting of beams, girders, columns, or load-bearing members. Piping shall be free from traps and shall drain toward tank and equipment. Installation of oil piping and equipment in buildings shall conform to NFPA 31, except as indicated or specified herein. Feed line to equipment shall have a gate valve located near tank.

3.1.3 Pipe Sleeves: Provide pipe sleeves where pipes and tubing pass through masonry or concrete walls, floors, roofs, and partitions. Sleeves in outside walls below and above grade, in floor, or in roof slabs, shall be steel pipe. Sleeves in partitions shall be zinc-coated sheet steel having a nominal weight of not less than 0.906 pound per square foot. Space between pipe, tubing, or insulation and the sleeve shall be not less than 1/4 inch. Hold sleeves securely in proper position and location before and during construction. Provide sleeves of sufficient length to pass through entire thickness of walls, partitions, or slabs. Extend sleeves in floor slabs 1/2 inch above finished floor. Firmly pack space between the pipe or tubing and sleeve with oakum, and calk on both ends of sleeve with elastic cement.

3.1.4 Floor, Wall, and Ceiling Plates: Secure plates to pipes at sleeves in buildings. All plates shall be painted cast-iron, malleable iron, or steel.

3.1.5 Steel Piping: Steel piping 2 inches and smaller shall be threaded or socket-welded. Steel piping 2-1/2 inches and larger shall be flanged or butt-welded. Piping joints shall conform to ANSI B31.4.

3.1.6 Screwed Joints in Piping: Use cylinder oil and graphite or graphite pipe-joint compound conforming to Mil. Spec. MIL-T-5544 applied to male threads only for making up screwed joints. Red or white lead and zinc compound conforming to Mil. Spec. MIL-T-22361 may be used. Lubricate threaded pipe joints, as well as bolts and studs used on high temperature pipe joints up to 1050 degrees F, with anti-seize compound in accordance with Mil. Spec. MIL-A-907. Piping shall be free from fins and burrs. Ream or file out pipe ends to size of bore and remove chips. Attach screwed flanges by screwing the pipe through the flange, and reface pipe and flange accurately.

3.1.7 Welding:

3.1.7.1 Welding Procedure Specifications: Before any welding is performed, the Contractor shall submit to the Contracting Officer three copies of his welding procedure specification for all metals included in work, together with proof of its qualifications as outlined in ANSI B31.1.

3.1.7.2 Performance Qualification Record: Before any welder or operator shall perform any welding the Contractor shall also submit to the Contracting Officer three copies of the Welder's Performance Qualification Record in accordance with ANSI B31.1 showing that the welder was tested under the approved procedure specification submitted by the Contractor. In addition the Contractor shall also submit each welder's assigned number, letter, or symbol which shall be used to identify the work of the welder and which shall be affixed immediately upon completion of the weld. Welders making defective welds after passing a qualification test shall be given a requalification test and upon failing to pass the test shall not be permitted to work this contract.

3.1.7.3 Previous Qualifications: Welding procedures, welders, and welding operators previously qualified by test may be accepted for this contract without requalification subject to the approval of the Contracting Officer and provided that all the conditions specified in ANSI B31.1 are met before a procedure can be used.

3.1.7.4 Welding of Piping: Welding of joints in piping, butt welds, fillet welds, bends, loops, offsets, and cleaning of pipe shall be in accordance with ANSI B31.1.

3.1.7.5 Quality of Welds: Quality of welds, correction of defects, stress relieving, and preheating shall be in accordance with ANSI B31.1.

3.1.7.6 Arc Welding and Gas Welding: In accordance with ASME Boiler and Pressure Vessel Codes Section IX.

3.1.8 Unions and Flanges: Place unions and flanges where necessary to permit easy disconnection of piping and apparatus. Each connection having a screw end valve shall have a union. In long lines inside buildings, place unions and flanges not farther apart than 100 feet, except in pipe lines of welded construction. Unions and flanges shall be as specified.

3.1.9 Valves: Install valves in positions accessible for operation and repair. Install check valve and a gate valve on suction line of each fuel oil storage tank.

3.1.10 Fuel Oil Storage Tanks: Install storage tanks and vents and other connections in accordance with NFPA 30, NFPA 31, recommendations and published instructions of the manufacturer, and as indicated. Concrete shall have a compressive strength of 3300 psi, 3/4 inch maximum aggregate size and 3 to 4 inches slump. Materials for sand, gravel and concrete shall meet requirements specified in Section 03300, "Cast in Place Concrete." Excavation and backfill for storage tank installation shall comply with Section 02200, "Earthwork."

3.1.10.1 Underground Fuel Oil Tanks: Tanks shall rest on a full length concrete pad with hold down straps. Provide a minimum of 6 inches of clean sand between steel tank and pad and a minimum of 12 inches of pea gravel between fiberglass reinforced plastic tank and pad. Tanks shall have a cover of earth of not less than 2 feet in non-vehicular traffic areas and a cover of not less than 3 feet in vehicular traffic areas, with all pipe connections at top of tank. Backfill for steel tanks may be either sand or pea gravel. Backfill for fiberglass reinforced plastic tanks shall be pea gravel. Backfill shall be well compacted, particularly under the tanks, in order to provide adequate support. Before placing tank into excavation, all foreign matter shall be cleaned from tank. Excavation shall be free from all materials that may cause damage to the tank or tank coating. Tanks shall be carefully lifted and slowly lowered into the ground. Under no circumstances shall lifting devices damage the tank or tank coating. Handle tanks during transportation in such a manner as to prevent damage to tank and protective coating.

3.1.11 Fuel Pump and Day Tank: Fuel pump and day tank unit shall be wall mounted as indicated on a rigid steel bracket bolted to the masonry wall using not less than four 1/2 inch galvanized bolts that pass through the wall. Two inch galvanized washers shall be provided on the inside face of the wall.

3.2 FIELD TESTS:

3.2.1 Tests: Prior to application of test pressure, remove or valve off piping components which may be damaged by test and install a currently calibrated test gage in the system. Maintain test pressure for at least one hour. In the event of leakage, locate and repair leak and repeat test.

3.2.1.1 Piping Test: Before backfilling of pipe trenches, perform hydrostatic test of fuel oil piping with No. 2 fuel-oil at 1-1/2 times system pressure or 100 psig whichever is greater.

3.2.1.2 Steel Fuel Oil Storage Tanks: Field-test tanks in accordance with Method A of Manufacturing and Production Tests of UL 142, except that the underground tanks shall be tested for leaks both before and after being placed in the trench. Mechanical calking is not permitted for correcting leaks in tanks.

3.2.1.3 Fiberglass Reinforced Plastic Tank (FRP): Test in accordance with Mil. Spec. MIL-T-52777.

*** END OF SECTION ***

SECTION 16011

GENERAL REQUIREMENTS, ELECTRICAL

1. APPLICATION: This section applies to all sections of Division 16 of this project except as specified otherwise in the individual sections.

2. SUBMITTALS: Specific items requiring submittals shall be as specified in each individual sections of Division 16. Shop drawings shall be submitted and approved before procurement, fabrication, or delivery of such items to the job site. Partial submittals are not acceptable; such submittals will be returned without review.

2.1 Manufacturer's Data: Submittals for each manufactured item shall be manufacturer's descriptive literature, equipment drawings, diagrams, performance and characteristic curves, and catalog cuts. Each submittal shall include the manufacturer's name, trade name, catalog model or number, nameplate data, size, layout dimensions, capacity, specification reference, applicable Federal, Military and Industry specification references, and all other information necessary to establish contract compliance.

2.2 Standards Compliance: When materials or equipment must conform to the standards of organizations such as the American National Standards Institute (ANSI), American Society for Testing and Materials (ASTM), National Electrical Manufacturers Association (NEMA), and Underwriters Laboratories (UL), proof of such conformance shall be submitted to the Contracting Officer for approval. If an organization uses a label or listing to indicate compliance with a particular standard, the label or listing will be acceptable evidence, unless otherwise specified in the individual sections. In lieu of the label or listing, the Contractor shall submit a certificate from a independent testing organization, which is competent to perform acceptable test and is approved by the Contracting Officer. The certificate shall state 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 standard. For materials and equipment whose compliance with organizational standards or specifications is not regulated by an organization using its own listing or label as proof of compliance, a certificate of compliance from the manufacturer shall be submitted for approval. The certificate shall identify the manufacturer, the product, and the referenced standard and shall simply state that the manufacturer certifies that the product conforms to all requirements of the project specification and of the referenced standards listed.

3. DELIVERY AND STORAGE: Equipment and materials shall be properly stored and adequately protected and carefully handled to prevent damage before and during installation. Equipment and materials shall be handled, stored, and protected in accordance with the manufacturer's recommendations and as approved by the Contracting Officer. Electrical conduit shall be stored to provide protection from the weather and accidental damage. Plastic conduit shall be stored on even supports and in locations not subject direct sun rays or excessive heat. Cables shall be sealed, stored and handled carefully to avoid damage to the outer covering or insulation and damage from moisture and weather. Damaged or defective items, in the opinion of the Contracting Officer, shall be replaced with new items at no cost to the Government.

4. CATALOGED PRODUCTS: Materials and equipment shall be the cataloged products of manufacturers regularly engaged in production of such materials or equipment and shall be manufacturer's latest standard design that complies with the specification requirements. When two or more units of the same type, class, and size of equipment are required, these units shall be products of a single manufacturer; however, the component parts of the system need not be the products of the same manufacturer. Each major component of equipment shall have the manufacturer's name, address, and the model and serial number on a nameplate securely affixed in a conspicuous place; the nameplate of the distributing agent will not be acceptable.

5. MANUFACTURER'S RECOMMENDATIONS: Where installation procedures are specified to be in accordance with the recommendations of the manufacturer of the material or equipment 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.

6. MECHANICAL REQUIREMENTS: The interconnecting power wiring and conduit, control wiring rated 120 volts (nominal) and conduit, the motor-control equipment forming a part of motor-control centers, of switchgear assemblies, and the electrical power circuits are included under this Division. The electrical components of mechanical equipment, such as motors, motor starters, control or push-button stations, float or pressure switches, solenoid valves, and other devices functioning to control mechanical equipment, and control wiring and conduit for circuits rated 100 volts or less are specified in the appropriate sections covering such work rather than in Division 16.

*** END OF SECTION ***

SECTION 16402

ELECTRICAL WORK

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

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

B 1-70 (R 1976)	Hard-Drawn Copper Wire
B 8-81	Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft

1.1.4 National Electrical Manufacturers Association (NEMA) Publications:

ICS1-1978 (Rev. 3-80)	General Standards for Industrial Control and Systems
FA1-1973	Outdoor Floodlighting Equipment
ICS2-1978 (Rev. 2-80)	Standards for Industrial Control Devices, Controllers and Assemblies
ICS6-1978 (Rev. 1-80)	Enclosures for Industrial Controls and Systems
KS1-1975 (R 1981)	Enclosed Switches

MG1-1978 (Rev. 6-81)	Motors and Generators
TC6-1978	PVC Plastic Utilities Duct for Underground Installation
WD1-1979 (Rev. 2-81)	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:

(All UL publications shall be current editions published and available in print on the date of advertisement of this contract.)

1	Flexible Metal Conduit
50	Cabinets and Boxes
57	Electric Lighting Fixtures
67	Panelboards
360	Liquid-Tight Flexible Steel Conduit
467	Grounding and Bonding Equipment
486A	Wire Connectors and Soldering Lugs for Use with Copper Conductors
486C (Draft)	Splicing Wire Connectors
489	Molded-Case Circuit Breakers and Circuit Breaker Enclosures
510	Insulating Tape
514	Outlet Boxes and Fittings
869	Service Equipment
943	Ground-Fault Circuit Interrupters

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.

1.3 SUBMITTALS:

1.3.1 Manufacturers' Data:

a. Receptacles
b. Circuit breakers
c. Switches
d. Conduit and fittings (each type)
e. Ground rods
f. Device plates
g. Insulated conductors
h. Outlet and junction boxes
i. Panelboard
j. Lighting Fixtures

PART 2 - PRODUCTS

2.1 MATERIALS AND EQUIPMENT, GENERAL: 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.

2.2 CONDUIT AND FITTINGS:

2.2.1 Rigid Steel Conduit (Zinc-Coated): ANSI C80.1.

2.2.2 Plastic-Coated Rigid Steel and IMC Conduit: NEMA RN1, Type 40 (40 mils thick).

2.2.3 Flexible Metal Conduit: UL 1.

2.2.3.1 Liquid-Tight Flexible Metal Conduit (Steel): UL 360.

2.2.4 Fittings for Metal Conduit and Flexible Metal Conduit: UL 514. All fittings shall be cadmium- or zinc-coated in accordance with UL 514. Fittings shall be threaded type only.

2.3 OUTLET BOXES AND COVERS: UL 514, cadmium- or zinc-coated.

2.4 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. Wires and cables manufactured more than 12 months prior to date of delivery to the site shall not be used.

2.4.1 Conductors: Conductors No. 10 AWG and smaller shall be solid, and those No. 8 AWG and larger shall be stranded. All conductors shall be copper.

2.4.1.1 Minimum Conductor Sizes: Minimum size for branch circuits shall be No. 12 AWG; for Class 1 remote-control and signal circuits, No. 14 AWG; and for Class 2 low-energy remote-control and signal circuits, No. 16 AWG.

2.4.2 Color Coding: Provide for all service, feeder, branch, control, and signaling circuit conductors. Color shall be green for grounding conductors, and white for neutrals, except where neutrals of more than one system are installed in same raceway or box, the other neutral shall be white with a colored (not green) stripe. The color of the ungrounded conductors in different voltage systems shall be as follows:

120/208 volt, 3-phase:	Phase A - black
	Phase B - red
	Phase C - blue

2.4.3 Insulation: Unless specified or indicated otherwise, or required to be otherwise by NFPA 70, all power and lighting wires shall be 600-volt, Type THW, THWN, XHHW, or RHW, except that grounding wire may be Type TW; remote-control and signal circuits shall be Type TW, THW or TF.

2.4.4 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.

2.5 SPLICES AND TERMINATION COMPONENTS: UL 486A for wire connectors, and UL 510 for insulating tapes. Connectors for wires No. 10 AWG and smaller shall be insulated pressure-type in accordance with UL 486A or UL 486C (twist-on splicing connector). Provide solderless terminal lugs on stranded conductors.

2.6 DEVICE PLATES: Provide UL listed, one-piece device plates for outlets and fittings to suit the devices installed. Plates shall be of zinc-coated sheet steel or cast metal having round or beveled edges.

2.7 Toggle Switches: Fed. Spec. W-S-896, totally enclosed with bodies of thermosetting plastic and a mounting strap. Wiring terminals shall be of the screw type, side wired. Switches shall be rated quiet-type ac only, 120/277 volts, with the current rating and number of poles indicated.

2.8 Disconnect Switches: NEMA KS1. Switches serving as motor-disconnect means shall be horsepower rated. Provide heavy duty type switches. Fused switches shall utilize Class R fuseholders and fuses, unless indicated otherwise.

2.9 Breakers Used as Switches for Lighting: Breakers shall be marked "SWD" in accordance with UL 489.

2.10 RECEPTACLES: NEMA WD1, heavy-duty, grounding type. Ratings and configurations shall be as indicated. Bodies shall be of 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.

2.10.1 Weatherproof Receptacles: Provide in a cast metal box with a gasketed, weatherproof, cast-metal cover plate and a gasketed cap over each receptacle opening. The cap(s) shall be provided with a spring-hinged flap. Receptacle shall be UL approved for use in "wet locations."

2.10.2 Ground Fault Circuit Interrupter Receptacles: UL 943, and shall be duplex type for mounting in a standard outlet box. The device shall be capable of detecting a current leak of 5 milliamperes.

2.11 PANELBOARD: UL 67, UL 50, and UL 869. Panelboard shall be circuit breaker equipped. Design shall be such 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. Directories shall be typed to indicate load served by each circuit and mounted in a holder behind transparent protective covering.

2.11.1 Panelboard Buses: Support bus bars on bases independent of the circuit breakers. Main buses and back pans shall be designed so that breakers may be changed without machining, drilling, or tapping. Provide an isolated neutral bus in 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.

2.11.2 Circuit Breakers: Fed. Spec. W-C-375 thermal magnetic type with interrupting capacity of 10,000 amperes symmetrical minimum. Breaker terminals shall be UL listed as suitable for the type of conductor provided. Plug-in circuit breakers are not acceptable.

2.11.2.1 Multipole Breakers: Provide common-trip type with a single operating handle. Breaker design shall be such that an overload in one pole automatically causes all poles to open. Maintain phase sequence throughout each panel so that any three adjacent breaker poles are connected to Phases A, B, and C, respectively.

2.11.2.2 Circuit breaker for installation in existing panel shall be of the type suitable for mounting in existing panel without panel modifications.

2.12 MOTORS: NEMA MG1, except sealed (hermetic-type) motor-compressors shall meet UL 984. Determine specific motor characteristics to insure provision of correctly sized starters and overload heaters. Motors for operation on 208-volt, 3-phase circuits shall have a voltage rating of 200 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.

2.12.1 Motor Sizes: The approximate size of each motor is indicated. Size shall be sufficient for the duty to be performed and shall not exceed its full load nameplate current rating when driven equipment is operated at specified capacity under the most severe conditions likely to be encountered. When motor size provided differs from the size indicated (or specified), the Contractor shall make the necessary adjustments to the wiring, disconnect devices, and branch circuit protection to accommodate the equipment actually provided.

2.13 MOTOR CONTROLLERS: NEMA ICS1 and NEMA ICS2. All controllers shall have thermal overload protection in each phase. Magnetic-type motor controllers shall have under voltage protection when used with momentary-contact pushbutton stations or switches and shall have under voltage release when used with maintained-contact pushbutton stations or switches. When used with a pressure, float, or similar automatic-type or maintained-contact switch, the controller shall have a hand-off-automatic selector switch. Connections to the selector switch shall be such that only the normal automatic regulatory control devices will be bypassed when the switch is in the "hand" position. All safety control devices, such as low and high pressure cutouts, high temperature cutouts, and motor overload protective devices, shall be connected in the motor control circuit in both the "hand" and the "automatic" positions. Control circuit connections to any hand-off-automatic selector switch or to more than one automatic regulatory control device shall be made in accordance with an indicated, or a manufacturer's approved, wiring diagram. The selector switch shall have means for locking in any position. For each motor not in sight of the controller, the controller disconnecting means shall be capable of being locked in the open position or a manually operated, nonfused switch which will disconnect the motor from the source of supply shall be placed within sight of the motor location. Overload protective devices shall give adequate protection to the motor windings, be of the thermal inverse-time-limit type, and include a manual-reset type pushbutton on the outside of the motor controller case. The cover of a combination motor controller and manual switch or circuit breaker shall be interlocked with the operating handle of the switch or circuit breaker so that the cover cannot be opened unless the handle of the switch or circuit breaker is in the off position.

2.13.1 Enclosures for Starters and Controllers: NEMA ICS6.

2.14 LIGHTING FIXTURES: UL 57. All fixtures shall be complete with lamps.

2.14.1 Floodlight: NEMA FA1. Unit shall have die cast aluminum housing, Alzak aluminum reflector, tempered lens, integral ballast, high pressure sodium lamp (size as indicated), and galvanized steel mounting trunion.

2.14.2 Fluorescent Fixture: Heavy duty industrial type with 20 gage minimum housing, 22 gage minimum reflector, and baked enamel or polyester finish. Ballast shall be energy saving type with input wattage of 86 or less when operating two 40 watt lamps.

2.14.3 Bracket Fixture: Cast aluminum housing, white polycarbonate globe, gasketed.

2.15 GROUNDING AND BONDING EQUIPMENT: UL 467. Ground rods shall be the sectional type, copper-encased steel, with minimum diameter of 3/4 inch and total length as indicated.

PART 3 - EXECUTION

3.1 INSTALLATION:

3.1.1 General Requirements: Electrical installations shall conform to the requirements of NFPA 70 and to the requirements specified herein.

3.1.2 Wiring Methods: Wiring method shall be insulated conductors installed in conduit, except where Type 50 cord is indicated. An insulated equipment grounding conductor shall be provided in all feeder and branch circuits, including lighting circuits. All conduit shall be rigid galvanized steel, unless specified otherwise.

3.1.2.1 Service Entrance Conduit: Rigid steel. Underground conduit shall be encased in concrete (3 inches minimum all around), and shall be buried a minimum of 24 inches below grade.

3.1.3 Conduit Installation: Unless indicated otherwise, conceal conduit within finished walls, ceilings, and floors. Install conduit parallel with or at right angles to ceilings, walls, and structural members where conduit will be visible after completion of project.

3.1.3.1 Conduit Installed in Concrete Floor Slabs: Locate so as not to adversely affect the structural strength of the slabs. Install conduit within the middle one-third of the concrete slab. Space conduits horizontally not closer than three diameters except at cabinet locations. Curved portions of bends shall not be visible above the finish slab. Increase slab thickness as necessary to provide a minimum one-inch cover over conduit. Where embedded conduits cross expansion joints, provide suitable watertight expansion fittings and bonding jumpers. Conduit larger than one-inch trade size shall be parallel with or at right angles to the main reinforcement; when at right angles to the reinforcement, the conduit shall be close to one of the supports of the slab.

3.1.3.2 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.

3.1.4 Mounting Heights: Mount panelboard so the height of the top operating handle will not exceed 78 inches from the floor. Mount lighting switches 48 inches above finished floor, receptacles 18 inches above finished floor. Measure mounting heights of wiring devices and outlets to the center of device or outlet.

3.1.5 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.

3.1.6 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. Make ground connection to driven ground rods on the exterior of the building.

3.1.6.1 Grounding Conductor: Provide an insulated, green-colored equipment grounding conductor in all feeder and branch circuits. This conductor shall be separate from the electrical system neutral conductor.

3.1.6.2 Resistance: The maximum resistance to ground of the grounding system shall not exceed 25 ohms under normally dry conditions. Where the resistance obtained exceeds 25 ohms, contact the Contracting Officer for further instructions.

3.2 FIELD TESTS: The Contractor shall provide all test equipment and personnel and submit written copies of all test results.

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. Perform insulation resistance tests on all wiring No. 6 AWG and larger using an instrument which applies a voltage of approximately 500 volts to provide a direct reading of resistance; minimum resistance shall be 250,000 ohms.

3.2.3 Grounding System Test: Test the grounding system to assure continuity and that the resistance to ground is not excessive. Test each ground rod for resistance to ground before making any connections to the rod; then tie entire grounding system together and test for resistance to ground. Make resistance measurements in normally dry weather, not less than 48 hours after rainfall. Submit written results of each test to the Contracting Officer and indicate the location of the rods as well as the resistance and soil conditions at the time the measurements were made.

*** END OF SECTION ***

ATTACHMENT 2

STATE OF FLORIDA

DEPARTMENT OF ENVIRONMENTAL REGULATION

TWIN TOWERS OFFICE BUILDING
2600 BLAIR STONE ROAD
TALLAHASSEE, FLORIDA 32301-8241

BOB GRAHAM
GOVERNOR

VICTORIA J. TSCHINKEL
SECRETARY

September 13, 1983

Captain Donald B. Campbell
Acting Commanding Officer, CEC, USN
NAS Cecil Field, Florida 32215

Dear Captain Campbell:

The Bureau of Air Quality Management has received your application for a permit to construct a classified waste incinerator at the Naval Station Mayport, Duval County, Florida. Based on our initial review of your proposal, it has been determined that additional information is needed before we can process the application. The information required to complete the application is listed below:

SECTION II: GENERAL PROJECT INFORMATION

A. Project Description

Is any excess air introduced in the secondary chamber?
Does this incinerator operate on a batch feed basis or continuously?

SECTION III: AIR POLLUTION SOURCES & CONTROL DEVICES

Applicable information of this section should be completed.

C. Airborne Contaminants Emitted

What emission limits (lb/hr) are you proposing for particulate matter, sulfur dioxide, nitrogen oxides, carbon monoxide and hydrocarbons?

E. Fuels

What is the maximum heat input and consumption rate?
What is the percent sulfur in the oil?

SECTION V: SUPPLEMENTAL REQUIREMENTS

Please show derivation of emission estimates.

As soon as the requested information is received, we will resume processing your application. If you have any questions on this matter, please call Teresa Heron, review engineer, at (904)488-1344 or write to me at the above address.

Sincerely,

C. H. Fancy, P.E.
Deputy Chief
Bureau of Air Quality
Management

CHF/ks

ATTACHMENT 3

DEPARTMENT OF THE NAVY
SOUTHERN DIVISION
NAVAL FACILITIES ENGINEERING COMMAND
2144 MELBOURNE ST., P.O. BOX 10068
CHARLESTON, S. C. 29411
TEL. #803-743-5510

PLEASE ADDRESS REPLY TO THE COMMANDING OFFICER, NOT TO THE SIGNER OF THIS LETTER
REFER TO:
Code 1141

18 OCT 1983

DER
OCT 24 1983
BAQM

Mr. C. H. Fancy
Department of Environmental Regulation
Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, Florida 32301-8241

Subj: Classified Waste Incinerator Contract N62467-83-C-0015, Naval Station, Mayport, FL

Dear Mr. Fancy:

This letter is in answer to your 13 October 1983 letter concerning the subject project. The incinerator proposed will operate on a batch feed basis and has excess air introduction in the secondary chamber. The applicable parts of Section III of the application have been completed and are enclosed with the requested emission calculations. The information provided should allow you to complete your review process.

If there is any question concerning this submittal, please call Mr. G. M. Goldston at the above telephone number. We appreciate your timely review of this project.

Very truly yours,

D. R. Spell

D. R. SPELL, P.E.
Head Environmental Branch

Copy to:
NAVSTA Mayport

EMISSION CALCULATIONS

I. No. 2 Fuel Oil

A. Fuel Consumption Rate = $\frac{\text{Maximum Heat Input}}{\text{Heat Content}}$

$= \frac{4.875 \text{ MBTU/hr}}{.141 \text{ MBTU/gal}} = 34.6 \text{ gal/hr}$

Burn Rate $= \frac{575 \text{ lb/hr}}{2000 \text{ lb/ton}}$

$= 0.29 \text{ ton/hr}$

B.

Pollutant	Emission Factor (lb/ton)	Burn Rate (ton/hr)	Discharge (lb/hr)
Particulates	7	0.29	2.0
SO_2	2.5	0.29	0.7
CO	10	0.29	2.9
HC	3	0.29	0.9
NO_x	3	0.29	0.9

E. Requested permitted equipment operating time: hrs/day_____; days/wk_____; wks/yr_____;

if power plant, hrs/yr_____; if seasonal, describe:_____

_____

_____

_____

F. If this is a new source or major modification, answer the following questions. (Yes or No)

1. Is this source in a non-attainment area for a particular pollutant? _____

   a. If yes, has "offset" been applied? _____

   b. If yes, has "Lowest Achievable Emission Rate" been applied? _____

   c. If yes, list non-attainment pollutants. _____

2. Does best available control technology (BACT) apply to this source? If yes, see Section VI. _____

3. Does the State "Prevention of Significant Deterioration" (PSD) requirement apply to this source? If yes, see Sections VI and VII. _____

4. Do "Standards of Performance for New Stationary Sources" (NSPS) apply to this source? _____

5. Do "National Emission Standards for Hazardous Air Pollutants" (NESHAP) apply to this source? _____

H. Do "Reasonably Available Control Technology" (RACT) requirements apply to this source? _____

   a. If yes, for what pollutants?_____

   b. If yes, in addition to the information required in this form, any information requested in Rule 17-2.650 must be submitted.

Attach all supportive information related to any answer of "Yes". Attach any justification for any answer of "No" that might be considered questionable.

SECTION III: AIR POLLUTION SOURCES & CONTROL DEVICES (Other than Incinerators)

A. Raw Materials and Chemicals Used in your Process, if applicable: N/A

Description	Contaminants		Utilization Rate - lbs/hr	Relate to Flow Diagram
	Type	% Wt		

B. Process Rate, if applicable: (See Section V, Item 1)

1. Total Process Input Rate (lbs/hr): N/A

2. Product Weight (lbs/hr): N/A

C. Airborne Contaminants Emitted: (Information in this table must be submitted for each emission point, use additional sheets as necessary)

Name of Contaminant	Emission[1]		Allowed[2] Emission Rate per Rule 17-2	Allowable[3] Emission lbs/hr	Potential[4] Emission		Relate to Flow Diagram
	Maximum lbs/hr	Actual T/yr			lbs/yr	T/yr	
Particulates	2.0	2.9	Rule 17-2.600	Latest Tech.	2.0	2.9	N/A
SO_2	0.7	1.0	"	"	0.7	1.0	"
CO	2.9	4.2	"	"	2.9	4.2	"
HC	0.9	1.3	"	"	0.9	1.3	"
NOX	0.9	1.3	"	"	0.9	1.3	"

[1]See Section V, Item 2.

[2]Reference applicable emission standards and units (e.g. Rule 17-2.600(5)(b)2. Table II, E. (1) - 0.1 pounds per million BTU heat input)

[3]Calculated from operating rate and applicable standard.

[4]Emission, if source operated without control (See Section V, Item 3).

D. Control Devices: (See Section V, Item 4) N/A

Name and Type (Model & Serial No.)	Contaminant	Efficiency	Range of Particles Size Collected (in microns) (If applicable)	Basis for Efficiency (Section V Item 5)

E. Fuels

Type (Be Specific)	Consumption*		Maximum Heat Input (MMBTU/hr)
	avg/hr	max./hr	
No. 2 Fuel Oil	34.6	34.6	4.875

*Units: Natural Gas--MMCF/hr; Fuel Oils--gallons/hr; Coal, wood, refuse, other--lbs/hr.

Fuel Analysis:

Percent Sulfur: 0.3% Percent Ash: None

Density: 6.8 lbs/gal Typical Percent Nitrogen: None

Heat Capacity: 20,735 BTU/lb 141,000 BTU/gal

Other Fuel Contaminants (which may cause air pollution): None

F. If applicable, indicate the percent of fuel used for space heating. N/A

Annual Average _____ Maximum _____

G. Indicate liquid or solid wastes generated and method of disposal.

N/A

H. Emission Stack Geometry and Flow Characteristics (Provide data for each stack):

Stack Height: _____ ft. Stack Diameter: _____ ft.

Gas Flow Rate: _____ ACFM _____ DSCFM Gas Exit Temperature: _____ °F.

Water Vapor Content: _____ % Velocity: _____ FPS

SECTION IV: INCINERATOR INFORMATION

Type of Waste	Type 0 (Plastics)	Type I (Rubbish)	Type II (Refuse)	Type III (Garbage)	Type IV (Pathological)	Type V (Liq.& Gas By-prod.)	Type VI (Solid By-prod.)
Actual lb/hr Incinerated							
Uncontrolled (lbs/hr)							

Description of Waste _____

Total Weight Incinerated (lbs/hr) _____ Design Capacity (lbs/hr) _____

Approximate Number of Hours of Operation per day _____ day/wk _____ wks/yr. _____

Manufacturer _____

Date Constructed _____ Model No. _____

	Volume $(ft)^3$	Heat Release (BTU/hr)	Fuel		Temperature (°F)
			Type	BTU/hr	
Primary Chamber					
Secondary Chamber					

Stack Height: _____ ft. Stack Diamter: _____ Stack Temp. _____

Gas Flow Rate: _____ ACFM _____ DSCFM* Velocity: _____ FPS

*If 50 or more tons per day design capacity, submit the emissions rate in grains per standard cubic foot dry gas corrected to 50% excess air.

Type of pollution control device: [ ] Cyclone [ ] Wet Scrubber [ ] Afterburner

[ ] Other (specify) _____