

**NOTICE!**

**ALL DRAWINGS  
ARE LOCATED  
AT THE END OF  
THE DOCUMENT**

SPECIFICATIONS AND DRAWINGS  
FOR  
PHASE II CONSTRUCTION  
(BUILDING 891, UTILITIES AND TANK FOUNDATIONS)  
REMEDIAL ACTION, 881 HILLSIDE  
ROCKY FLATS PLANT  
GOLDEN, COLORADO

Prepared for  
ROCKWELL INTERNATIONAL  
AEROSPACE OPERATIONS  
ROCKY FLATS PLANT

DECEMBER 1989

Prepared by  
ENGINEERING-SCIENCE, INC.  
DENVER, COLORADO

In Conjunction with  
THE RALPH M. PARSONS COMPANY  
PASADENA, CALIFORNIA

ADMIN RECORD

REVIEWED FOR CLASSIFICATION/UCRU

By W. J. Pallas  
Date 9/10/89 (initials)

"REVIEWED FOR CLASSIFICATION

By ITB/cl-k  
Date 10/13/89

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SECTION 01100  
SPECIAL CONTRACT REQUIREMENTS

01101 LOCATION OF WORK

The work covered by this Contract will be performed at the Rocky Flats Plant, near Golden, Colorado. (See Location Map and Area Plot Plan in Division 01500.) This facility is one which is owned by the Government and operated on behalf of the DOE by Rockwell International.

01102 SCOPE OF WORK, PERFORMANCE OF WORK BY CONTRACTOR

This Contract covers the furnishing of all plant, labor, equipment, supplies, and materials and performing all work in strict accordance with the terms of the Contract.

The Contractor shall perform on the site and with his own organization work equivalent to at least 15 percent of the total dollar amount of work to be performed under the contract, not including the cost of materials. If during the progress of the work hereunder, the Contractor requests a reduction in such percentage and the Buyer determines that it would be to the Buyer's advantage, he may, in writing, authorize a reduction.

01103 CONTRACT DRAWINGS AND SPECIFICATIONS

The Contractor will be furnished, without charge, 10 sets of Specifications and half-sized Drawings, one full-size set of reproducible. The Drawings which constitute a part of the Contract Documents are as indexed at the end of these Specifications.

01104 ABBREVIATIONS

Abbreviations contained in various sections of the specifications refer to the following organizations, societies, associations, standards, publications, terms, etc.

AASHTO	American Association of State Highway and Transportation Officials.
ACI	American Concrete Institute.
AGA	American Gas Association.
AGMA	American Gear Manufacturers Association.
AIMA	Acoustical and Insulating Materials Association.
AISC	American Institute of Steel Construction, Inc.
AISI	American Iron and Steel Institute.
AMCA	Air Moving and Conditioning Association, Inc.
ANSI	American National Standards Institute.
APA	American Plywood Association.
API	American Petroleum Institute.
ASCE	American Society of Civil Engineers.

ASHRAE American Society of Heating, Refrigeration, and  
 Air Conditioning Engineers.  
 ASME American Society of Mechanical Engineers.  
 ASTM American Society for Testing and Materials.  
 AWI Architectural Woodwork Institute.  
 AWPB American Wood Preservers Bureau.  
 AWPI American Wood Preservers Institute.  
 AWS American Welding Society.  
 AWWA American Water Works Association.  
 CBM Certified Ballast Manufacturers.  
 CLFMI Chain Link Fencing Manufacturers Institute.  
 CRSI Concrete Reinforcing Steel Institute.  
 CS Commercial Standard, US Department of Commerce.  
 ETL Electrical Testing Laboratories.  
 Fed Spec Federal Specification.  
 HI Hydraulics Institute.  
 ICBO International Conference of Building Officials.  
 IEEE Institute of Electrical and Electronic Engineers.  
 IPCEA Insulated Power Cable Engineers Association.  
 MIL- Military Specification (leading symbol).  
 MSS Manufacturers Standardization Society of the Valve  
 and Fittings Industry.  
 NAPF National Association of Plastic Fabricators.  
 NEC National Electric Code.  
 NEMA National Electrical Manufacturers Association.  
 NFPA National Fire Protection Association.  
 NSF National Sanitation Foundation.  
 NWMA National Woodwork Manufacturers Association.  
 OFCI Owner-Furnished Contractor-Installed.  
 OFCR Owner-Furnished Contractor-Relocated.  
 OSHA Occupational Safety and Health Administration, U.S.  
 Department of Labor, as defined in the General  
 Conditions.  
 PCA Portland Cement Association.  
 PDI Plumbing and Drainage Institute.  
 PS Product Standard, U.S. Department of Commerce.  
 SDI Steel Deck Institute.  
 SJI Steel Joist Institute.  
 SMACNA Sheet Metal and Air-Conditioning Contractors.  
 National Association.  
 SPR Simplified Practice Recommendations, U.S. Department  
 of Commerce.  
 UBC Uniform Building Code.  
 UL Underwriters' Laboratories, Inc.  
 WCLIB West Coast Lumber Inspection Bureau.  
 WIC Woodwork Institute of California.  
 WHPA Western Wood Products Association.

01105 SECURITY MEASURES

- a. The Contractor shall furnish to the Buyer a letter listing all Contractor organizations; any deviations from the normal workday or workweek at the Rocky Flats Plant; The Contractor shall fill out a gate pass form (RF-34660) furnished by the Buyer for all Contractor and Subcontractor personnel requiring access to specified construction areas. Access will be granted for the period of performance of work. The Buyer shall be notified of the termination of employment of individuals submitted for access. The Buyer reserves the right to exclude from the worksite any employee as deemed appropriate. Access to the plant site will not be granted to persons who are not citizens of the United States of America.
1. When the duration of construction is 30 days or less, the Buyer shall issue each Contractor individual nonpicture security badges (passes) and parking permits for access to the plant. These badges and parking permits are accountable property of the U.S. Government and shall be returned to the designated gate at the end of each day.
  2. When the duration of construction is 30 days or more, the Buyer shall issue each Contractor individual picture security badges (passes) and parking permits for access to the plant. These badges and parking permits are accountable property of the U.S. Government and shall be returned upon the completion of the project.
  3. The failure of the Contractor to return all badges and parking permits could result in a delay of contract closing and the withholding of \$500 from the final payment for each missing badge and parking pass.
  4. The Buyer's Subcontract Administrator shall be notified immediately of any missing or lost badges and parking permits.
  5. The Buyer's Plant Protection Department will immediately report to the Buyer's Subcontractor Administrator any individual nonpicture security badge and parking permit not returned to the designated gate at the end of each day.
- b. The work under this contract will be performed in security areas and employees will be subject to security controls required by the DOE. Contractor employees who possess a DOE personnel security clearance will be permitted access to the security areas under special controls. The Contractor shall arrange for access with the Buyer.

- c. No uncleared Contractor personnel will be permitted within security areas without security escorts. These escorts will be furnished at no cost to the Contractor; however, a 24-hour advance notice of the Contractor's access requirements is necessary.
- d. The Contractor shall schedule his work so as to minimize the number of security escorts required.
- e. "Q" Access Authorization Requirements:  
  
Personnel with "Q" access authorization is required for inside the Building 881 area fence.
- f. For personnel requiring "Q" access authorization, the Buyer will furnish the necessary security forms (for the Contractor's personnel to complete) and all required investigations incidental to obtaining access authorizations, at no cost to the Contractor. Such action normally requires 150 to 180 calendar days. The Buyer reserves the right to limit the number of "Q" access authorizations to be processed by each craft or to require additional access authorizations if deemed necessary to properly prosecute the project.
- g. All persons receiving access authorizations will be subjected to lectures, badging, and miscellaneous administrative actions, estimated to take approximately 4 hours per man. All costs for the time involved as a result of these actions shall be borne by the Contractor, whether it involves more or less time than estimated above. All persons being terminated from "Q" access authorization work on this Contract, whether by reason of completion of assigned work or for other reasons, will be required to attend security lectures and sign affidavits regarding treatment of classified information which may have been accumulated while on the project. Termination procedures will require approximately 15 minutes per man. All costs for the time involved will be borne by the Contractor.
- h. If the Contractor cannot obtain sufficient personnel having "Q" access authorizations to complete work on this Contract, the Contractor may apply for an extension of the contract time to allow for the processing of the required access authorizations.
- i. Neither DOE's denial of a "Q" access authorization to the Contractor's employee, nor DOE's termination of a "Q" access authorization previously granted to such employee shall be the basis for an extension of the contract period or for an increase in the contract price.

- j. Security forms to obtain "Q" access authorizations for Contractor personnel shall be returned to the Buyer, filled out as required, within 7 days after Notice to Proceed. Failure to return properly completed forms, within the time limit, may be cause for termination of contract.

01106 HEALTH SCIENCES MEASURES

- a. Portions of the work under this contract will be performed in areas subject to Rocky Flats Health, Safety & Environment rules and regulations as specified below.

All persons requiring access to these areas will be subjected to lectures and administrative actions which are estimated to take approximately 16 hours per man. All costs for the time involved as a result of these actions shall be born by the Contractor, whether it involves more or less time than that estimated above.

- b. Reimbursement for Equipment Retained by the Buyer:

1. Tools and equipment shall be monitored prior to being removed from construction areas.
2. Any tools or equipment which are determined by the Buyer to be unsuitable for future use after having been monitored by the Buyer's Radiation Monitoring personnel will be retained by and disposition made by the Buyer.
3. Reasonable compensation will be made for any tools or equipment which are retained by the Buyer. The Contractor shall immediately notify the Buyer in writing of the value which he places on the tools and/or equipment and the basis for such valuation.

- c. Specific Requirements:

1. Protective clothing required for Contractor's nonworking supervisory personnel entering areas for short periods will be shoe covers, respirators, safety glasses, smocks, and dosimetry badges.
2. All persons required to wear protective clothing will be required to take a shower at the close of each work day in shower facilities provided by the Buyer. Towels and lockers will be furnished by the Buyer.
3. Food, beverages, and tobacco are not permitted in the construction areas of this project.

4. Radiation Monitoring coverage will be provided by the Buyer on an as-required basis, except that a full-time radiation monitor will be present during all excavation, demolition or removal operations.
5. The Buyer will furnish lockable waste boxes to the construction site for the disposal of materials that are determined to emit radionuclides. The Contractor shall place materials so designated in these boxes. Waste boxes will be kept locked and stored inside buildings.
6. No pregnant females shall be permitted in radiation controlled areas.
7. A continuously recording anemometer, with high level audible alarm and warning light set at 30 mph, will be required during excavation activities.

#### 01107 PLAN OF OPERATIONS

There will be no stipulated sequence of construction. The Contractor shall arrange his schedule such that, when work is started, work will proceed promptly and vigorously to completion. The Buyer may require the Contractor to show satisfactory proof that materials, equipment, workers, etc., are or will be available as required to complete the work without undue delay. Normal working hours for Contractor shall be 8:00 a.m. to 4:30 p.m. unless otherwise noted.

#### 01108 HEALTH AND SAFETY

In addition to the requirements of Special Provisions No. 3 and GP-56, the following safety items will be emphasized and enforced:

- a. Ladders:
  1. No three-legged ladders will be allowed.
  2. No wooden ladders will be allowed in any building.
  3. Aluminum ladders will not be allowed for work in areas where there is electrical power equipment.
  4. Industrial fiberglass ladders will be allowed.
- b. All contractors shall comply with NFPA 241 (Safeguarding Building Construction and Demolition Operations).
- c. All workmen will be required to wear hard hats. All visitors to posted construction areas will be required to wear hard hats.
- d. All compaction performed with vibratory equipment will be performed by workmen wearing approved foot protection devices.

- e. All Contractor personnel will wear shirts, long pants, and shoes on the plant site.
- f. A lift device known as the "Xtraman Hoist" or any lifting devices where, by design, the operator or any other person is used as the ballast or counterweight of the device is not to be used on construction projects at the Rocky Flats Plant.
- g. Smoking restriction shall be as posted.
- h. Safety meetings shall be held weekly.

01109 MEDICAL RADIOISOTOPE PROCEDURES ON CONTRACTOR PERSONNEL

All persons engaged in construction at the Rocky Flats Plant are required to report any diagnostic or therapeutic treatment with radioisotopes to the Buyer. Personnel should report prior to treatment, if possible, or immediately after such treatment when they return to work.

01110 MONTHLY EMPLOYMENT UTILIZATION REPORT

Contractors using crafts subject to Part I of the Colorado Statewide Plan and/or subject to mandatory goals and ranges of Part II should submit Form CC-257 (Monthly Employment Utilization Report) no later than the 20th day of each month to:

Denver Area Office Director  
OFCCP/ESA  
2500 Curtis Street - Suite 100  
Denver, CO 80205

01111 ROOF PROTECTION

Personnel requiring access to the roofs of various buildings shall comply with the following requirements:

- a. Temporary walkways will be installed to and around any work areas.
- b. Material will not be set on the roof surface unless suitable protection is provided for the roof surface.
- c. All scrap and excess material must be removed daily when the work or exercise is complete.

01112 PRIVATELY OWNED RADIO PAGERS

Security regulations do not allow the use of privately owned radio pagers at the Rocky Flats Plant except in areas designated as "controlled," such as the warehouse, maintenance shops, garage, etc. Pagers must also be left in privately owned vehicles when entering any area that is not a "controlled" area.

01113 HOLIDAY WORK CURTAILMENT

During the holiday periods covering the days from December 25, 1989, through January 1, 1990, Construction Contractor activities will be suspended. Subcontractors shall plan their work accordingly. Access to the plant site during these time periods will be by special arrangement with the Buyer only.

01114 USE OF FIRE RETARDENT MATERIALS

The Contractor shall use fire retardent materials in construction which are specified in applicable divisions of Technical Provisions.

END OF SECTION

SECTION 01300  
SUBMITTALS

01301 GENERAL (Refer to GP-59)

- a. Descriptive submittals shall be made for all items of equipment set forth in the tables at the end of this section or such other items as may be identified during the design phase of the Contract. Submittals marked with an asterisk must be in reproducible form, the same size and scale as the Contract drawings, or as directed. The Contractor shall submit eight complete sets for each submittal item, except fire equipment items which will require ten complete sets.
- b. Omissions of items from the submittal table does not relieve the Contractor from the responsibility for submitting vendor data for any other applicable items that would normally require such submittals. The most closely related item listed will govern the type of submittals required.
- c. If required, samples and descriptive data shall be submitted, within the time specified in these specifications, or if no time is specified, within a reasonable time before use to permit inspection and testing; and shall be delivered as specified in these specifications and shall be properly marked to show the name of the material, trade name of manufacturer, place of origin, name and location of work where the material represented by the sample is to be used, and name of Contractor submitting the sample. Samples not subject to destructive tests may be retained until completion of the work, but thereafter will be returned to the Contractor, if he so requested in writing, at his own expense. Failure of any samples to pass the specified requirements will be sufficient cause for refusal to consider further any samples from the same manufacturer whose materials failed to pass the tests.
- d. Catalogs for submittal shall have unrelated pages removed with capacities and specified parameters relating to the item or items clearly marked.
- e. All items which form a system or subsystem that must be reviewed simultaneously because of coordination requirements shall be submitted concurrently.
- f. The Contractor shall also furnish the Buyer with five copies of instruction books covering handling, storage, installation, operation, maintenance, and spare parts provisioning for any equipment being furnished under this contract. These instruction books will be required 30 days prior to shipment of the equipment.
- g. If the Contractor fails to submit for approval the required data within the specified time, the Buyer will select a complete line of materials and/or equipment. If the Contractor submits for

inclusion in the work materials and/or equipment not in accordance with the specifications, the Buyer will have the right to reject them and select a full line of materials and/or equipment. The selection made by the Buyer will be final and binding, and the items shall be furnished and installed by the Contractor without change in the contract price.

- h. All submittals shall be corrected to Buyer requirements prior to the completion of the project and turned over to the Buyer.
- i. Each submittal of drawings and data by the Contractor shall be accompanied by a letter of transmittal giving list of numbers, titles of drawings, status (Revision Number and Date), action to be taken, and five properly executed copies of the Drawing Transmittal Form attached hereto.

Address to: Rockwell International  
Aerospace Operations  
Rocky Flats Plant, Building 130  
P. O. Box 464  
Golden, Colorado 80401-0464

- j. Contractor shall further supplement the transmittal letter, if necessary, with other needed data clarifications. All prints, reproducibles, and material submitted shall be stamped with the transmittal number. The Buyer will furnish blank copies of drawing transmittal forms for use by the Contractor.

#### 01302 REVIEW OF SUBMITTALS

- a. After receiving submittals, the Buyer will promptly examine the drawings and/or data only for general arrangement, general dimensions, and suitability and will approve them or return them with comments. This approval shall not relieve the Contractor of his responsibility for sufficiency of detail, design, or correctness of detailed dimensions.
- b. Approval of descriptive submittals will not relieve the Contractor of the responsibility for correcting any errors which may exist or for meeting requirements of the specifications. No partial submittals will be accepted.
- c. The Buyer will return reviewed submittal data to the Contractor within ten working days after receipt of each submittal. The Contractor shall schedule sufficient time in the procurement process for such review.
- d. Within 10 days of receipt of returned submittals with comments, the Contractor shall revise and resubmit for approval in the same quantity and in like manner stated above.

## LEGEND

- a. Shop Drawings
- b. Catalog Data
- c. Equipment List
- d. Material List
- e. Elementary Diagrams and Wiring Diagrams
- f. Installation Instructions
- g. Maintenance Instructions
- h. Operating Instructions
- i. Samples, Colors
- j. Certifications
- k. Performance Curves
- l. Design Data
- m. Recommended Spare Parts Lists
- n. Computations
- o. Theory of Operation
- p. Demolition Procedure

## SUBMITTAL TABLE

Waste Handling Plan (see Section 01702, Paragraph C).

- e. The Contractor shall submit all forms, data, information, certificates, schedules, etc., as required in other sections of the specifications. Omission of an item from the above tabulation does not relieve the Contractor from the responsibility for submitting the item required.
- f. Complete submittals are required for all items of equipment or materials submitted for "as-equal" consideration. If the Contractor submits a letter stating that he is installing the exact material, equipment, or model number called out in the specifications, no submittal is required.



SECTION 01500

TEMPORARY FACILITIES, CONTROLS,  
AND SPECIAL PROJECT REQUIREMENTS

01501 FIRE PROTECTION SYSTEMS

Fire protection systems are not included in Phase II Construction. Fire extinguishers shall be provided as required in Section 13121. The Contractor shall be responsible for fire protection for his own vehicles, facilities, and equipment.

01502 TEMPORARY FIELD OFFICE

The Contractor will not be required to furnish and maintain field office facilities for the Buyer; however, he shall provide for his own field office requirements if needed.

When a Contractor provides a temporary office or storage facility that is either a trailer or a portable building, a "Contractor Yard/Trailer Use Permit", see pages 01500-4 and 01500-5, must be completed and submitted to the Construction Management Inspection Manager for approval and issue.

A trailer or portable building will be located near the construction site at a location designated by the Buyer, and must be secured in accordance with the Standard for Trailer Anchorage on page 01500-6.

01503 GOVERNMENT-FURNISHED PROPERTY (Refer to GP-62)

- a. The Buyer or the Government will furnish to the Contractor, as free issue, the following property to be incorporated or installed in the work or used in its performance:

<u>Item No.</u>	<u>Quantity</u>	<u>Description</u>
T201, T202, T203, T204	4	Influent Storage Tanks
T205, T206, T207	3	Effluent Storage Tanks
Building 891	1	Pre-Engineered Building

- b. Such property will be furnished on or before initiation of construction.
- c. Such property will be furnished at Rocky Flats Plant.

01504 AVAILABILITY OF UTILITIES AND SERVICES  
(Refer to Special Provision No. 7 and GP-79)

- a. Water and electricity to complete construction of this contract work will be made available to the Contractor within 100 ft of the jobsite for work within existing buildings. For exterior

work, water and electricity will be made available at the nearest building or where designated by the Buyer.

- b. The Buyer's Construction Management Department shall designate the parking area for the personal cars of the Contractor's employees. These cars must remain parked at the designated area throughout the working day. Only the Contractor's working vehicles will be permitted to be driven on the plantsite except before starting time and after quitting time.
- c. For interior work, Construction personnel can use toilet facilities adjacent to the work areas. For exterior work, the Contractor shall furnish toilet facilities for his personnel.
- d. All 120-V, single-phase, 15-A and 20-A receptacle outlets, serving tools, or equipment being used outside of buildings shall be equipped with ground-fault circuit interrupters. Such interrupters shall be furnished by the Contractor. This requirement will be strictly enforced.

01505 TESTING (Refer to Special Provision No. 9)

- a. If it is provided in the technical sections that a test is to be performed at Buyer expense, costs of any such test which reveals that the contract requirements have not been met will be paid by the Contractor and not the Buyer.
- b. The Contractor shall cooperate with the Buyer and any testing organization selected by the Buyer in the preparation for the performance of any test to be conducted by the Buyer or any testing organization selected by the Buyer.
- c. Tests of Pressure Vessels
  1. Prior to installation and acceptance by the Buyer, any power boiler, low-pressure heating boiler, or unfired pressure vessel that is included within the scope of the ASME Boiler and Pressure Vessel Code, operated at pressures of 15 psi or greater, furnished under this contract, will be stamped with ASME Boiler and Pressure Vessel Code Symbol and a National Board of Boiler and Pressure Vessel Code Symbol and a National Board of Boiler and Pressure Vessel Inspector's number, thus certifying that all necessary tests have been performed. Manufacturer's data reports (unless exempted by the ASME Code) will be filed with the National Board in Columbus, Ohio.

Five copies of these data reports and National Board certificate shall be submitted to the Buyer.

2. Process waste storage tanks shall be tested and certified by ASME for 15 psig service.

3. Any boilers or pressure vessels operated at pressures stated above, utilized by the Contractor in his performance of the work, will be similarly tested and certified before being brought on the project and annually thereafter so long as they are used on the project site.
- d. If it is provided in the technical specifications that the Contractor is to perform field radiography of welds, the following shall apply:
  1. All field radiography shall be performed by a radiographer who is licensed by the Department of Health, State of Colorado.
  2. Prior to starting such work, the Contractor shall present to the Buyer for his approval written procedures regarding:
    - (a) The handling and use of the radioactive source on the plant site, and
    - (b) The operational methods to be followed in performing the field radiography.

#### 01506 WORK PERMITS

At least 24 hours prior to the start of any excavation or welding, the Contractor shall request the appropriate work permit from the Buyer. These permits are issued as a matter of course. For excavations involving installation of buried utilities, including electrical and alarm systems, metallic-coated plastic detector tape will be issued as GFE to the Contractor to be installed approximately 12 inches directly above the buried utility or as directed by the Buyer.

#### 01507 UTILITY OUTAGES

The Contractor shall furnish the Buyer 48 hours advance notice of any planned utility outage.

#### 01508 LIGHTNING PROTECTION

New lightning protection systems shall be completed and in service (approved) prior to the time when the building or protected item is 85% complete as evidenced by the Contractor's approved schedule and the Contractor's request for payment.

ROCKY FLATS  
CONTRACTOR YARD/TRAILER USE PERMIT

DATE: \_\_\_/\_\_\_/\_\_\_ (SEE BELOW)

CONTRACTOR: \_\_\_\_\_ SUPERVISOR: \_\_\_\_\_

ADDRESS: \_\_\_\_\_ PHONE: \_\_\_\_\_

PROJECT: \_\_\_\_\_ AREA/BLDG: \_\_\_\_\_

CONTRACT NO.: \_\_\_\_\_ AUTHORIZATION NO.: \_\_\_\_\_

CONTRACT PERIOD: (FROM) \_\_\_\_\_ (TO) \_\_\_\_\_

TRAILER USED FOR: \_\_\_\_\_

TYPE OF MATERIAL STORED: \_\_\_\_\_

FLAMMABLES (?): \_\_\_\_\_

CONTRACTORS MUST COMPLY WITH ALL RULES PERTAINING TO THE USE OF THE CONTRACTOR'S OFFICE/STORAGE FACILITIES AT ROCKY FLATS. CONSTRUCTION MANAGEMENT PERSONNEL WILL CONDUCT WEEKLY INSPECTIONS OF THE AREA TO INSURE CONTRACTOR COMPLIANCE. VIOLATIONS OF THE RULES CAN RESULT IN EVICTION.

ROCKWELL MAY DISPOSE OF ANY CONTRACTOR EQUIPMENT/MATERIALS REMAINING ON PLANT-SITE MORE THAN TEN DAYS AFTER COMPLETION OF THE CONTRACT.

THIS PERMIT IS VALID FOR THE DURATION OF THE CONTRACT - NOT TO EXCEED ONE YEAR. REISSUANCE OF THE PERMIT IS THE RESPONSIBILITY OF THE CONTRACTOR.

\_\_\_\_\_  
CONTRACTOR REPRESENTATIVE

\_\_\_\_\_  
CONSTRUCTION COORDINATOR

\_\_\_\_\_  
FIRE DEPARTMENT

\_\_\_\_\_  
CONSTRUCTION MANAGEMENT MANAGER

\_\_\_\_\_  
HS&E

(Permit must be enclosed in a waterproof plastic envelope, and securely attached to the outside entrance to the trailer. A separate permit is required for each trailer.)

RULES PERTAINING TO CONTRACTOR'S YARD

1. PERMIT MUST BE DISPLAYED ON OUTSIDE OF TRAILER
2. TRAILER MUST BE TIED DOWN ACCORDING TO ROCKWELL STANDARD
3. ONLY ROCKWELL MATERIALS CAN BE STORED
4. TRAILER TIE-DOWNS MUST BE CLOSE TO THE GROUND - NO DIRT OR CONCRETE PILES
5. FUEL STORAGE TANKS MUST BE KEPT SAFE AND APPROVED BY FIRE DEPARTMENT
6. STAIRS MUST BE KEPT SAFE AND TIED DOWN
7. NO HAZARDOUS MATERIALS (OTHER THAN FUEL) ARE TO BE STORED/USED/DISPOSED OF
8. DAMAGED ROADWAYS ARE TO BE REPAIRED
9. PALLETS, EMPTY BOXES, ETC. MUST BE DISPOSED OF
10. NO MATERIALS ARE TO BE STORED DIRECTLY ON THE GROUND
11. ALL MATERIALS ARE TO BE STACKED NEATLY AND TIED DOWN IF SUSCEPTIBLE TO WIND
12. TARPS ARE NOT ACCEPTABLE DURING HIGH WIND PERIODS
13. LONG TERM USE MATERIALS MUST BE WAREHOUSED OR STORED IN A TRAILER
14. NO LOOSE PLASTIC, SHEET METAL, PLYWOOD, ETC. IS ALLOWED
15. ON COMPLETION OF THE CONTRACT, REMOVE CONCRETE BLOCKING, WIRES, CABLES, ETC.
16. THE GENERAL APPEARANCE OF THE AREA AT ALL TIMES MUST BE GOOD.

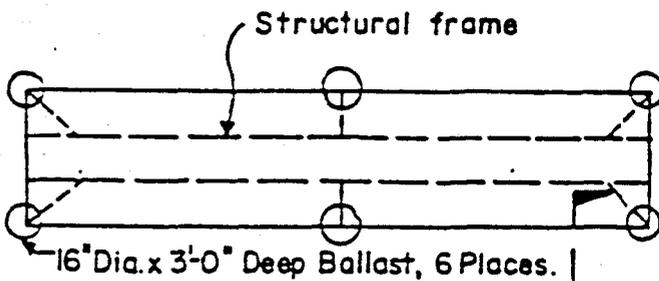
STANDARD FOR TRAILER ANCHORAGE

Trailers will have the following minimum anchorage measures taken to insure stability during high winds.

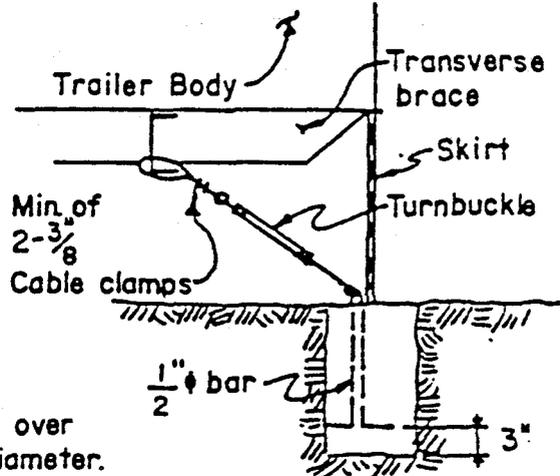
1. Long direction of trailer located in an east-west direction.
2. Located immediately east of an existing structure.
3. Base of trailer blocked up with 8"x 8"x16" concrete blocks to the working elevation and tied down per sketch. Blocks will be placed at each tiedown point shown on the sketch.

"If for any reason measures 1 thru 3 cannot be followed, further analysis will be required by Engineering & Construction."

4. The Building Supt will be responsible for inspection of Trailer blocking and tiedown integrity a minimum of twice a year, with assistance from Safety if required.
5. When the usual internal walls are going to be removed, in order to provide an open work space, a check with Engineering must be made to determine the need for additional internal bracing.



PLAN  
NO SCALE



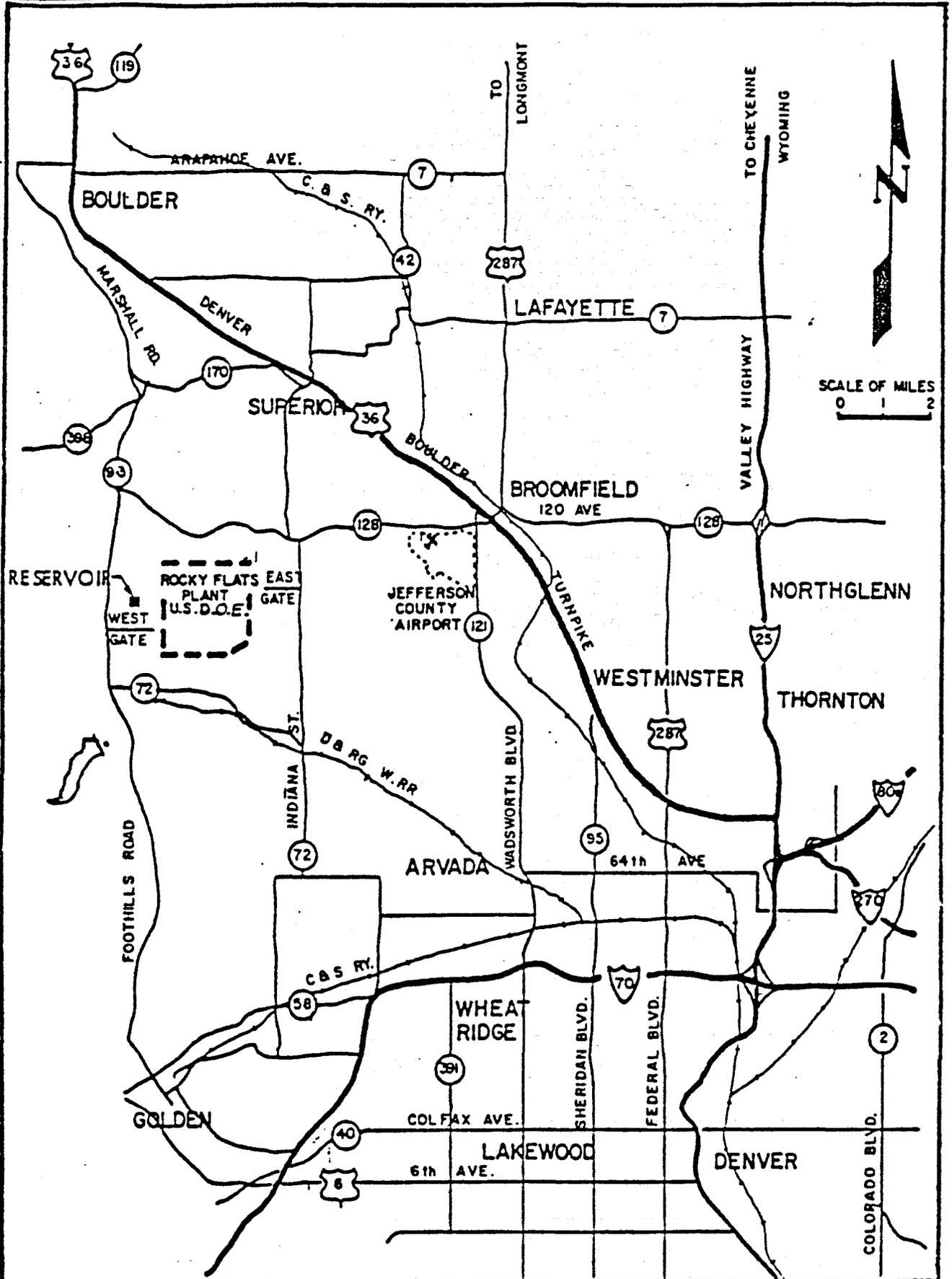
SECTION "A"  
NO SCALE

- ① Loop  $\frac{3}{8}$ " Wire rope thru 1" holes in frame or over frame then loop thru turnbuckle of same diameter.
- ② Turnbuckle fastened to  $\frac{1}{2}$ "  $\phi$  Anchor embedded in 16" dia. x 3'-0" deep concrete ballast 6 places.
- ③ Locate all holes and or loops within 4" of transverse member.

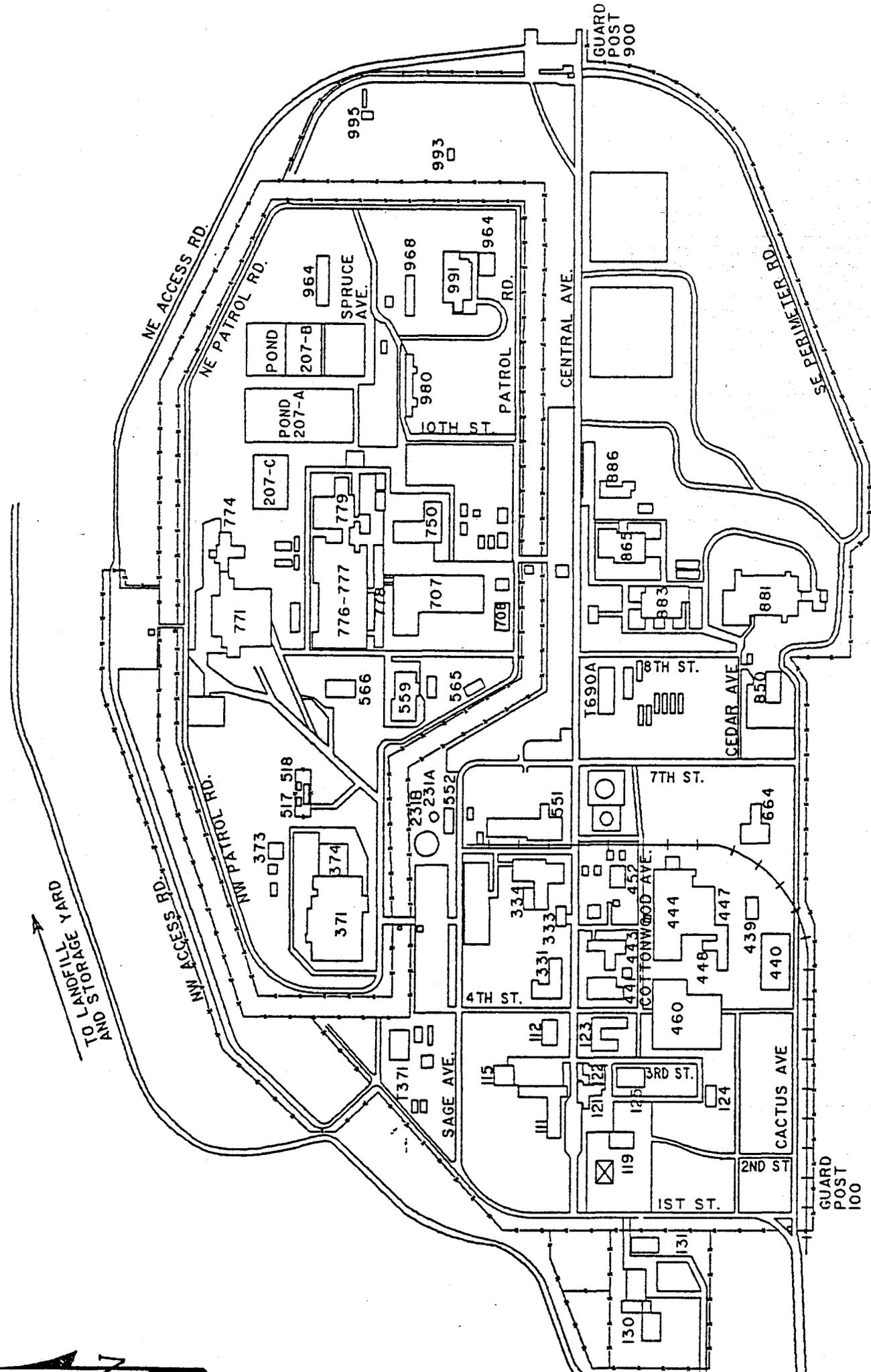
ROCKY FLATS PLANT STD

A	ORIGINAL ISSUE	WGL	2-20-73	WGL	11917	1-3	
Issue	Description	Appr'd.	Appr'd.	Date	By	Appr'd.	Class.
STANDARD FOR: TRAILER ANCHORAGE		SAFETY Design Engr. Dept.					
		ROCKWELL INTERNATIONAL ATOMICS INTERNATIONAL DIVISION ERDA CONTRACT E 129-21-3633					
		ROCKY FLATS PLANT			GOLDEN, COLORADO 80401		
SIZE	DRAWING NUMBER	ISSUE	SHEET				
A	23854-1	A	1 of 1				

ROCKY FLATS PLANT LOCATION MAP



DATE - 1/28/81	ROCKY FLATS PLANT LOCATION MAP		
SCALE - GRAPHIC			



# ROCKY FLATS AREA PLOT PLAN

R. MISC. R.L. RF. AREA PLOT PLAN 5/89

SECTION 01610  
MATERIAL HANDLING AND WASTE DISPOSAL

01611 WASTE DEFINITIONS

Construction projects deal with four types of waste as defined below:

- a. Off-Site Sanitary Waste -- Routine, non-radioactive, non-hazardous waste acceptable to public landfills. Such wastes include paper, waste cardboard, plastic, metal, wood, glass, garbage (food waste), sand, gravel, concrete, masonry products, and miscellaneous construction debris. Waste materials noted in this paragraph and generated from the buildings identified in the Approved Building List at the end of this Section, shall be considered Off-site Sanitary Waste.
- b. On-site Sanitary Waste -- Waste materials described as in paragraph (1.) above, except coming from buildings and areas of the plant not identified in the Approved Building List. Excess excavated materials, asphalt street paving, and waste generated from the exterior of all buildings (even those on the Approved Building List) shall be handled as on-site sanitary waste. Asbestos disposal must be handled as detailed in other sections of the Technical Provisions.
- c. Hazardous Waste -- Those waste materials exhibiting a hazardous characteristic (ignitible, corrosivity, reactivity, or toxicity) or are listed in Colorado Hazardous Waste Regulations 5-CCR-1007-3. Examples of hazardous wastes include paint thinners, Freon, Trichoroethene, epoxy and enamel paints.
- d. Contaminated Waste -- Those waste materials that contain or are contaminated with radioactive materials.
- e. Mixed Waste -- Those waste materials containing both hazardous and contaminated materials.
- f. Empty Containers -- Those containers that have met the conditions set forth in 6-CCR-1007-3, 261-7, Colorado Hazardous Waste Regulations, and are therefore not considered hazardous wastes even though they may have contained hazardous or toxic materials at one time. Empty containers shall only be disposed at the Rocky Flats on-site landfill.

01612 GENERAL REQUIREMENTS

- a. The Contractor shall closely adhere to the following procedures to assure that all waste generated during construction will be properly dispositioned and disposed.
- b. A preconstruction conference will be held with the Contractor immediately after award of the contract. In addition to the standard review of procedural items, waste handling procedures will be reviewed with the Contractor.

- c. Submittals -- The Contractor will be required to submit a Waste Handling Plan for approval by the Buyer before starting construction. This plan will identify the types, location and approximate volume of the different kinds of waste that will be generated, on-site storage locations, permanent disposal sites to be used, and a listing of subcontractors/vendors who will haul or dispose of waste materials.
- d. The Contractor shall use returnable containers and packages for all materials and supplies delivered to the jobsite whenever possible. The Contractor shall limit, as much as possible, the amount of waste accumulated during construction.
- e. All material and equipment being removed from buildings or exterior building sites, except those identified in the Approved Building List at the end of this Section, shall be monitored by Radiation Monitoring before being removed from the area.
- f. The Contractor shall, at all times, keep the work area clean and orderly. All debris, scrap, and rubble shall be removed from the work area as they are created. At the end of each work shift, the work area shall be swept clean and left in a neat and orderly manner. Access routes for other personnel must be kept clear at all times.
- g. Installed equipment and materials removed by the Contractor under this contract, and not authorized to be reused in the work, shall remain the property of the Buyer. All such equipment and material shall be properly identified and delivered to the Buyer as directed by the Buyer. The Contractor shall use care in removing salvageable materials and equipment so as not to cause undue damage that may render the equipment or materials unusable.

#### 01613 WASTE DISPOSAL SITES

- a. Waste disposal is approved for several locations, depending on the nature and type of the waste material. These sites are:
  - 1. BFI Waste Systems Landfill -- This site is located three miles south of plant site on Highway 93. All materials approved as Off-site Sanitary Waste shall be transported and dumped at this landfill. The Contractor shall provide for all transportation; however, all dumping fees will be paid by the Buyer under an existing landfill contract with Rockwell International. Dumping fees shall not be included or reimbursed as part of the construction contract proposal.
  - 2. Rocky Flats On-site Landfill -- This site is located one mile north of Guard Post 100. The Contractor shall provide for all transportation to this site. No fees are required. Waste materials approved for this site include waste that comes from buildings or areas that are not included on the Approved Building List, but have been monitored by Radiation Monitoring as being non-contaminated, including:

- Excess excavated material.
  - Asbestos (see technical sections 02080 if applicable).
  - Removed roofing materials containing or mixed with asbestos.
  - Broken asphalt.
  - Empty containers
- b. The Rocky Flats On-site Landfill will be open Monday through Friday from 7:45 a.m. to 11 a.m. and 12:30 p.m. to 2 p.m. Clean dirt and broken asphalt may be dumped until 3:30 p.m.
  - c. Other dumping areas for waste materials may not be used unless written permission is obtained from the Buyer for disposal at other sites.
  - d. Concrete truck washout will be permitted at the Rocky Flats Landfill as noted on the Area Plot Plan, in a location designated by the Buyer.

01614 SANITARY WASTE DISPOSAL FROM APPROVED BUILDINGS

This subsection identifies the handling of construction rubble and waste that are considered suitable for disposal at the BFI Waste Systems Landfill. Only waste generated from buildings identified in the Approved Building List at the end of this section shall be considered as Off-site Sanitary Waste.

- a. The Construction Coordinator will maintain a separate log for each project that identifies each load transported. When a load is ready for offsite transport to the BFI Waste Systems Landfill, the Construction Coordinator will take a sequentially numbered copy of the Master Return Order to the Traffic Department who will then prepare a Bill of Lading authorizing shipment. The Contractor shall allow one hour after the waste is loaded in the transport vehicle for the preparation of documentation authorizing off-site shipment of sanitary waste.
- b. The Contractor will take the Bill of Lading to the Shipping Department in Building 130. The Contractor will sign the Bill of Lading at the time and will retain the Security copy.
- c. Plant Security personnel will stop each transport vehicle, as it exists Guard Post 8; and will retain the Security copy of the Bill of Lading for each load before allowing the vehicle to continue on to the BFI Waste Landfill.

- d. Off-site Sanitary Waste does not require monitoring by Radiation Monitoring. All other types of waste must be monitored.
- e. All waste material delivered to the Contracted Off-site Sanitary Landfill will be disposed in accordance with the terms of that contract.
- f. All loads taken off-site must be fully secured and covered. Any additional dumping fees resulting from improper loading and handling shall be paid for by the Contractor.
- g. All waste dumpsters furnished by the Contractor shall be locked at all times when not in use. The Contractor shall designate a custodian for each dumpster who is responsible for the collection, control and surveillance of waste deposited in the dumpster.

01615 WASTE SEGREGATION, CONTROLLED RELEASE AREAS

All areas of the plant, other than those identified in the Approved Building List, have the potential to contain multiple types of waste, including on-site sanitary and contaminated waste. This subsection deals with the segregation and disposal of waste from these areas.

The following steps govern the disposition, segregation and disposal of waste as it is generated:

- a. The Construction Coordinator will arrange for a site survey by Radiation Monitoring before any demolition or excavation activities begin. This survey will identify potential waste types and identify construction procedures required for other than sanitary type waste.
- b. The Construction Coordinator will monitor the Contractor's compliance with his approved plan as well as compliance with all applicable Rocky Flats waste procedures. The Construction Coordinator will assist the Contractor in the identification of waste types, in particular contaminated versus on-site sanitary waste. Any radiation Monitoring support or other Rockwell involvement will be requested and coordinated by the Construction Coordinator.
- c. All waste will be segregated and monitored by Radiation Monitoring as it is generated and before loading for transport to a permanent disposal site. The Construction Coordinator will arrange for final monitoring by Radiation Monitoring of each loaded transport vehicle.
- d. On-site sanitary waste shall be hauled to the Rocky Flats On-site Landfill.
- e. The site survey conducted by Radiation Monitoring will identify low level radioactive and contaminated waste. The Construction Coordinator will also provide direction for the segregation of

hazardous wastes. If improper segregation does occur, or mixing of waste types is identified, segregation of on-site sanitary waste will be attempted. If this is not possible, the identified waste load will be handled as the appropriate waste type. Under no circumstances will contaminated or hazardous waste be shipped off-site as sanitary waste.

- f. Contaminated waste shall be deposited in waste boxes provided by the Buyer. Disposal of such boxes shall be the responsibility of the Buyer.

01617 HANDLING AND DISPOSAL OF HAZARDOUS WASTE

- a. Before bringing a hazardous material to Rocky Flats, a Contractor must notify Industrial Hygiene and Hazardous Material Control through the Construction Coordinator. If a Material Safety Data Sheet (MSDS) for the material is not in Hazardous Materials Control's master file, the Contractor must provide a copy thereof.
- b. The use of the chlorinated solvents 1.1.1 - Trichloroethane (TRIC or Chlorethene VG) and Freon-TF (Genesolv) as cleaners and degreasers has been discontinued at Rocky Flats as of October 1, 1988. There are nonhazardous substitutes available including Alum Oakite NST Cleaner (as a 5% solution in water) and "De-Solv-it". Contact the Rocky Flats Construction Coordinator for the use and disposal of these substitutes or other substitute cleaners and degreasers proposed by the Contractor.

APPROVED BUILDING LIST  
(Revision 2)

331A	020	443
	060	549
T112A	061	551
T121A		
T334B	100	552
T371A	111	553
T371C	112	554
T371D	113	555
T371F	114	556
T371G	115	558
T441A	119	661
T442A	120	662
T452A	121	
T452B	124	675
T452C	127	900
T452D	128	920
T452E	129	931
T452G	130	987
T690A	131	988
T690B	250	993
T690C	333	995
T690D	335	
T690E	428	
T690F	429	
T690G		
T690H		
T690M		

## SECTION 02200--EARTHWORK

### PART I: GENERAL

1.1 APPROVAL: Prior to starting any excavations, an approved excavation permit and written permission shall be obtained from the Buyer.

#### 1.2 PROTECTION AND SAFETY

##### A. Traffic Control

1. Keep all roads, sidewalks, and parking areas that are not part of this project usable at all times.
2. The Buyer shall provide all necessary barricades, lights, signals, etc., for the protection of the workers and the public, as established by the Occupational Safety and Health Administration (OSHA) Construction Safety and Health Regulation 29 CFR, Part 1926, Subpart G, Signs, Signals, and Barricades.

##### B. Excavations, Trenching, and Shoring

1. All excavations, trenching, and shoring shall comply with the rules and regulations as established by OSHA Construction Safety and Health Regulations 29 CFR, Part 1926, Subpart P, Excavation, Trenching, and Shoring.
2. OSHA Pamphlet 2226, Excavation and Trenching Operations, can be used as an additional aid.

#### 1.3 EXISTING UTILITIES

- A. Notify the Buyer immediately when existing utilities are encountered during excavation.
- B. Obtain approval from the Buyer before backfilling existing utilities.

### PART II: PRODUCTS

#### 2.1 EXCAVATED MATERIAL

- A. Material to be excavated is assumed to be earth and other materials that can be removed with a power shovel.
- B. If rock is encountered within the limits of excavation, notify the Buyer immediately and do not proceed except as instructed.

#### 2.2 FILL MATERIALS

- A. Fill material for structures and utility trenches shall be granular soils free of organic matter.

- B. Sand fill shall pass a 20-mesh and be retained on a 200-mesh U.S. Standard sieve and shall be free of organic material, trash, and debris.
- C. Class I Structural Fill--Suitable excavated material containing no stones having a diameter greater than 3 in.
- D. Class II Structural Fill--Suitable excavated material containing no stone having a diameter greater than 6 in.
- E. Sewer Line Embedment Material--This material shall consist of angular 1/4- to 1 1/2-in. graded stone (ASTM D2321).
- F. Water, Gas, and Underground Conduit Embedment Material--This material shall be sand fill.
- G. Frozen materials shall not be used for fill.
- H. All suitable material removed from the excavation shall be used in forming fills. No excavated material shall be wasted without approval of the Buyer.
- I. Fill for storage areas and roads shall consist of overburden and bedrock materials, including broken asphalt pavement, obtained from excavated areas.

2.3 WARNING TAPE: Furnished by Buyer and installed by Contractor.

### PART III: EXECUTION

#### 3.1 GENERAL

- A. The worksite and areas shown on the drawings shall be cleared of all natural obstructions and existing foundations, pavements, utility lines, and other items that will interfere with the construction operations, as approved by the Buyer.
- B. Proper allowances shall be made for form construction, waterproofing, shoring, and inspection. Where walls or footings are authorized to be deposited directly against excavated surfaces, the surfaces shall be sharp, clean, and true. Bottoms of excavations for footings, piers, grade beams, etc., shall be level, clean, and clear of loose materials.
- C. Trenching for utility systems shall be of sufficient width for proper laying of pipe and conduit. The trench banks shall be as nearly vertical as is practical. Undercutting will not be permitted. Trenches shall be of sufficient depth to provide not less than the minimum cover shown on the drawings or 3 ft.
- D. Protect bottoms of all excavations from free-standing water and frost. Do not place foundations, footings, grade beams, or slabs on wet or frozen ground.

- E. Suitable excavated material that is required for fill under slabs shall be separately stockpiled as directed by the Buyer.

### 3.2 OVEREXCAVATION

- A. All unstable materials encountered below the established elevation of the excavation that will not provide a firm foundation for subsequent work shall be removed as directed.
- B. Where the excavation is directed to be made below the established elevations, the excavation, if under slabs, shall be restored to the proper elevation in accordance with the procedure specified for backfilling, or if under footings, the depth of the walls or footing shall be increased as may be directed by the Buyer.
- C. Excavations carried below the depths indicated WITHOUT SPECIFIC DIRECTION shall be returned to the proper elevation in accordance with the procedure specified for backfilling, except that in wall or footing excavations, the concrete shall be extended to the bottom of the excavation.

### 3.3 BACKFILLING

- A. Prior to backfilling, remove all forms and clean excavations of all trash and debris.
- B. Trenches for piping, conduits, or other underground utilities shall be backfilled to a minimum of 6 in. over the top of the pipe, conduit, cable, etc., with sand fill unless otherwise detailed on the drawings.
- C. Fill shall be placed in horizontal layers not in excess of 6 in. in thickness and shall have a moisture content such that the required degree of compaction may be obtained. Each layer shall be compacted by hand or machine tampers or by other suitable equipment to 90% of maximum density as determined by the Modified Proctor Testing Method.
- D. Install Buyer-furnished orange warning tape 12 in. above any underground utilities.
- E. Spreading Fill Material
  - 1. Completed fill shall correspond to the contours shown on the drawings.
  - 2. Place fill materials in successive layers of loose materials not more than 6 in. deep.
  - 3. Uniformly spread each layer using a road machine or other approved device.
  - 4. Compact each layer of fill thoroughly using an approved roller to obtain 90% maximum density, as determined by the Modified Proctor Testing Method.

3.5 SUBGRADE PREPARATION FOR ROADS: Roadbeds not requiring fill shall be prepared as follows:

A. Subgrade Preparation

1. Rough grade the roadbed to the approximate final shape of subgrade required.
2. Scarify the roadbed to a minimum depth of 6 in., and thoroughly cultivate until the material is finely divided.
3. Alternately water and recultivate the subgrade material to obtain the optimum moisture content required for compaction. Minimum depth of moistened subgrade shall be 6 in.

B. Shaping

1. Shape subgrade to a true cross section sufficiently higher than the specified grade to allow for compaction.
2. Rough grading shall be done in a manner that will not leave ridges of material that will interfere with immediate drainage of water from the subgrade.
3. During shaping and compacting, any high spots or depressions that develop in the subgrade shall be scarified, cut down, or back-filled and compacted as specified below.

C. Wetting and Compacting

1. Furnish sufficient watering equipment to ensure proper moisture content of all materials being placed.
2. Sprinkle each course of material in a manner that will avoid areas of dry material alternated by areas of saturated soil or pools of water.

3.4 PLACEMENT OF FILL ABOVE GRADE

A. Preparation of Ground Surface

1. Where fill is placed over existing pavement or compacted gravel, scarify and compact the existing surface before placing fills.
2. Uniformly moisten areas to receive fill and compact to minimum 90% of maximum density as determined by the Modified Proctor Testing Method.
3. Immediately following wetting, uniformly compact the material by rolling to obtain 90% maximum density as determined by the Modified Proctor Testing Method.

### 3.6 COMPACTION

- A. Except as otherwise specified, moisture/density relationships shall be as determined by American Society for Testing and Materials (ASTM) D1557, and the degree of field compaction shall be controlled with ASTM D1556 or ASTM D2922. All tests will be taken by the Government.
- B. The Government will pay for any test for soil compaction that passes the requirements of the specifications, but the Contractor shall pay for any soil tests that indicate the soil compaction does not meet requirements of the specifications.

### 3.7 GRADING

- A. Uniformly smooth grade all areas covered by the project, including excavated and backfilled sections, and adjacent transition areas. The degree of finish shall be that ordinarily obtainable from either blade graded or scraper operations.
- B. The finish surface shall be not more than 0.15 ft above or below the established grade or approved cross section.
- C. All drainage swales shall be finished so as to drain readily.

### 3.8 DISPOSAL OF DEBRIS AND EXCESS MATERIAL

- A. Rubble and debris not suitable for fill shall be transported to a sanitary landfill 1 mile northeast of Access Gate 8.
- B. Excess material from excavation, unsuitable for or not required for backfilling, shall be wasted, spread, and leveled or graded as directed by the Buyer within 1 mile of the site.

END OF SECTION

## SECTION 02551--SANITARY SEWERS

### PART I: GENERAL

#### 1.1 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 02200, Earthwork

### PART II: PRODUCTS

#### 2.1 POLYVINYL CHLORIDE SEWER PIPE AND FITTINGS

- A. Pipe--American Society for Testing and Materials (ASTM) 3034, wall thickness SDR 35.
- B. Fittings--ASTM 3034, wall thickness SDR 35.

#### 2.2 ELASTOMERIC SEALS (gaskets) FOR JOINING PLASTIC PIPE: ASTM F477

#### 2.3 CAST IRON FITTINGS: American Water Works Association (AWWA) C110

#### 2.4 PRECAST REINFORCED CONCRETE MANHOLE SECTIONS: ASTM 478

#### 2.5 MANHOLE RINGS AND COVERS: MacClear, O.S. Denver

#### 2.6 MANHOLE JOINT SEALER: Ram-Nek

#### 2.7 WARNING TAPE: Furnished by Buyer and installed by Contractor.

### PART III: EXECUTION

#### 3.1 LAYING PIPE AND INSTALLING FITTINGS

- A. The Contractor shall provide the necessary mason's lines and supports to ensure installation of the pipe to the lines and grades shown on the plans. Facilities for lowering the pipe into the trench shall be such that neither the pipe nor the trench will be damaged or disturbed.
- B. The Buyer shall inspect all pipe and fittings before they are installed and reject any piece that is damaged by handling or defective to a degree that will materially affect the function and service of the pipe.
- C. The Contractor shall take adequate measures to prevent the intrusion of foreign materials of any kind into the pipe or fittings. At the end of each day's work, the Contractor shall adequately plug any open ends of installed pipe and fittings in order to prevent the intrusion of foreign materials.

- D. The pipe shall be firmly and accurately set to line and grade so that the invert will be smooth and uniform. Spaces for pipe bells shall be dug in the subgrade to accommodate the bells. These spaces shall be deep enough to ensure that the bells do not bear the load of the pipe. After installation, the barrel of each pipe section shall be in contact with the bedding for its full length, exclusive of the bell.
- E. Pipe shall not be installed on frozen, soft, or spongy subgrade material. Pipe shall not be installed in standing water. The Contractor shall furnish all necessary equipment and labor to properly dewater the trench, as the need arises, at the Contractor's cost.
- F. Pipe that is not reasonably true in alignment or grade or that shows any settlement after laying shall be taken up and relaid without extra compensation to the Contractor.
- G. Pipe and fittings shall be joined in accordance with accepted industry practice. The end of the barrel and the inside of the bell shall be clean prior to joining. The gasket shall be lubricated in accordance with the manufacturer's recommendations, placed in the bell, and the spigot shall be inserted in the bell to full depth. Nuts and bolts on mechanical joints shall be torqued in accordance with manufacturer's instructions.

3.2 INSTALLING PRECAST CONCRETE MANHOLES: Precast manholes shall be installed in accordance with ASTM C891.

END OF SECTION

SECTION 02552--NATURAL GAS LINES

PART I: GENERAL

1.1 RELATED WORK SPECIFIED ELSEWHERE

A. Section 02200, Earthwork

1.2 SAFETY STANDARDS: Materials installation procedures, and testing procedures shall conform to Part 192, Transportation of Natural Gas and Other Gas by Pipeline, Minimum Federal Safety Standards.

PART II: PRODUCTS

2.1 POLYETHYLENE GAS PRESSURE PIPE AND FITTINGS

A. Pipe--American Society for Testing and Materials (ASTM) D2513-78ES, PE2306, SDR 11.

B. Fittings--Insert-type polyethylene fusion fittings for SDR-11.0 polyethylene pipe, ASTM D3197.

2.2 BLACK IRON FITTINGS AND PIPE

A. Reducing Fittings--Threadolet

B. Nipples--Schedule 40, ASTM A-120

C. Pipe--Schedule 40, ASTM A-120

2.3 VALVES: Bronze plug cock, 200 lb, with square head, suitable for natural gas.

2.4 TRANSITION: Threaded steel pipe bonded to polyethylene pipe.

2.5 PIPE JOINT COMPOUND: Teflon tape.

2.6 PIPE WRAPPING TAPE: Polyken, cold applied.

2.7 WRAPPING PRIMER: Polyken, for cold-applied tape.

2.8 CURB BOX: Buffalo-type, Mueller No. H-10346 complete. Furnish shutoff rod and hexagon key.

2.9 LOCATER: No. 14 stranded copper, insulated.

2.10 WARNING TAPE: Furnished by Buyer and installed by Contractor.

## PART III: EXECUTION

### 3.1 TIE-IN

- A. Remove wrapping and coating from existing natural gas line. Clean pipe and prepare for welding. Tap into pipe and weld Threadolet in place. Install nipple and plug valve. Clean weld area and nipple as required, coat with Polyken primer, and wrap with Polyken tape.
- B. Welding procedures must conform to API 1104 and Section IX of ASME Boiler and Pressure Vessel Code. Pipe-line welders must be qualified according to these standards.

3.2 POLYETHYLENE PIPE INSTALLATION: Pipe must be bedded in and covered on all sides by sand a minimum of 3 in. thick. Pipe shall be placed at a minimum depth of 30 in. Pipe and fittings shall be joined using the Socket Fusion Technique of ASTM Standard D2657-67 (reapproved 1977).

3.3 TESTING: Unless otherwise indicated in this specification, pressure testing shall be in accordance with Part 192, Transportation of Natural Gas and Other Gas By Pipeline, Minimum Federal Safety Standards. The test pressure must be at least 150% of the maximum operating pressure of 50 psig, whichever is greater. However, the maximum test pressure may not be more than three times the design pressure of the pipe. The temperature of the thermoplastic material must not be more than 100°F during the test. The new gas line shall be tested a minimum of 15 min for each 100 ft of pipe length.

3.4 LOCATER WIRE INSTALLATION: After placing sand over pipe, lay copper locater above gas line. Wire must be continuous. Strip 6 in. of insulation from each end of wire, and terminate bare ends in soil at ends of gas line.

3.5 TRENCH BACKFILL: Use granular backfill material free of stones greater than 2 in. maximum dimension. Place backfill material in 6-in. lifts, and compact to 90% maximum density at optimum moisture content for the material.

3.6 WARNING TAPE: Place warning tape in trench as backfilling operation proceeds. Tape shall be a maximum of 12 in. below finish ground surface.

END OF SECTION

## SECTION 02553--WATER LINES

### PART I: GENERAL

#### 1.1 RELATED WORK SPECIFIED ELSEWHERE

A. Section 02200, Earthwork

### PART II: PRODUCTS

- 2.1 PIPE: American National Standards Institute/American Water Works Association (ANSI/AWWA) C151 with inside and outside bituminous coating, bell and spigot push-on-type joints. Pipe wall thickness shall be .29 in.
- 2.2 PIPE FITTINGS: ANSI/AWWA C110 with inside and outside bituminous coating.
- 2.3 VALVES: Mechanical joint, iron body, bronze mounted, nonrising stem. Clow No. F5707.
- 2.4 VALVE INDICATOR POST: Lock-type. Clow No. 5707.
- 2.5 SEALS (gaskets) FOR JOINING PIPE AND FITTINGS: ANSI/AWWA C111.
- 2.6 GASKET LUBRICANT: As recommended by pipe manufacturer.

### PART III: EXECUTION

#### 3.1 LAYING PIPE AND INSTALLING FITTINGS

- A. The Contractor shall provide the necessary mason's lines and supports to ensure installation of the pipe to the lines and grades shown on the plans. Facilities for lowering the pipe into the trench shall be such that neither the pipe nor the trench will be damaged or disturbed.
- B. The Buyer shall inspect all pipe and fittings before they are installed and reject any piece that is damaged by handling or defective to a degree which will materially affect the function and service of the pipe.
- C. The Contractor shall take adequate measures to prevent the intrusion of foreign materials of any kind into the pipe or fittings. At the end of each day's work, the Contractor shall adequately plug any open ends of installed pipe and fittings in order to prevent the intrusion of foreign materials.
- D. The pipe shall be firmly and accurately set to line and grade so that the invert will be smooth and uniform. Spaces for pipe bells shall

be dug in the subgrade to accommodate the bells. These spaces shall be deep enough to ensure that the bells do not bear the load of the pipe. After installation, the barrel of each pipe section shall be in contact with the bedding for its full length, exclusive of the bell.

- E. Pipe shall not be installed on frozen, soft, or spongy subgrade material. Pipe shall not be installed in standing water. The Contractor shall furnish all necessary equipment and labor to properly dewater the trench, as the need arises, at the Contractor's costs.
- F. Pipe that is not reasonably true in alignment or grade or that shows any settlement after laying shall be taken up and relaid without extra compensation to the Contractor.
- G. Pipe and fittings shall be joined in accordance with accepted industry practice. The end of the barrel and the inside of the bell shall be clean prior to joining. The gasket shall be lubricated in accordance to the manufacturer's recommendations, placed in the bell, and the spigot shall be inserted in the bell to full depth. Nuts and bolts on mechanical joints shall be torqued in accordance with manufacturer's instructions.

3.2 PRESSURE AND LEAKAGE TESTS: From 10-in. main in Fourth Street to 6-in. gate valve, testing pressure shall be that pressure existing in 10-in. line after water is reintroduced into the 10-in. line. The trench shall be backfilled to the minimum depth required to perform a pressure test under nonopen trench conditions prior to commencing the test. The trench shall be observed for obvious leaks for a period of 30 min.

### 3.3 TESTING AND DISINFECTION

- A. 1. From 10-in. main in Fourth Street to 6-in. gate valve, testing line to which the new 4-in. line is connected. The trench shall be backfilled to the minimum depth required to perform a pressure test under nonopen trench conditions prior to commencing the test. Water shall be introduced into the new pipe line, and the trench shall be observed for obvious leaks for a period of 30 min. Test pressure will be approximately 40 psig.
- 2. This test will be the minimum acceptable and will not relieve the Contractor of any responsibility for the integrity of the pipeline.
- 3. The Contractor shall furnish all necessary labor, tools, equipment, gages, and parts of whatever nature required to properly perform the pressure test and shall make all repairs and corrections necessary to furnish a water line in conformance with this specification at the Contractor's cost.

- B. DISINFECTION: The new water lines shall be disinfected in a manner that will satisfy Jefferson County Health Department requirements. Notify Industrial Hygiene 24 hr in advance of the beginning of sterilization and of the beginning of sterilization and of the subsequent flushing.

END OF SECTION

## SECTION 03100--CONCRETE FORMWORK

### PART I: GENERAL

#### 1.1 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 03200, Concrete Reinforcement
- B. Section 03350, Concrete

1.2 APPROVALS: All concrete formwork complete and in place shall be approved by the Buyer before concrete is placed.

### PART II: PRODUCTS

#### 2.1 FORMS

- A. Forms for all surfaces shall be made of surfaced lumber, plywood, or material that will provide a surface at least equal to surfaced lumber or plywood.
- B. Forms for all exposed surfaces shall be constructed of plywood or an approved equal. Plywood for forms shall be of the grade Exterior B-B (concrete form) conforming to the latest Product Standard for Soft Plywood, Construction and Industrial, of the National Bureau of Standards.
- C. Plywood panels shall be not less than 5/8 in. thick.
- D. Plywood less than 5/8 in. thick otherwise conforming to the requirements specified herein may be used with a continuous backing of 3/4-in. sheeting.
- E. Metal forms shall be approved by the Buyer.

#### 2.2 MISCELLANEOUS MATERIALS

- A. Form Coating--A colorless mineral oil similar to Horn's form film.
- B. Form ties shall be adjustable in length and be so constructed that no metal will be within 1 in. of finished surfaces after form removal. Wire ties shall not be used where the concrete will be exposed to weathering or to view.

### PART III: EXECUTION

3.1 DESIGN REQUIREMENTS: Formwork shall be designed and erected by the Contractor in accordance with the American Concrete Institute (ACI) Recommended Practice for Concrete Formwork (ACI Standard 347) and in accordance with the following:

- 1) Forms shall conform to the shape, lines, and dimensions of members as called for on the drawings and shall be substantial, free from surface defects, and sufficiently tight to prevent leakage of concrete.
  - 2) Forms shall be properly braced or tied together to maintain position and shape under load.
  - 3) Joints shall be leakproof and arranged vertically.
  - 4) Lumber previously used in forms shall have nails withdrawn, and surfaces to be exposed to concrete shall be cleaned before reuse.
  - 5) Forms shall be so placed as to be readily removable without hammering or prying against the concrete.
- 3.2 CORNER FORMS: All vertical and horizontal corners to be exposed when forms are removed shall have a 3/4- X 3/4-in. minimum chamfer unless indicated otherwise on the drawings.
- 3.3 COATING
- A. Apply two coatings of form oil to forms before placing concrete.
  - B. After application, remove surplus oil from forms, and before placing concrete, remove all oil from reinforcing steel.
- 3.4 REMOVAL OF FORMS AND FALSE WORK
- A. Leave false work and forms in place under structural slabs, beams, and girders for 14 days after the day of the last pour except:
    - 1) When high early strength cement is used, forms for all structures may be removed after 2 days.
    - 2) In cold weather, this length of time shall be determined by the Buyer utilizing test cylinders cured under jobsite conditions.
  - B. Remove all other forms in not less than 12 hr.
- 3.5 FILLING HOLES: Holes remaining from bolts or form ties or rods shall be filled solid with cement mortar. All excess mortar at face of filled holes shall be struck-off flush.

END OF SECTION

SECTION 03200

CONCRETE REINFORCEMENT

PART I: GENERAL

1.1 RELATED WORK SPECIFIED ELSEWHERE:

- A. Section 03100: Concrete Formwork
- B. Section 03300: Cast-in-Place Concrete

1.2 DELIVERY AND HANDLING:

- A. Deliver steel reinforcement in an undamaged condition, and store away from drainage ways and vehicular traffic.
- B. Handle reinforcement in a manner that will avoid bending or permanent deforming of the bars.

PART II: PRODUCTS

2.1 MATERIALS:

- A. Reinforcement Bars: Conform to American Society for Testing and Materials (ASTM) A-615, Grade 40.
- B. Mesh Reinforcement: Conform to ASTM A-185.

PART III: EXECUTION

3.1 DESIGN: Reinforcing details shown on the Drawings shall govern the furnishing, fabrication, and placing of reinforcement. Construction shall conform to the following requirements:

- A. Quantities and placement of reinforcement shall be in accordance with American Concrete Institute Standard 318 and the Manual of Standard Practice of the Concrete Reinforcing Steel Institute.
- B. Splices:
  - 1. Splices of bars shall be made only where shown on the plans or as approved by the Buyer. Where bars are spliced they shall be lapped at least 30 bar diameters unless otherwise shown on the Drawings.
  - 2. Splicing shall be accomplished by placing the bars in contact with each other and wiring them together.
  - 3. Welding of reinforcing steel will not be permitted unless specifically authorized by the Buyer.

### 3.2 PLACING OF REINFORCEMENT:

- A. Before placing, thoroughly clean all reinforcement of rust, dirt, mill scale or coatings, and other material which would reduce the bond.
- B. Reinforcement appreciably reduced in section shall not be used.
- C. Following any substantial delay in the work, previously placed reinforcement left for future bonding shall be inspected and cleaned.
- D. Do not bend or straighten reinforcement in a manner that will injure the material.
- E. Heating of reinforcement for bending or straightening will not be permitted.
- F. Torch cutting of reinforcing steel will not be permitted.
- G. Reinforcement shall be accurately placed and securely tied at all intersections and splices with 16-gage black annealed wire and shall be securely held in position during the placing of concrete by spacers, chairs, and approved supports.

END OF SECTION

SECTION 03300

CAST-IN-PLACE CONCRETE

PART I: GENERAL

1.1 RELATED WORK SPECIFIED ELSEWHERE:

- A. Section 03100: Concrete Formwork
- B. Section 03200: Concrete Reinforcement

1.2 APPROVALS:

- A. Obtain written approval from the Buyer before placing concrete.
- B. Obtain approval from the Buyer for each individual pour or structure.

1.3 DESIGN CRITERIA:

- A. The design of the concrete mix, that is, the exact proportion of cement, aggregates, additives, and water, shall be the responsibility of the Contractor.
- B. The proposed mix shall be submitted for approval 10 working days prior to placing concrete.

1.4 ENVIRONMENTAL REQUIREMENTS:

- A. Temperature: Do not place concrete unless the atmospheric temperature in the shade is above 40 degrees F and rising (except as noted below).
- B. Weather: Do not place concrete in rainy weather.
- C. Cold Weather Concreting:
  - 1. Obtain permission from Buyer before doing any cold weather concreting.
  - 2. Perform concrete work in accordance with American Concrete Institute (ACI) Standard 306 when the mean daily temperature is 40 degrees F or there is a danger of the temperature falling below 32 degrees F.

## PART II: PRODUCTS

### 2.1 MATERIALS:

#### A. Cement:

1. Portland Cement: Conform to American Society for Testing and Materials (ASTM) C150, Type I, unless specifically noted otherwise on the drawings.
2. Air-Entraining Portland Cement: Conform to ASTM C150, Type IA or IIA, low alkali.
3. High Early Strength Portland Cement: Conform to ASTM C150, Type III.

#### B. Aggregate:

1. Aggregate for Regular-Weight Concrete: Conform to ASTM C33.
2. Aggregate for Lightweight Concrete: Conform to ASTM C330.
3. Coarse aggregate shall be 3/4- to 1-1/2-in. maximum size.

#### C. Water: Clean and potable.

#### D. Admixtures:

1. Air Entraining: Conform to ASTM C260.
2. Obtain approval for use of admixtures (except air entraining). No calcium chloride shall be used.

#### E. Expansion Joint Material:

1. For vertical application, use self-expanding cork or sponge rubber conforming to ASTM D1752.
2. For horizontal application, use nonextruding asphalt-impregnated fiber material conforming to ASTM D1751.

#### F. Curing Materials:

1. Water-Proof Paper: Conform to ASTM C171, Type I or Type II.
2. Polyethylene Sheeting: Minimum 4 mils thick, white color.
3. Curing Compound: Conform to ASTM C309, Type 2, having a white-pigmented base.

G. Waterstops: Waterstops shall be extruded from an elastomeric polyvinylchloride compound which contains the necessary plasticizers, resins, stabilizer, and other materials necessary to meet the performance requirements of this specification. No reclaimed or scrap PVC shall be used. Unless shown otherwise on the Drawings, waterstops at expansion and movement joint shall be 3/8 inch (10 mm) thick by 9 inch (22.8 cm) wide with serrated ends and a 3/4 inch (19 mm) I.D. centerbulb. Unless shown otherwise on Drawings, waterstops at construction joints shall be 3/8 inch (10 mm) thick by 9 inch (22.8 cm) wide with serrated ends, centerbulb not required. All waterstop intersections (ells, tees, crosses etc.) shall be fabricated by the manufacturer and these shall have 2 foot (61 cm) long legs to facilitate field butt splicing.

1. Waterstops' joints shall conform to Drawings.
2. Before waterstop material is installed in any structure, current test reports and written certificates must be submitted to the Buyer indicating that all waterstops meet the physical property requirements outlined in the current U. S. Army Corps of Engineers Specification CRD-C-572.
3. All in-place water stop installations including locations and joints shall be approved by Buyer prior to placement of concrete.

H. Bond Breakers: Bond breakers shall be polyethylene tape or equal as recommended by sealant manufacturer to prevent adherence of sealant to back-up material.

## 2.2 PROPORTIONING OF CONCRETE:

- A. Concrete shall be proportioned in accordance with ACI Standard 211.1 to attain the required design strength.
- B. Air entrainment shall be used in concrete for all structures that will be exposed to freezing and thawing including subsurface within frostline.
- C. The concrete shall have a slump appropriate for the selected work. Slump shall not be less than 1 in. nor greater than 4 in. except as authorized by the Buyer.
- D. Concrete shall be designed to develop the minimum compressive strength as shown on the Drawings. When the compressive strength is not indicated on the Drawings, it shall be a minimum of 4,000 PSI at 28 days.

### 2.3 MIXING OF CONCRETE:

- A. Concrete shall be mixed in accordance with ACI Standards 318 and 304.
- B. Transit-mixed concrete shall be mixed and delivered in accordance with ACI Standard 304.
- C. When necessary for proper control of concrete, mixing of transit-mixed concrete shall be done at site of concrete placement.

### PART III: EXECUTION

#### 3.1 PREPARATION FOR PLACING CONCRETE:

- A. Remove water and mud from excavation.
- B. Remove hardened concrete, wood chips, ice, and other debris from the interior of forms.
- C. Oil or wet forms just prior to placing concrete.
- D. Notify other crafts so they may deliver anchors for other work. Obtain their assistance in setting anchors if required.
- E. Moisten absorptive foundations against which concrete will be placed.

#### 3.2 PLACING CONCRETE:

- A. Concrete shall be placed in accordance with ACI Standards 318 and 304.
- B. Concrete shall be placed in forms within 60 min. from the time of introduction of cement and water.
- C. Do not retemper concrete.
- D. Deposit concrete as close as practicable to its final position. Do not drop concrete more than 3 ft.
- E. Place concrete in continuous horizontal layers; the depth of each layer shall not exceed 12 in.

#### 3.3 MECHANICAL AGITATION:

- A. Immediately after depositing, compact the concrete by means of mechanical vibrators in accordance with ACI standards. Slabs may instead be compacted by means of grid tampers when approved by the Buyer.

- B. Vibrator shall be flexible electric type or approved compressed-air type.
- C. Do not place vibrator against reinforcing or forms or use vibrator to transport concrete within forms.

#### 3.4 FINISHING HARDENED CONCRETE:

- A. Smooth Finish: Give smooth finish to all exterior concrete surfaces, except slabs, that will be exposed to view.
  - 1. Thoroughly wet and then brush coat surfaces with cement grout (one part Portland cement to two parts fine aggregate mixed with water to consistency of thick paint).
  - 2. Spread grout with sponge or wood float to fill all pits and surface irregularities.
  - 3. Scrape off excess grout and rub surface with burlap to remove visible grout film.
  - 4. In hot weather, keep grout damp by means of fog spray during the setting period.
- B. Rubbed Finish: Give rubbed finish to interior concrete surfaces, except slabs, that will be exposed to view.
  - 1. Give smooth finish as specified above, then rub with carborundum stones and water.
  - 2. Do not use mortar or grout during rubbing.
  - 3. Remove excess mortar that is worked up during rubbing.

#### 3.5 FINISHING FRESH CONCRETE:

- A. Monolithic Slab Finish: Give monolithic finish to interior floor slabs.
  - 1. Compact fresh concrete and screed to required elevation.
  - 2. Float to a true, even plane with no coarse aggregate visible.
  - 3. After surface moisture has disappeared, steel trowel floor slab to a smooth, even finish, free from trowel marks.
- B. Broomed Finish: Give broomed finish to all trading surfaces of docks, walks, and steps exterior to the building.

1. Give monolithic finish as specified above, except immediately after steel troweling brush surface with a stiff bristle brush.
  2. Brush in parallel strokes at right angles to the normal flow of traffic.
- C. Slab Flatness Tolerances: Finished cast-in-place slabs shall not vary more than 1/8 in. from a 10-ft. straightedge.
- D. No water shall be added to finished surface.
- 3.6 CURING: Protect concrete against loss of moisture for at least 7 days by using one of the following methods for the surfaces indicated:
- A. Vertical Surfaces and Under Surfaces of Beams and Elevated Slabs:
1. Moist cure with forms in place for the full curing period, or
  2. Cover with wet burlap, or
  3. Fog spray.
- B. Slabs Ongrade and Floor Slabs:
1. Cover with water-proof curing paper or polyethylene sheet, lapped 4 in. at joints and sealed with tape or
  2. Cover with burlap or cotton mats and keep such covering continuously wet or
  3. Apply curing compound in a two-coat continuous operation using a minimum of 1 gal. per 200 ft<sup>2</sup> for each coat. Apply second coat at right angles to direction of first coat.
- C. Exterior Walks, Docks, and Stairs:
1. Apply curing compound in a two-coat continuous operation using a minimum of 1 gal. per 200 ft<sup>2</sup> for each coat. Apply second coat at right angles to direction of first coat or
  2. Use method indicated in paragraph A above.
  3. Do not use curing compound on concrete surface to which future concrete will be bonded.

3.7 PATCHING:

- A. Immediately after removal of forms, remove all fins and loose material.
- B. Chip out to solid concrete all honeycomb, aggregate pockets, and voids over 3/4 in. in diameter.
- C. Fill chipped holes with epoxy mortar or neat cement grout. Finish holes flush to adjacent surfaces.
- D. Damp cure patchwork for 72 hr.

3.8 FIELD QUALITY CONTROL:

- A. Sample-Taking:
  - 1. Preparation of concrete samples and testing of such samples shall be the responsibility of the Buyer.
  - 2. The Contractor shall provide assistance in obtaining concrete samples.
  - 3. The buyer may take three test cylinders from each placement of 50 yd<sup>3</sup> or fraction thereof.
- B. Compression Tests:
  - 1. Test cylinders shall be made in accordance with ASTM C31 and tested in accordance with ASTM C39.
  - 2. One cylinder will be tested at 7 days, one at 28 days, and one retained as a spare.
- C. Slump Tests: Slump of concrete shall be determined at point of discharge from the mixer in accordance with ASTM C143.

END OF SECTION

## SECTION 03600--GROUT

### PART I: GENERAL

- 1.1 DELIVERY AND STORAGE: Store all nonshrink grouting materials in undamaged condition with seals and labels intact as packaged by the manufacturer.

### PART II: PRODUCTS

#### 2.1 GROUT

- A. Composition shall be one part Portland cement and three parts sand.
- B. Add water to create a stiff mixture.
- C. Minimum compressive strength shall be 1,500 psi at 28 days.
- D. Discard grout not placed after 1 1/2 hr.

### PART III: EXECUTION

#### 3.1 GROUTING

- A. Pack grout tightly around pipe or conduit in penetrations through masonry or concrete walls.
- B. Smooth exposed surfaces of grout to blend with adjacent surfaces.

END OF SECTION

## SECTION 03601--NONSHRINK GROUT

### PART I: GENERAL

- 1.1 RELATED WORK SPECIFIED ELSEWHERE: Structural steel, base plates, anchoring devices, and leveling shims: Section 05500.
- 1.2 DELIVERY AND STORAGE: Store all nonshrink grouting materials in undamaged condition with seals and labels intact as packaged by the manufacturer.

### PART II: PRODUCTS

#### 2.1 MATERIALS

- A. Nonshrink grout for setting column bases, anchor bolts, equipment, and other items shown on the drawings shall be one of the following types:
  1. EMBECO (premix): As manufactured by Master Builders Company.
  2. Ceilcote 648: As manufactured by The Ceilcote Company, Inc.
- B. Adhesive for Ceilcote Grout--Ceilcote 348 Adhesive Fast Set as manufactured by The Ceilcote Company, Inc.
- C. Portland Cement--Conform to American Society for Testing Materials (ASTM) C150, Type I.
- D. Sand--Conform to ASTM C33, Fine Aggregate.
- E. Pea Gravel--Conform to ASTM C33, Coarse Aggregate, graded so that at least 90% passes 3/8-in. sieve and 90% is retained by a No. 4 sieve.

#### 2.2 MIXES

- A. EMBECO Grout
  1. For less than 2-in. clearances or where size or shape of space makes grouting difficult, use standard EMBECO grout and water.
  2. For greater than 2-in. clearances where coarse aggregate will not obstruct free passage of the grout, use EMBECO grout with 3/8-in. aggregate (premixed).
  3. Use the minimum amount of water necessary to produce a flowable grout without causing either segregation or bleeding. After the grout has been mixed, do not add more water for any reason.
- B. Ceilcote Grout--Mix according to manufacturer's instructions.
- C. Portland Cement Mortar for Raked-Out Edges of EMBECO Grout--One part Portland cement, two parts sand, and 0.50 parts water by weight.

### PART III: EXECUTION

#### 3.1 FORMWORK

- A. Build leakproof forms that are strong and able to withstand grout pressures.
- B. Provide enough clearance between the formwork and the area to be grouted to permit proper placement of grout.

#### 3.2 SURFACE PREPARATION

- A. Clean concrete surfaces to be grouted of all defective concrete, dirt, oil, grease, and other foreign matter.
- B. Lightly roughen the concrete.
- C. Remove grease and foreign materials from all steel surfaces in contact with grout.
- D. Align, level, and maintain final positioning of all components to be grouted.
- E. Saturate all concrete surfaces with clean water, remove excess water, and leave none standing.

#### 3.3 PLACING

- A. Place nonshrink grouting quickly and continuously by the most practical means permissible: pouring, pumping, or under gravity pressure. Do not use either pneumatic-pressure or dry-packing methods without written permission.
- B. Where practicable, apply grout from one side only to avoid entrapping air.
- C. Do not vibrate the placed grout mixture or allow it to be placed if the area is being vibrated by nearby equipment.
- D. Do not remove leveling shims for at least 48 hr after grout has been placed.
- E. After the EMBECO grout has reached initial set, rake out all exposed edges approximately 1/2 in. into the grouted area and point with cement-sand mortar or grout.

- 3.4 CURING: Cure grout for 3 days after placing by keeping wet and covering with curing paper or by another approved method.

END OF SECTION

## SECTION 05400--LIGHTGAGE FRAMING

### PART I: GENERAL

SUBMITTALS: Submit erection manual and catalog data for substitute manufacturer. See Section 01300, Submittals.

### PART II: PRODUCTS

2.1 MANUFACTURER: Lightgage framing shall be as manufactured by the Porta Fab Corporation.

#### 2.2 MATERIALS

A. Framing members shall be of the depth and gage shown on the drawings. Studs and joists shall be punched for passage of concealed wiring.

B. Gypsum Board--See Section 09250.

2.3 FINISH: All light-gage steel members shall be galvanized.

### PART III: EXECUTION

#### 3.1 INSTALLATION

A. Studs shall be set 16 in. oncenter and spaced by bridging as shown on the drawings.

B. Finished framing shall be plumb, neat in appearance, and free from defects.

#### 3.2 FIELD CONNECTION

A. Welded as recommended by the manufacturer.

B. Self-drilling, self-tapping sheet metal screws or bolts.

END OF SECTION

## SECTION 05500--STRUCTURAL AND MISCELLANEOUS METALS

### PART I GENERAL

#### 1.1 REQUIREMENTS OF REGULATORY AGENCIES

- A. The design, detailing, fabrication, and erection of steelwork shall conform to American Institute of Steel Construction (AISC) "Specification for the Design, Fabrication, and Erection of Structural Steel for Buildings."
- B. Welding shall conform to American Welding Society (AWS) "Code for Welding in Building Construction," D1.1.

#### 1.2 QUALIFICATIONS

- A. Welding procedures, welders, welding operations, and tackers shall be qualified in accordance with AWS Code D1.1.
- B. Submit to the Buyer the names of welders to be employed in the work together with approved certification.

#### 1.3 SUBMITTALS

##### A. Shop Drawings

- 1. Submit shop drawings indicating all shop and erection details, including cuts, copes, connections, holes, threaded fasteners, rivets, and welds.
- 2. All welds, both shop and field, shall be indicated by AWS "Welding Symbols," A2.0.

##### B. Erection Procedure--Submit descriptive data to illustrate the structural steel erection procedure, including the sequence of erection and temporary staying and bracing.

##### C. Manufacturer's Literature--Submit description of each type of welding stud and arc shield.

##### D. Submit manufacturer's installation requirements for drilled anchors.

#### 1.4 PRODUCT HANDLING

- A. Deliver anchor bolts and other items to be set in concrete or masonry in ample time before need.
- B. Store steel members above ground on platforms or skids.

## PART II: PRODUCTS

### 2.1 MATERIALS

- A. Steel Shapes, Bars, and Plates--Conform to American Society for Testing and Materials (ASTM) A36.
- B. Structural Steel Tubing--Conform to ASTM A500 or A501.
- C. Raised-Pattern Rolled Steel Floor Plates--Conform to Federal Specification QQ-F-461, Class 1, hollow back, Pattern 12 or 15. Sizes as shown on drawings.
- D. Pipe Railing--Conform to ASTM 53, Grade B, Schedule 40. Finish: black.
- E. Galvanizing--Conform to ASTM A123, A386 and ASTM Recommended Practices A384, A385.
- F. Metal-Arc Electrodes--Conform to ASTM A233, AWS A5.1, Classification E6010.
- G. Gas Welding Rods--Conform to ASTM A251, AWS A5.1, Classification RG-60.
- H. Fasteners and Anchors
  - 1. Standard Bolts and Nuts: ASTM A307, Grade A.
  - 2. High-Strength Threaded Fasteners: ASTM A325.
  - 3. Rivets: ASTM A502, Grade 1.
  - 4. Anchor Bolts: Conform to Section 1.3, ASTM A-307.
  - 5. Drilled Anchors: Hilti fastening systems or ITT Phillips Red head anchors.
  - 6. Piston Drive Anchors and/or Powder-Actuated Anchors: Hilti fastening systems.

### 2.2 FABRICATION

#### A. General

- 1. Connections shall be as indicated on the drawings. Connections not indicated shall be made in accordance with AISC "Specification for the Design, Fabrication and Erection of Structural Steel for Buildings."
- 2. All cutting of metal shall be true to the lines required, and all burrs and sharp edges shall be removed.

3. Holes shall be cut, punched, or drilled at right angles to the surface of the metal and shall not be enlarged by burning. Holes in base plates or bearing plates shall be drilled.

B. Welding

1. Welded construction shall conform to AWS Code D1.0.
2. All welding shall be made by the electric shielded-arc or submerged-arc method.
3. Gas welding will not be permitted except light sections with thicknesses up to 14-gage USSG.

C. Painting--Do not paint steelwork to be encased in concrete. All other steelwork shall be given one coat of shop paint as follows:

1. Clean steelwork by hand wire brushing or by other methods of loose mill scale, loose rust, weld slag or flux deposit, dirt, and other foreign matter. Remove oil and grease deposits with solvent.
2. Prime steelwork with one coat of oil-base rust-inhibitive metal primer.
3. Parts inaccessible after assembly shall be given two coats of shop paint as specified above.
4. Where practicable, do not prime surfaces that are to be welded after erection. If painted, remove paint before field welding at least 2 in. beyond either side of the joints. After welding, field paint to match adjacent surfaces.

PART III: EXECUTION

3.1 ERECTION OF STRUCTURAL STEEL

A. Bolting

1. Protect bolt heads from damage during erection.
2. Provide bolts installed on beveled surfaces with beveled washers to give full bearing to bolt heads and nuts.
3. Provide bolts of lengths that will extend entirely through, but no more than 1/4 in. beyond the nuts. Draw nuts tight against the work. Upset threads after tightening to prevent loosening.
4. High-strength bolting shall conform to the AISC "Specification for Assembly of Structural Joints Using High Strength Steel Bolts."

- B. Anchor Bolts--Preset into built-in work by using templates or other means necessary to accurately locate these items.
- C. Drilled anchors as per manufacturer's instructions.
- D. Base plates and bearing plates requiring grouting:
  - 1. Support and align on steel wedges or shims. Cut wedges and shims off flush with edge of base and leave in place.
  - 2. After the supported members have been positioned, plumbed, and anchor nuts tightened, grout the entire bearing area as specified in Section 03600, Grout.
- E. Alignment
  - 1. After assembly, align and adjust the various members of a completed frame or structure before final fastening.
  - 2. Fasten the splices of compression members after abutting surfaces have been brought completely into contact.
  - 3. Before assembly, clean and remove burrs from bearing surfaces and from surfaces that will be in permanent contact.
  - 4. Correct poor matching of holes by redrilling to the next larger size. Do not weld for redrilling or burn unfair holes to correct for poor matching of holes.
  - 5. As erection progresses, secure the work to take care of all dead loads, wind, and erection stresses until permanent connections are completed.
  - 6. Tighten field bolts and leave in place unless removal is required, in which case fill holes flush with plug welds.
- F. Drift pins may be used to bring parts into alignment, but do not use in a manner that will distort or damage the metal.
- G. Do not use a gas cutting torch in the field for correction of fabrication errors unless written approval has been obtained from the Buyer.

### 3.2 INSTALLATION OF MISCELLANEOUS ITEMS

#### A. Steel Floor Plates

- 1. Raised-pattern steel floor plates shall be welded to steel supporting members except floor plates indicated as removable.
- 2. Joints in floor plates shall occur only over supports.

B. Pipe Railings

1. Drill holes 4 in. deep in concrete for posts (if preset sleeves not specified).
2. Moisten interior of hole with clean water. Pour grout mixture into annular space until it overflows the hole.
3. Wipe off excess grout and leave 1/8-in. buildup sloped away from post.
4. Set posts and rails plumb or horizontal to within 1/4 in. in 12 ft.

C. Gratings.

1. General. Manufacturer shall provide grating lengths to assure a minimum bearing of 1 inch at each end of grating bars when grating is butting either end. Field check as required to satisfy this requirement. Except as otherwise designated, provide banding at all penetrations and at all ends of grating.
2. Aluminum Grating. Use Irving Aluminum Type AA, Reliance Type 1R4, Kerrigan Type KA-00, or equal. Throughout grating shall have a mill finish and products of a single manufacturer shall be used.
  - a. The following minimum bearing bar size to span ratio shall be furnished unless otherwise designated:

<u>Brq Bar Size</u>	<u>Max. Span</u>	<u>Seat Angle</u>	<u>Shelf Angle</u> (long leg Vertical)	<u>Bolts-Shelf Angle</u>
1-1/4"x1/8"	3'-6"	2x1-1/2x1/4	3x2x1/4	5/8"@3'.0"
1-1/2"x1/8"	4'-0"	3x2x1/2	3x2x1/4	5/8"@2'-0"
1-1/2"x3/16"	4'-6"	3x2x1/2	3x2x1/4	5/8"@2'.6"
1-3/4"x3/16"	5'-6"	2x2x1/4	3x2x1/4	5/8"@2'-0"
2"x3/16"	6'-0"	2-1/2x2-1/2x1/2	3x2x1/4	5/8"@2'-0"
2-1/4"x3/16"	6'-6"	2-1/2x2-1/2x1/4	3x2x1/4	5/8"@2'-0"
2-1/2"x3/16"	7'-0"	3x3x1/2	3x2x1/4	5/8"@2'.0"

- b. All grating shall be furnished in panels 3'-0" wide. All openings in gratings shall be banded and this banding done in such a manner as to reestablish the original strength of the grating.
- c. Seat angles and anchors shall be aluminum as shown on the Drawings.

3. Grating Fastening Devices. For metal gratings use either welded or mechanical attachments except where and as specifically detailed for locations such as stair treads and incidental landings. For aluminum grating fabricate attachments of 18-8 austinitic stainless steel and use hot dip galvanized devices for attaching galvanized gratings.

3,3 FIELD QUALITY CONTROL

- A. The Buyer shall perform the following:
  1. Qualification of field welding procedures and personnel.
  2. Inspection of erected structural steelwork for conformance with the requirements specified.
  3. Witness and approve all anchor installations
- B. Inspection of field-assembled high-strength bolted construction shall be in accordance with Section 6, AISC Specification for Structural Joints.
- C. Inspection of field welds shall be in accordance with Section 6 of AWS Code D1.0.

END OF SECTION

SECTION 07201

METAL BUILDING INSULATION

PART I: GENERAL

1.1 STORAGE:

- A. Store insulation materials at jobsite in manufacturer's original containers or bundles. Do not open until inspected by the Buyer.
- B. Protect materials from contact with soil and moisture during storage.

1.2 ENVIRONMENTAL CONDITIONS: Building interior must be dry and free of all condensation and moisture during installation of insulation.

PART II: PRODUCTS

2.1 Insulation for side walls for ceiling shall be Buyer furnished and shall be 6 inch fiberglass (R-19) with a 3.2 mil vinyl vapor barrier, manufactured by Mato Inc.

PART III: EXECUTION

3.1 CEILING INSULATION:

- A. Install vapor barrier side down (toward room).
- B. Butt against all surrounding structural members.
- C. Follow manufacturer's instructions for installation.

3.2 WALL INSULATION:

- A. Butt tight against all surrounding structural members.
- B. At eaves, install insulation in any cavities that may be left between structural member and ceiling insulation.
- C. Apply adhesive at top of insulation to prevent settling away from sill at eave.
- D. Follow manufacturer's instructions for installation.

END OF SECTION

## SECTION 07900--CAULKING AND SEALANTS

### PART I: GENERAL

1.1 LOCATION: Apply sealant around the following locations:

- 1) Door frames and thresholds
- 2) Expansion joints
- 3) Roofing penetrations, collars, and flashings
- 4) Elsewhere as shown on the drawings

1.2 DELIVERY AND STORAGE OF MATERIALS

- A. Deliver and store materials in original packages until ready to use.
- B. Store in a manner that will prevent damage by water, freezing, breakage, or contact with foreign materials.

### PART II: PRODUCTS

2.1 MATERIALS

- A. Silicone Sealant--Silpruf, one part primerless silicone sealant, as manufactured by General Electric.
- B. Silicone Sealant--Construction 1200, one part primerless high modulus sealant as manufactured by General Electric.
- C. Backup Rod
  1. Backup rod shall be an extruded, flexible, compressible, polyethylene foam, designed for backup of elastomeric cold applied sealants.
  2. Diameter: 25% to 50% greater than the joint width.
- D. Bond Breaker--Polyvinyl chloride electrical tape with adhesive back.
- E. White Oakum--Twisted jute packing to commercial standards, embedded with bentonite.
- F. Sealants--Shall be tested according to UL-723 "Test for Surface Burning Characteristics".

### PART III: EXECUTION

3.1 PREPARATION

- A. Surfaces of joints to be sealed shall be clean, dry, and free from oil, dirt, frost, and foreign matter.

- B. Use backup rod for wide joints when recommended by manufacturer of sealant.
- C. Ambient temperature shall be between 40° and 100°F when sealant is applied.
- D. Thoroughly wash concrete and masonry surfaces to remove soluble alkaline salts.
- E. Clean metal surfaces of corrosion by wire brushing or using chemical cleaners.

### 3.2 APPLICATION

#### A. General

- 1. Sealant shall be uniformly smooth and free of wrinkles.
- 2. Apply sealant sufficiently convex to result in a flush joint when dry.
- 3. Follow manufacturer's recommendations.

#### B. Door Frames

- 1. Apply sealant bead around frames in concrete or masonry walls.
- 2. Gaps larger than 1/2 in. between frame and opening shall be grouted in by other trades.

#### C. Thresholds

- 1. Set metal thresholds in sealant bed at least 1/8 in. thick.
- 2. Secure threshold in place with minimum of three expansion screws.
- 3. Remove excess sealant around edges.

#### D. Expansion Joints--Clean joints, apply bond breaker, and apply silicone sealant.

### 3.3 CLEANUP: Clean all sealant from adjacent surfaces.

END OF SECTION

## SECTION 07901--PIPE PENETRATIONS

### PART I: GENERAL

- 1.1 LOCATION: Apply caulking or sealant as follows: at pipe, duct, and conduit penetrations; exterior and interior walls; ceilings; floor slabs; penetrations between contaminated and uncontaminated zones; and as noted unless otherwise shown on the contract drawings.
- 1.2 DELIVERY AND STORAGE OF MATERIALS
  - A. Deliver and store materials in original packages until ready to use.
  - B. Store in a manner that will prevent damage by water, freezing, breakage, or contact with foreign materials.

### PART II: PRODUCTS

#### 2.1 MATERIALS

- 2.1.1 Caulk--3M Brand Fire Barrier Caulk CP-25.
- 2.1.2 Silicone Foam--Dow Corning 3-6548 Silicone RTV Foam.
- 2.1.3 Polyurethane Sealant--For floors use Vulkem 45 as manufactured by Mameco International, one part, pourable, primerless, self-leveling sealant, gray in color, and conforming to Federal Specification TT-S-00230 C, Type 1 (Class A).
- 2.1.4 White Oakum--Twisted jute packing to commercial standards, imbedded with bentonite.
- 2.1.5 Pipe Sleeve--Schedule 40 galvanized pipe or fabricated from zinc-coated steel sheet having a nominal weight of not less than 1.656 psf. Length shall be sufficient to pass through the entire thickness of the wall and/or floor.
- 2.1.6 Conduit Seal--Fitting shall be EZS horizontal or EYS vertical seal fitting as supplied by Crouse-Hinds.
  - a. Sealing compound shall be a Chico A as supplied by Crouse-Hinds.
  - b. Packing fiber shall be Chico X as supplied by Crouse-Hinds.

### PART III: EXECUTION

#### 3.1 PENETRATION METHODS

##### 3.1.1 New Concrete Walls

Cast sleeve in place. Sleeve sizing shall be one inch larger than electrical conduit, pipe, or air duct dimension. Square or rectangular

duct sleeves shall be of sufficient wall thickness and temporarily braced to prevent distortion during casting period.

### 3.1.2 Existing Concrete Walls

Core drill for conduit or pipe or saw cut hole for rectangular duct, a minimum of 1 in. larger than electrical conduit, pipe, or air duct dimensions.

### 3.1.3 New and Existing Masonry Block Walls (with cells grouted solid)

Same as "Existing Concrete Walls," paragraph 3.1.2.

### 3.1.4 New and Existing Masonry Block Walls (with hollow cells)

Core drill or saw cut for sleeve. Sleeve sizing shall be as described in paragraph 3.1.2.

### 3.1.5 New Concrete Floors (other than floors on grade)

Cast sleeve in place. Sleeve sizing shall be as described in paragraph 3.1.1.

### 3.1.6 Existing Concrete Floors (other than floors on grade)

Core drill to the nearest common hole diameter or saw cut to accommodate sleeve. Sleeve hole shall be a minimum of 1 in. larger than electrical conduit, pipe, or air duct sleeve.

### 3.1.7 Light-Gage Metal Walls and Permanent-Type Ceilings

Core drill or saw cut to match outside dimension of electrical conduit, pipe, or air duct.

### 3.1.8 Banker Partitions and Suspended Ceilings

Core drill or saw cut for conduit, pipe, or air duct. Sealing is not required.

### 3.1.9 Light-Gage Metal Stud Walls

Core drill or saw cut for sleeve. Pipe or duct sleeve sizing shall be as described in paragraph 3.1.1. Flanges are required on both ends of finished wall surfaces. Attach flanges with through bolts.

## 3.2 SURFACE PREPARATION

3.2.1 Surfaces to be sealed shall be clean, dry, and free from oil, dirt, frost, and foreign matter. Fresh concrete to be sealed shall have cured for at least 7 days prior to application of caulk or sealants.

3.2.2 Ambient temperature shall be above 40°F and below 100°F when sealant is applied.

3.2.3 Clean all metal surfaces of corrosion by wire brushing or using chemical cleaners.

### 3.3. SEALING METHODS

Two methods are given for each condition. Either method is acceptable. Special effort shall be made to concentrically locate and seal conduit, pipe, or duct in sleeve.

### 3.4 NEW CONCRETE WALLS

3.4.1 The space between the electrical conduit, pipe, or air duct and the sleeve shall be firmly packed with white oakum and sealed on both ends with a minimum depth of 1 in. caulk.

3.4.2 The space between the electrical conduit, pipe, or air duct and the sleeve shall be dammed at both ends and sealed with silicone foam per manufacturer's recommended procedures.

### 3.5 EXISTING CONCRETE WALLS

3.5.1 The space between the electrical conduit, pipe, or air duct and the core-drilled or saw-cut hole shall be firmly packed with white oakum and sealed on both ends with a minimum depth of 1 in. caulk.

3.5.2 The space between the electrical conduit, pipe, or air duct and the core-drilled or saw-cut hole shall be sealed with silicone foam per manufacturer's recommended procedures. No sleeve required.

### 3.6 NEW AND EXISTING MASONRY BLOCK WALLS (with cells grouted solid)

Same as paragraph 3.5, "Existing Concrete Walls."

### 3.7 NEW AND EXISTING MASONRY BLOCK WALLS (with hollow cells)

3.7.1 The space between the electrical conduit, pipe, or air duct and sleeve shall be firmly packed with white oakum and sealed on both ends with a minimum depth of 1 in. caulk.

3.7.2 The space between the electrical conduit, pipe, or air duct and the sleeve shall be sealed with silicone foam per manufacturer's recommended procedures.

3.7.3 The space between the sleeve and the drilled or cut hole shall be filled solid with nonshrink grout.

### 3.8 NEW CONCRETE FLOORS (other than floors on grade)

The space between the electrical conduit, pipe, or air duct and the sleeve shall be firmly packed with white oakum and sealed on both ends with a minimum depth of 1 in. polyurethane sealant or caulk.

### 3.9 EXISTING CONCRETE FLOORS (other than floors on grade)

3.9.1 The space between the electrical conduit, pipe, or air duct and the sleeve shall be firmly packed with white oakum and sealed on both ends with a minimum depth of 1 in. polyurethane sealant or caulk.

3.9.2 The space between the sleeve and the drilled or cut hole shall be filled solid with nonshrink grout.

### 3.10 LIGHT GAGE METAL WALLS

Seal between electrical conduit, pipe, or air duct and drilled or cut opening with a 1/4-in. bead of caulk.

### 3.11 PERMANENT TYPE CEILINGS

Seal between electrical conduit, pipe, or air duct and drilled or cut opening with a 1/4-in. bead of caulk.

### 3.12 LIGHT GAGE METAL STUD WALLS

3.12.1 The space between the electrical conduit, pipe, or air duct and the sleeve shall be firmly packed with white oakum and sealed with a minimum of 1-in. deep of caulk.

3.12.2 The space between the electrical conduit, pipe, or air duct and the sleeve shall be sealed with silicone foam per manufacturer's recommended procedures.

3.12.3 The space between the flange and wall shall be sealed with 1/4-in. bead of caulk.

### 3.13 SEALANT/CAULK APPLICATION

3.13.1 Sealant/caulk shall be applied uniformly smooth and free of wrinkles.

3.13.2 Apply sealant/caulk sufficiently convex to result in a filled joint that is flush after the sealant has cured.

END OF SECTION

## SECTION 08100--HOLLOW METAL DOORS AND FRAMES

### PART I: GENERAL

#### 1.1 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 08700, Finish Hardware
- B. Section 09900, Painting

#### 1.2 QUALITY CONTROL--CERTIFICATIONS

- A. Furnish certification of label construction for doors not requiring labels but requiring labeled construction.
- B. Heat transmission test shall be certified by an approved independent testing laboratory.

#### 1.3 SUBMITTALS--SHOP DRAWINGS

- A. Submit shop drawings covering each type of door and frame, frame conditions, and complete anchorage details, supplemented by suitable schedules covering doors and frames.
- B. Show glass and louver opening sizes and locations in doors.
- C. Indicate size, gage, and location of reinforcement for hardware on drawings.
- D. Detail connections of hollow metal work to structural steel framing concealed in hollow metal work.

#### 1.4 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, and handle hollow metal work in a manner to prevent damage and deterioration.
- B. Store doors upright in a protected dry area at least 1 in. off the ground or floor and at least 1/4 in. between individual pieces.
- C. Protect exposed finish surfaces of prefinished items with masking tape.

### PART II: PRODUCTS

#### 2.1 BASIC MATERIAL

- A. Sheet steel for frames shall be hot-rolled carbon steel.

- B. Sheet steel for doors shall be cold-rolled stretcher level sheet steel.

## 2.2 FRAMES

- A. Frames for new and existing concrete and masonry opening shall be rough buck and cabinet jamb type. If an existing opening is too small to accept a standard rough buck jamb, a combination jamb may be used.
- B. Frames for metal stud walls shall be combination buck, frame, and trim type.
- C. Minimum Gage--16 gage for all frames.
- D. Corner joints shall have all contact edges closed tight with faces and stops continuously welded and ground smooth. Knockdown-type frames are not acceptable except for rough buck and cabinet jamb type.
- E. Form 5/8-in. minimum stop integral with frame.
- F. Provide three holes for each strike jamb and two holes for header of double frames for application of door silencers.
- G. When possible, provide frames with 14-gage floor clips welded to each jamb member.
- H. Provide two 16-gage steel spreaders for double-rabbeted frames tack welded to the bottom of both jambs.
- I. Anchors
  - 1. Masonry Anchors: Provide frames anchored into masonry with four 3/8-in. J-bolts per rough buck jamb for doors to 7 ft and one additional anchor per jamb for each 18 in. of height over 7 ft.
  - 2. Steel Stud Anchor: Provide frames anchored to steel studs with three 16-gage Z-shaped anchors per jamb for doors to 7 ft and one additional anchor per jamb for each 18 in. of height over 7 ft.
  - 3. Bolt Anchors: Provide frames anchored into existing conditions with four 3/8-in. minimum-bolt-type anchors per rough buck jamb for doors to 7 ft and one additional anchor per jamb for each 18 in. of height over 7 ft.

## 2.3 DOORS

- A. All doors shall be 1 3/4 in. thick with continuously welded edges, dressed and ground smooth and with no visible seams on door faces or vertical edges.

B. Face sheets shall be 18-gage steel for doors up to 3 ft 6 in. wide. Doors 3 ft 6 in. and wider shall have 12-gage face sheets, except where label requirements specify 18 gage.

C. Internal Stiffeners

1. Surface sheets shall be supported by Z-channel or continuous truss members not less than 18 gage (28 gage for continuous truss), spaced not more than 6 in. on center and internally spot welded to both surface sheets not more than 4 in. on center.
2. Top and bottom edges of all doors shall be closed flush with continuous 18-gage channel members extending full width of door.
3. Edges of doors shall be supported by 18-gage interior edge channels extending full height of door.

D. Interior surfaces of door shall be treated with a sound-deadening material to eliminate metallic ring.

E. Clearances

1. Between doors and frames at head and jamb, 1/8 in.
2. At sill where no threshold is used, 1/2 in. Where threshold is used, 1/8 in. between door and threshold.
3. Between meeting edge of doors in pairs, 1/8 in.
4. Bevel edges of single-acting doors, 1/8 in. in 2 in.

F. Glass Molding

1. Doors to be glazed shall be provided with 18-gage molding to secure glass. Molding shall have all corners fully mitered and welded.
2. Glazing bead shall be permanently secured to the exterior side of the door by concealed internal welding. Interior glazing bead shall be held in place with countersunk, oval-head screws.

G. Louvers

1. Louvers shall be 18 gage inverted chevron type unless otherwise noted on door schedule.
2. Louvers shall be welded to frame and securely fastened beneath the door face sheets to conceal louver moldings.

## 2.4 PREPARATION FOR FINISH HARDWARE

A. Doors and frames shall be factory-reinforced, drilled, and tapped for mortise template hardware in accordance with the approved hardware schedule. Obtain current hardware templates from hardware supplier.

- B. Provide welded-in reinforcing plates for surface-applied hardware.
- C. Frame Reinforcement--Thicknesses and sizes for frame reinforcement shall be as follows:
1. Butt Hinges: 3/16-in. plate 9 in. long and full width of the frame profile.
  2. Closer: 12-gage channel section 12 in. long and full width of frame trim.
  3. Reinforcements for Strikes, Flush Bolts, and All Other Surface-Mounted Hardware: 12 gage.

END OF SECTION

## SECTION 08700--HARDWARE AND SPECIALTIES

### PART I: GENERAL

#### 1.1 SUBMITTALS

- A. Submit complete listing of hardware to be furnished showing:
- Door mark number
  - Government number or manufacturer specified
  - Size (where applicable)
  - Finish
  - Proposed manufacturer and catalog number
  - Quantity of each item
- B. Furnish manufacturer's literature for each item for evaluation of products.

#### 1.2 DELIVERY

- A. Deliver hardware items to project site in manufacturer's original packages.
- B. Hardware for each door shall be separately packaged and marked with the respective door mark number.

#### 1.3 PROTECTION

- A. Protect finish hardware from damage and marring of finish.
- B. Any hardware which becomes damaged or marred prior to final acceptance shall be replaced with new, identical items.

- 1.4 CERTIFICATION: Hardware for fire-rated doors shall bear the Underwriters' Laboratories, Inc. (UL), label.

### PART II: PRODUCTS

#### 2.1 ACCEPTABLE MANUFACTURERS

- A. Door hardware shall be the standard products of the following manufacturers:
- Best
  - Corbin
  - Von Duprin
  - Stanley
  - Russwinn

- B. Substitute manufacturers will be accepted only by submittal when approved manufacturer is not available.

## 2.2 MATERIALS

### A. Butt Hinges

1. Butt hinges shall be heavy-duty wrought steel, full mortised, five knuckle ball bearing, nonrising (and on exterior doors nonremovable), loose-pin hinges.
2. Conform to Federal Specification FF-H-16c, Type T2115 (Stanley FBB-168).
3. Furnish three 4 1/2- X 4 1/2-in. butts for each door unless otherwise specified.

### B. Closers

1. Closers shall be compact overhead surface-mounted type with separate spring power adjustment for general and latching speed.
2. Conform to Federal Specification FF-H-121c, Type 3001, Size V (Norton Series 1600).
3. Furnish regular arm with closer unless hold-open or fusible-link feature is specified in the hardware schedule.

### C. Locksets

1. Locksets and latchsets shall be cylindrical, full-mortise types.
2. Conform to Federal Specification FF-H-00106b, Series 86, with 4S trim (Corbin 7500 series with antifriction latchbolt).
3. The function for each lockset shall be as specified in the hardware schedule.

### D. Exit Devices

1. Exit (panic) devices shall be mortise-lock types. Vertical-rod exit devices shall have rods completely concealed in door.
2. Conform to Federal Specification FF-H-00106b, Series 820 (Von Duprin 8800 series).
3. The function for each exit device shall be as specified in the hardware schedule.

### E. Flush Bolts

1. Flush bolts shall be made of forged brass or bronze and have standard 12-in. length.

2. Conform to Federal Specification FF-H-00111b, Type 1045 (Sargent 3470).
3. Furnish bottom flush bolt with dust-proof recessed strike.

F. Door Stops

1. Wall stops shall be of forged brass or bronze and conform to Federal Specification FF-H-00111b, Type 1320 (Sargent 3372).
2. Floor stops shall be of forged brass or bronze and conform to Federal Specification FF-H-00111b, Type 1328 (Sargent 3374).

G. Fastenings of suitable size, quality, and type shall be provided to secure hardware in position. Machine screws and expansion shields shall be provided for securing items of hardware to concrete or masonry.

H. Miscellaneous materials and components (coordinating devices, kick-plates, etc.) not indicated in this article shall be as specified in the hardware schedule.

2.3 FINISH: The exposed surfaces of all finish hardware items shall be dull bronze, U.S. 10, unless otherwise specified.

2.4 KEYING

- A. All locksets and deadbolts shall be a type that will accept Best 1E64 cylinder.
- B. Cores and keys will be furnished and installed by the Buyer.
- C. Cylinders shall be furnished and installed by the Buyer.

PART III: EXECUTION

3.1 HARDWARE INSTALLATION

- A. Install hardware items in accordance with manufacturer's recommended instructions and templates.
- B. Hinges
  1. Install top hinge with center of hinge not more than 9 in. below top of door.
  2. Install bottom hinge with center of hinge not more than 12 in. above finish floor.
  3. Install intermediate hinges equidistance between top and bottom hinges.

C. Door Closers

1. Install in accordance with templates and instructions furnished by manufacturer.
2. Mount closer on room side of door.

D. Locks, Latches, and Strikes--Center strike of knob locks and knob latches 40 1/2 in. above finish floor.

E. Weatherstripping

1. Install on metal frames and doors in accordance with installation instructions furnished.
2. Fit tightly at corners to maintain continuity around door.

3.2 CLEANING AND ADJUSTING

- A. Before final acceptance, clean and adjust all hardware.
- B. Demonstrate correct function of hardware in presence of the Buyer.

3.3 HARDWARE SCHEDULE

- A. The quantity, function, and other requirements of finish hardware items for each door are noted on the hardware schedule.
- B. Hardware for each door is identified by a door mark as shown on the drawings.

END OF SECTION

SECTION 09250

GYPSUM DRYWALL

PART I: GENERAL

1.1 DELIVERY AND STORAGE OF MATERIALS:

- A. Deliver manufacturer's original containers, bundles, or packages to jobsite with seals unbroken and labels intact.
- B. Store materials in an approved manner and protect from contact with soil and exposure to the elements.

1.2 ENVIRONMENTAL CONDITIONS:

- A. Cold Weather: Heat the building before and during the application of the joint system to maintain a minimum uniform temperature of 55 degrees F.
- B. Moisture: Provide ventilation to eliminate excessive moisture.

1.3 PROTECTION: Protect adjacent work and equipment from damage during wallboard application and joint treatment.

PART II: PRODUCTS

2.1 MATERIALS:

A. Gypsum Wallboard:

- 1. Conform to American Society for Testing and Materials (ASTM) C36.
- 2. Gypsum wallboard for general use shall be 1/2 in. thick with tapered edges.
- 3. Type "X" (special fire retardant) wallboard shall be 5/8 in. thick with tapered edges, UL listed.
- 4. Provide in 4-ft. widths and in lengths as long as practical to eliminate butt joints.

B. Joint Tape: Conform to ASTM C475--Perf-A-Tape as manufactured by United States Gypsum.

C. Joint and Finishing Compounds:

- 1. Conform to ASTM C475.
- 2. Use Perf-A-Tape Joint Compound (or All-Purpose Ready-Mixed Compound) for embedding and first-coat application.

3. Use Perf-A-Tape Topping Compound (or Perf-A-Tape Ready-Mixed Topping Compound) for fill and finishing.

D. Inside and outside vertical corner reinforcement shall be as manufactured by United States Gypsum.

E. One-inch drywall screws, Type S, shall be used to attach drywall to steel studs or furring channels in conventional construction.

## 2.2 MIXING OF JOINT AND FINISHING COMPOUNDS:

A. Mix and use joint and finishing compounds in accordance with manufacturer's recommendations as shown on the bag.

B. Use ready-mixed materials as they come in original containers.

## PART III: EXECUTION

3.1 GENERAL: Installation of gypsum wallboard shall be in accordance with American National Standards Institute Standard A97.1, The Application and Finishing of Wallboard, and the following.

## 3.2 INSTALLATION OF GYPSUM WALLBOARD:

A. Drive screws so that the top of the screwhead is just below the wallboard surface without breaking the surface paper of the wallboard or stripping the framing member around the screw.

B. Space screws 3/8 in. to 1/2 in. from the ends and edges of the wallboard. Space screws at 12 in. on center for framing members.

## 3.3 JOINT TREATMENT:

A. Installation of Joint Tape:

1. Using a suitable tool or machine, apply a thin, uniform layer of Perf-A-Tape Joint Compound, approximately 3 in. wide, over the joint to be reinforced.

2. Center Perf-A-Tape over the joint and set into the compound leaving sufficient compound under the tape to provide proper bond. Recommended procedure is to apply a skim coat of compound after embedding tape.

3. Reinforce inside and outside vertical corner angles with the Perf-A-Tape folded to conform to adjoining surfaces and to form a straight, true angle. After drying, cover the Perf-A-Tape with one coat of topping.

4. Clean excess compound from the surface of the wallboard and allow all joints to dry a minimum of 24 hr. between each application of compound.

B. Application of Joint and Topping Compound:

1. Apply one coat of joint compound before or after hardening is complete in the embedding coat.
2. Apply two coats of topping compound over the joint compound. Spread each coat evenly over and slightly beyond the tapered edge area of the wallboard, and feather at the edges.
3. Apply each coat with a smooth, uniform slight crown over the joint and with the edges feathered slightly beyond the preceding coat.

C. Where Dur-A-Bead corner reinforcing is used, apply at least two coats of compound over the reinforcing as outlined in paragraph B above. When completed, the compound shall extend approximately 8 to 10 in. on either side of the exposed metal nosing.

D. Where Perf-A-Bead corner reinforcing is used, apply and conceal the reinforcing in accordance with the manufacturer's instructions.

E. Sand all coats as necessary after each application of joint compound or topping has dried. Leave all wallboard and treated areas uniformly smooth and ready to receive decoration after the final coat and sanding.

3.4 CLEANUP: Remove all misplaced and splattered joint compound from surrounding surfaces and the area of work. Leave all areas clean and dry.

END OF SECTION

SECTION 09650  
RESILIENT FLOORING

PART I: GENERAL

1.1 SUBMITTALS:

A. Samples:

1. Submit minimum of two samples of each type and color or pattern of resilient flooring and base material.
2. Mark samples with name of Contractor, project identification, and area where materials are to be used.

B. Maintenance Materials:

1. Furnish additional floor-covering materials of each size, color, pattern, and type of material included in the work.
2. Furnish materials at the rate of one carton for each 1,000 ft<sup>2</sup> or less.

1.2 PRODUCT DELIVERY AND STORAGE:

- A. Deliver materials to project site in manufacturer's original unopened containers with all identification labels intact.
- B. Store and protect materials in accordance with manufacturer's directions and recommendations.
- C. Unless otherwise directed, store materials in original containers at not less than 70 degrees F for not less than 24 hr immediately before installation.

1.3 ENVIRONMENTAL REQUIREMENTS:

- A. Maintain temperature in space to receive tile between 70 degrees and 90 degrees F for not less than 24 hr before and 48 hr after installation.
- B. Maintain minimum temperature of 55 degrees F after flooring is installed.

PART II: PRODUCTS

2.1 FLOOR-COVERING MATERIALS:

**A. General:**

1. Uniform in thickness and size.
2. Edges cut accurately and square.
3. Uniform color and patterns.

**B. Standard Asphalt Tile:**

1. Federal Specification SS-T-312, Type I.
2. Face Size: 9 x 9 x 1/8 in. thick.

**C. Vinyl Asbestos Tile:**

1. Federal Specification SS-T-312, Type IV.
2. Face Size: 12 x 12 x 1/8 in. thick.

**2.2 BASE MATERIALS:**

**A. General:**

1. Uniform in thickness.
2. Lengths as long as practicable to suit conditions of installation.

**B. Rubber Base:**

1. Federal Specification SS-W-40, Type I.
2. Six in. high, coved, flat, or carpet style.

**C. Standard Vinyl Base:**

1. Federal Specification SS-W-40, Type II.
2. Six in. high, coved, flat, or carpet style.

**D. Factory Premolded Corners: Match base materials.**

**2.3 APPLICATION MATERIALS:**

**A. General:** Provide type and brands of adhesive as recommended by manufacturer of covering material for the conditions of installation.

**B. Asphalt Emulsion Adhesive:** Federal Specification MMM-A-115, Class II.

**C. Asphalt Cutback Adhesive:** Federal Specification MMM-A-110.

- D. Wax, Cleaner, or Other Finishing Material: As recommended by floor covering manufacturer.

### PART III: EXECUTION

#### 3.1 INSPECTION OF SURFACES:

- A. Examine substrate for conditions that would affect execution and quality of resilient flooring as specified.
- B. Correct defects before proceeding with installation.

#### 3.2 PREPARATION:

- A. Remove dirt, oil, grease, or other foreign matter from surfaces to receive flooring.
- B. Fill cracks less than 1/16 in. wide and depressions less than 1/8 in. deep with crack filler. Other defects shall be corrected by the trades involved.

#### 3.3 APPLICATION OF ADHESIVES:

- A. Mix and apply adhesives in accordance with manufacturer's instructions.
- B. Provide safety precautions during mixing and application as recommended by adhesive manufacturer.
- C. Apply uniformly over surface with notched trowel.

#### 3.4 INSTALLATION OF TILE MATERIALS:

- A. Lay tile to center of room or space.
- B. Work toward perimeter.
- C. Cut border tile neatly and accurately to fit within 1/32 in. of abutting surfaces.
- D. Lay tile parallel to room axis in straight courses; lay tile with grain or pattern running in a perpendicular direction between adjacent tile.

#### 3.5 INSTALLATION OF BASE:

- A. Install base around perimeter of room or space and at toe spaces of casework of cabinets.
- B. Cut into accurate lengths for minimum number of joints.
- C. Match edges at all seams or double-cut adjoining lengths.

- D. Apply adhesive and firmly adhere to wall.
- E. Press down so bottom cove edge follows floor profile.
- F. Form internal corners coping and bending around corner.
- G. Form external corners by using premolded corners.

3.6 FINISHING AND CLEANING:

- A. Upon completion of installation of floor covering, adjacent work, and after materials have set, clean surfaces with a neutral cleaner as recommended by flooring manufacturer.
- B. Apply two coats of nonslip wax and buff to a sheen.
- C. Protect completed work from traffic and damage.

END OF SECTION

SECTION 09900

PAINING

PART I: GENERAL

1.1 QUALITY ASSURANCE:

A. Include on label of containers:

- . Manufacturer's name
- . Type of paint
- . Manufacturer's stock number
- . Color
- . Instructions for application
- . Paint analysis

B. Field Quality Control:

1. Request review of first finished room, space, or item of each color scheme required by Buyer for color, texture, and workmanship.
2. When required by Buyer, paint surface not smaller than 50 ft<sup>2</sup> as project standard for selected types of paint.

1.2 SUBMITTALS:

A. Furnish test samples of materials when required by the Buyer.

B. Color Samples:

1. Submit color samples or charts from which final colors shall be selected by the Buyer.
2. Colors indicated in the paint schedule shall be matched as closely as possible.

C. Submit proposed paint and color schedule for approval, including for each item:

- . Surface to be painted
- . Type of paint
- . Special thinners required, if any
- . Color
- . Special surface preparation required

1.4 PRODUCTS DELIVERY AND STORAGE:

- A. Delivery of Materials: Except for locally mixed custom colors, deliver materials in sealed containers with labels intact and legible.
- B. Storage of Materials:
  - 1. Paint materials and related equipment shall be stored outside of the building in the area assigned by the Buyer.
  - 2. The Contractor shall provide storage facilities adequate to protect the paint materials and equipment from inclement weather. The storage facilities shall have adequate ventilation. During cold weather, the storage facilities shall be heated to not less than the minimum recommended by the paint products manufacturer and at no time shall the temperature be below 35 degrees F.
  - 3. At the end of each work day, all paint materials shall be removed from the work area and properly stored.
  - 4. The Contractor shall obtain approval from the Buyer for all paint storage facilities used at the jobsite. All storage facilities used on the jobsite will be subject to inspection at any time by the Buyer's fire inspector.

1.5 JOB CONDITIONS:

- A. Environmental Conditions:
  - 1. Comply with manufacturer's recommendations for environmental conditions under which coatings and coating systems can be applied.
  - 2. Do not apply finish in areas where dust is being generated.
  - 3. Provide adequate ventilation when using flammable or toxic paint materials.
- B. Protection:
  - 1. Cover or otherwise protect surfaces not being painted.
  - 2. Furnish fire-retardant protective coverings. Do not use flammable material for protective coverings unless special permission is obtained from the Buyer.

## PART II: PRODUCTS

### 2.1 MATERIALS:

- A. Materials selected for painting systems for each type of surface shall be the products of a single manufacturer.
- B. Other products not specified, but required for the job, shall be "first-line" products designed for the intended use.

2.2 COLORS: Colors of paints shall match color chips selected by the Buyer.

### 2.3 MIXING AND TINTING:

- A. Deliver paints ready mixed to jobsite.
- B. Accomplish job mixing and job tinting only when acceptable to the Buyer.
- C. Using tinting colors recommended by manufacturer for the specific type of finish.

## PART III: EXECUTION

### 3.1 INSPECTION:

- A. Examine surfaces scheduled to receive paint for conditions that will adversely affect execution, permanence, or quality of work and which cannot be put into an acceptable condition through preparatory work.
- B. Do not proceed with surface preparation or coating application until conditions are suitable and approved by the Buyer.

### 3.2 PREPARATION OF SURFACES:

#### A. Gypsum Wallboard and Plaster:

1. Fill narrow, shallow cracks and small holes with spackling compound.
2. Rake deep, wide cracks, and deep holes.
  - a. Dampen with clean water.
  - b. Fill with thin layers of drywall joint cement.
3. Allow to dry.
4. Sand smooth. Do not raise nap of paper on wallboard.

B. Concrete Floors

1. Remove all oil, grease, and wax.
2. Acid etch bare concrete to ensure greater penetration and adhesion.
3. Neutralize acid by washing thoroughly with clean water.
4. Allow to dry until the moisture content of the surface is within limitations recommended by the paint manufacturer.

C. Ferrous Metals Surfaces:

1. Prepare surface in accordance with SSPC-SP2, Hand Tool Cleaning.
2. Feather edges of sound paint.
3. Building 891:
  - a. All interior exposed surfaces surface preparation: clean and dry, wire brush (SSPC-SP2 or SP3) failed areas.
  - b. All exterior exposed surfaces surface preparation: clean and dry, wire brush (SSPC-SP2 or SP3) failed areas.

D. Galvanized Metal: Clean surface in accordance with SSPC-SP1, Solvent Cleaning. Dry with clean lint-free cloth.

E. Aluminum: Clean surface in accordance with SSPC-SP1, Solvent Cleaning. Dry with clean lint-free cloth.

F. Wood:

1. Clean soiled surfaces with alcohol wash.
2. Sand to smooth and even surface; then dust off.
3. Apply knot sealer to all knots, pitch, and resinous sapwood before priming coat is applied.
4. Fill nail holes, cracks, open joints, and other defects with putty or wood filler after priming coat has dried. Color to match finish color.

### 3.3 APPLICATION:

- A. Apply paint with suitable brushes, rollers, or spraying equipment.
  - 1. Do not exceed rate of application recommended by paint manufacturer for type of surface involved.
  - 2. Keep brushes, rollers, and spraying equipment clean, dry, and free from contaminants.
- B. Comply with recommendation of product manufacturer for drying time between succeeding coats.
- C. Vary slightly the color of successive coats. Tinting shall be uniform.
- D. Sand and dust between each coat to remove defects visible from a distance of 5 ft.
- E. Finish coats shall be smooth, free of brush marks, streaks, laps or pileup of paints, and skipped or missed areas.
  - 1. Finished metal surfaces shall be free of skips, voids, or pinholes in any coat when tested with a low-voltage detector.
  - 2. Doors, frames, and finished metal work or wood work shall be painted by brush or spray only. Do not roll.
- F. Inspection:
  - 1. Do not apply successive coats until each completed coat has been inspected and approved by the Buyer.
  - 2. Only inspected coats of paint will be considered in determining the number of coats applied.
  - 3. Defective or improper previous coatings shall be removed or corrected to the satisfaction of the Buyer.
- G. Make edges of paint adjoining other materials or colors clean and sharp with no overlapping.
- H. Apply primer on all work before glazing.
- I. Do not paint over fire labels on fire doors.
- J. Change colors at corner of stop where colors differ between adjoining spaces or rooms.
- K. Refinish whole wall where portion of finish has been damaged or is not acceptable.

### 3.4 CLEANING:

- A. Touch up and restore finish where damaged.
- B. Remove spilled, splashed, or splattered paint from all surfaces.
- C. Do not mar surface finish of item being cleaned.

### 3.5 PAINTING SYSTEMS AND SCHEDULES:

#### A. Painting Systems:

1. Paint System One (PS-One) for interior-exterior metals.
  - a. Prime coat for touchup. Oil-base rust-inhibitive metal primer.
  - b. Finish: Solvent-type Alkyd enamel, two coats.
2. Paint System Two (PS-Two) for gypsum wallboard.
  - a.. Prime Coat: Quick-drying emulsion sealer.
  - b. Finish: Acrylic latex interior semi-gloss enamel, two coats.
3. Paint System Three (PS-Three) for masonry and porous concrete.
  - a. Prime coat for items not previously painted; vinyl emulsion masonry block filler.
  - b. Finish - Latex masonry paint, two coats.
4. Paint System Four (PS-Four) for masonry and gypsum walls in restrooms and showers.
  - a. Prime Coat - Polyvinyl acetate, high solids emulsion block filler, 6 mils dry.
  - b. Finish - Gloss, high solids, polyester-epoxy coating, 6 mils dry.
5. Paint System Five (PS-Five), Conseal (Urethane), for concrete floors in Building 891.
  - a. First Coat - 350-400 ft<sup>2</sup> /gal, thinned at four-to-one reduction.
  - b. Finish Coat - 300-400 ft<sup>2</sup> /gal, not thinned.

- c. Temperatures above 70° F and 50% relative humidity are recommended for best drying conditions. Allow 12-15 hr between coats and 18-24 hr before allowing traffic. Follow manufacturer's direction on container.
6. Paint System Six (PS-Six) for exhaust stacks.
  - a. Prime Coat (for touchup) - Alkyd resin galvanized primer.
  - b. Finish - Aluminum, oleoresinous varnish, two coats.
7. Paint System Seven (PS-Seven) fire retardant.
  - a. Prime Coat - Apply Prime Coat per manufacturer's recommendations.
  - b. Finish Coat - Iron Clad Retardo #220 as supplied by Benjamin Moore Paints and applied at 300 sq. ft./gallon. Paint shall be UL Listed for Class A Fire Retardant.
8. Paint System Eight (PS-Eight) for all interior exposed surfaces of Building 891.
  - a. Spot Prime - Tnemec Series 37-77 Chem-Prime, 2.5-3.0 Dry Film Mills (DFM).
  - b. First Coat - Tnemec Series 111 Tufcoat, 2.0-2.5 DFM.
  - c. Second Coat - Tnemec Series 111 Tufcoat, 2.0-2.5 DFM.
  - d. Total Both Coats - 4.0-5.0 DFM.
9. Paint System Nine (PS-Nine) for all exterior exposed surfaces of Building 891.
  - a. Spot Prime - Tnemec Series 37-77 Chem-Prime, 2.5-3.0 DFM.
  - b. First Coat - Tnemec Series 23 Enduratone, 2.0-2.5 DFM.
  - c. Second Coat - Tnemec Series 23 Enduratone, 2.0-2.5 DFM.
  - d. Total Both Coats - 4.0-5.0 DFM.

- B. Paint Schedules (all colors will be selected by the Buyer when not specified in the following schedules).
1. Masonry and Concrete Walls: PS-Three.
  2. Doors, Door Frames, and Steel Window Frames, Exterior and Interior Sides: PS-One.
  3. Ladders, Ladder Cages, and Handrails: PS-One, safety yellow.
  4. Concrete Floors: PS-Five.
  5. Gypsum Wallboard Walls and Ceilings: PS-Two.
  6. Restroom Interior Walls: PS-Four.
  7. Pipe Identification: PS-One, white background with black lettering. See Division 15 for identification procedures.
  8. Fire Retardant: PS-Seven.
  9. Building 891, interior surfaces: PS-Eight.
  10. Building 891, exterior surfaces: PS-Nine.
- C. Items Not Required To Be Painted:
1. Piping, conduit, and ductwork in production, maintenance, and laboratory areas.
  2. Roofing and roof-mounted fixtures.
  3. Exterior galvanized metals.

END OF SECTION

## SECTION 13121

### PRE-ENGINEERED BUILDING

#### PART 1 - GENERAL

1.01 DESCRIPTION. This Specification together with the Drawings and the Preston Steel Building Company details presented below give the description and design details of Building 891. The details give the size, the proposed arrangement and the materials of construction to be used as a basis for erection of the pre-engineered building.

A. Work Included in This Section. Principal items are:

1. Furnishing all labor, supervision, tools, materials and equipment for the erection of the pre-engineered metal building as shown on the Drawings.

B. Work Not Included in This Section.

1. Site preparation and earthwork.
2. Concrete and reinforcement, including placement of anchor bolts.
3. Asphaltic concrete paving.

#### 1.02 GENERAL.

A. The intent of these Specifications and Drawings is to establish a quality and performance level for structural design, material, durability and workmanship.

B. All materials shall be new, unused, and free from defect.

1.03 REFERENCE SPECIFICATIONS AND CODES. The following specifications with latest revisions shall be considered a part of this Specification, as applicable:

A. American Institute of Steel Construction "Specification for the Design, Fabrication, and Erection of Structural Steel for Building", latest revision and hereafter referred to as the A.I.S.C. Specification.

B. American Iron and Steel Institute's "Specification for the Design of Cold-Formed Steel Structural Members", latest revision, and hereafter referred to as A.I.S.I. Specification.

C. American Welding Society "Code for Welding in Building Construction", latest revision, and hereafter referred to as A.W.S. Specification.

D. Metal Building Manufacturers Association "Recommended Design Practices Manual", latest edition, and hereafter referred to as M.B.M.A.

E. Uniform Building code, 1979 Edition, as amended, hereafter referred to as U.B.C., or such other building code which governs Work of area in which Project is located.

F. Steel Door Institute "Standard Doors and Frames", latest edition and hereinafter referred to as S.D.I.

G. Thermal Insulation Manufacturers Association "TIMA Standard P.E.B. 202 Flexible Glass Fiber Insulation for Pre-Engineered Metal Buildings" hereinafter referred to as T.I.M.A. Specification.

H. The following criteria shall also be applicable to other phase of design:

1. A.S.T.M. - American Society of Testing Materials.
2. S.S.P.C. - Structural Steel Painting Council for Preparation and Painting of Material.

#### 1.05 PRODUCT HANDLING.

A. Deliver and unload at the job site location designated by the Buyer, from a storage location on the Rocky Flats Plant site as directed by the Buyer.

B. Materials which are stored at the project site shall be above ground on platforms, skids, or other supports and covered to protect from weather.

C. Clean materials which have become soiled before erecting.

#### PART 2 - PRODUCTS

##### 2.01 ROOF PANELS.

A. Roof panels shall be fastened to the purlins with neoprene-washed cadmium plated carbon steel screws or bolts factory coated to match panel color. Fasteners shall be adequately spaced to develop the uplift requirements.

##### 2.02 PURLINS.

A. The purlin's configuration, thickness and spacing shall be the building manufacturer's standard provided all design criteria, including deflection, is met or exceeded.

B. The deflection of the purlin shall not exceed 1/360 of its span when supporting the applicable uniformly distributed live load.

##### 2.03 ROOF OPENINGS.

A. Openings 12 inch or smaller, may be flashed and sealed to the roof panels providing complete support and weather-tightness. All bidders must submit a unit price for material and installation of a 12 inch or smaller vent base flashing.

B. Openings larger than 12 inch round or square, shall be framed with steel curbs. The curbs and appurtenances shall be supported by the roof purlins and/or header framing (if required). The curbs shall have a minimum projection of 9 inches above the high point of the weather surface of the roof, and shall be properly flashed and sealed to the roof panels providing complete support and weather-tightness.

2.05 WALL COVERING AND SUPPORTS.

A. Wall Panels.

1. The top, bottom, and intermediate panel closures, flashings, fascias, gutters and trim shall be the building manufacturer's standard, compatible with the material furnished as wall panels, as approved by Buyer.

2.06 STRUCTURAL STEEL PAINTING. All structural steel and light gage steel components, columns, beams, purlins and girts shall be painted as specified below:

A. Materials, surface preparation and application shall meet or exceed requirements for galvanized and ferrous metals in normal indoor and outdoor exposures as specified under Painting. The primer and top coats must come from the same company. There are no alternate suppliers.

B. In shop, prepare surfaces and shop prime.

C. In the field and after erection, all damaged areas on all shop primed steel surfaces shall be repaired by spot cleaning with hand and/or power tools before spot priming.

D. Spot priming.

E. After spot priming, the steel surfaces shall be top coated with two finish coats as specified under Painting.

2.07 DOORS AND FRAMES. Install Buyer-furnished doors and frames of sizes, types and in locations shown on the Drawings.

A. All framed openings for doors, frames, and other appurtenances shall be designed to structurally replace the wall or roof coverings and/or framing they displace. Field cutting of wall panels, above and/or below openings, will not be permitted.

B. Installation of all doors, frames, fasteners and sealants, finish hardware and other appurtenances shall be included in the Bid Proposal.

2.08 INSULATION. Install Buyer-furnished insulation as follows:

A. Roof Insulation shall be applied over the mesh and under the roof panels with the vapor barrier facing toward the interior of the

building. Provisions for the closing of all joints shall be the building manufacturer's standard recommendations. The mesh shall be fabricated of 19 gage galvanized wire welded with 2-in. x 2-in. openings.

B. Wall insulation shall be the same materials as roof insulation except the wire mesh will not be required.

2.09 GUTTERS AND DOWNSPOUTS. Provide six (6) inch gutter and four (4) inch downspout of standard with manufacturer, as approved by Buyer. Fabricate of galvanized steel and provide with factory finish as specified for roof and wall panels. Provide complete with strap attachments and leader head anti-clog device.

2.10 ANCHOR BOLTS.

A. Anchor bolts set in the foundation wall for anchoring the building have been installed as part of Phase I of the project and are not part of this work.

2.11 APPURTENANCES.

A. Fasteners. Screws and washers shall be cadmium plated carbon steel. Where required for weather tightness, screws shall be additionally equipped with neoprene washers. All exposed screws and washers shall be precoated and hardened fasteners colored to match building color.

B. Sealants. Sealant for sidelaps, end laps and flashing shall be a blend of butyl and epdm rubbers, with not less than 50% butyl, and suitable inert fillers and pigments. The material shall be non-asphaltic, non-shrinking, nondrying, and nontoxic and shall have superior adhesion to metals, plastics and painted surfaces at temperatures from -10°F to 140°F.

C. Closures. Hard butyl rubber matching the panel profile along the eave, rake, floor, and at accessories as required to provide a weather tight building.

D. Flashing or Trim. At the rake, corners, eaves, framed openings, accessories, and wherever else necessary provide weather tightness and a finished appearance.

E. Ridge Panels. A formed panel matching the slopes and profile of adjoining roof panels.

F. Louvers and Gravity Ventilators. Furnish and install units of types, sizes and in locations shown on Drawings, complete with bird screens, factory finish, freely operative features and secure attachments.

PART 3 - EXECUTION

3.01 ERECTION AND INSTALLATION. Erection of the metal building, accessories, and the interior finish shall be inspected by the metal

building manufacturer and a certification provided at the completion of the project. The certification shall provide assurance to the Buyer that the building and related items to this work have been installed in conformance with specified requirements, the building manufacturer's standard erection procedure in accordance with established trade practices and approved by the Buyer.

A. Before erecting, clean steel members which have become soiled.

B. Erect in accordance with the AISC specification.

C. Erection tolerances: In accordance with AISC code except where indicated on the Drawings.

D. Roof panels should be continuous from ridge to eave. If end laps are necessary, they shall be a minimum of 6 in. and shall occur at a roof purlin. All end and side laps shall be sealed with a continuous ribbon of tape sealer.

E. Wall panels shall have not more than one end lap on the sidewalls and not more than two end laps on the endwalls. One endwall lap shall occur at the eave height girt. All end laps shall occur at a girt. Bevel gable panels to match the roof slope.

F. Assemble to provide a complete, weather-tight building, with operative features, including finish hardware adjusted for freedom of operation without bind, twist or warp.

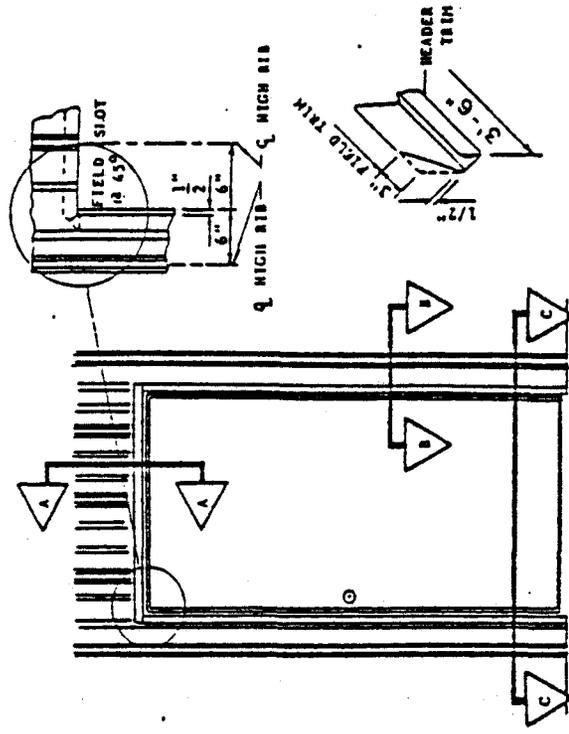
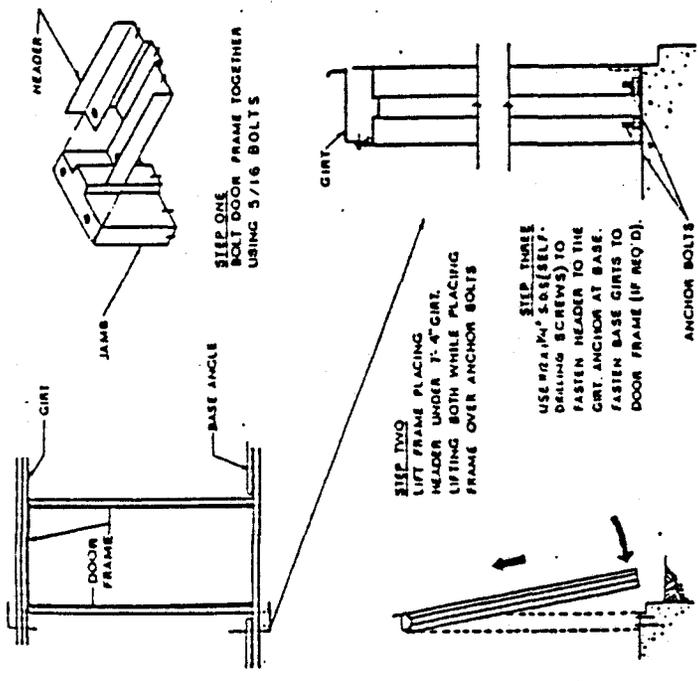
3.02 PAINING AND FINISHING. Workmanship and application shall conform with requirements hereinbefore specified for various portions of the structure.

3.03 CLEAN-UP. At completion of his work this Contractor shall clean up and remove from the premises all temporary construction, office or storage building, waste excess materials, debris, etc. caused by his operation. Contractor shall also remove excess materials, debris, etc. on a daily basis.

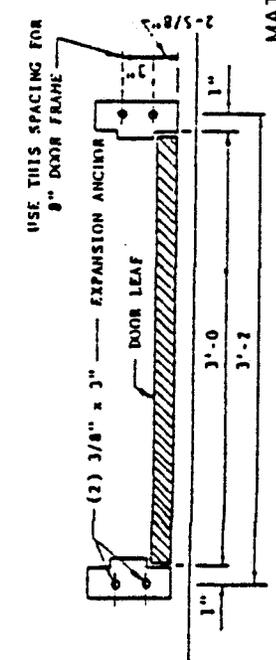
#### PART 4 - SPECIAL REQUIREMENTS

4.01 FIRE EXTINGUISHERS. The building shall be equipped with two portable fire extinguishers, one at each end. They shall be 2-1/2 gal. pressurized water, or equal and be UL-approved.

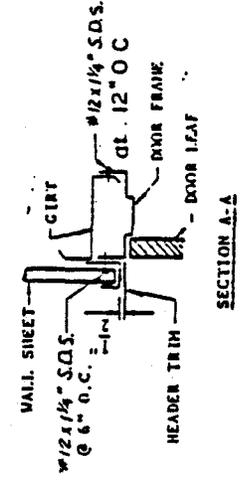
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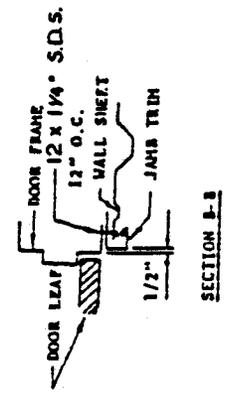
DOOR ELEVATION



MATCH SPACING OF DOOR FRAME ANCHOR PLATE



SECTION A-A



SECTION B-B

NOTES:

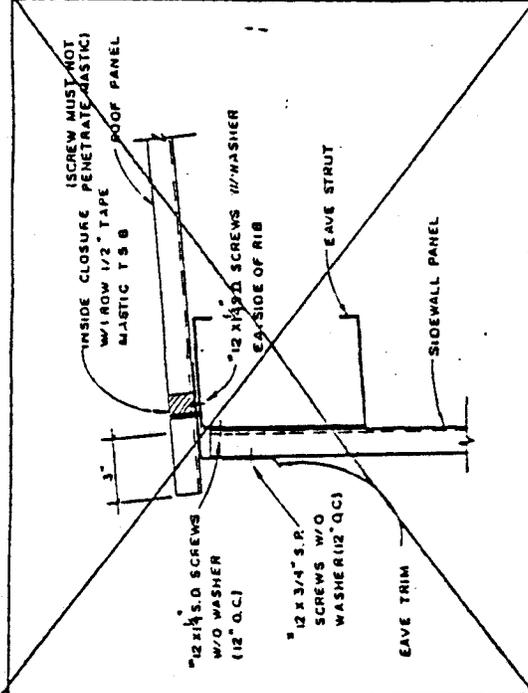
REVISED  
DESTROY PREVIOUS EDITION

REVISIONS		REV. BY
NO.	DATE	

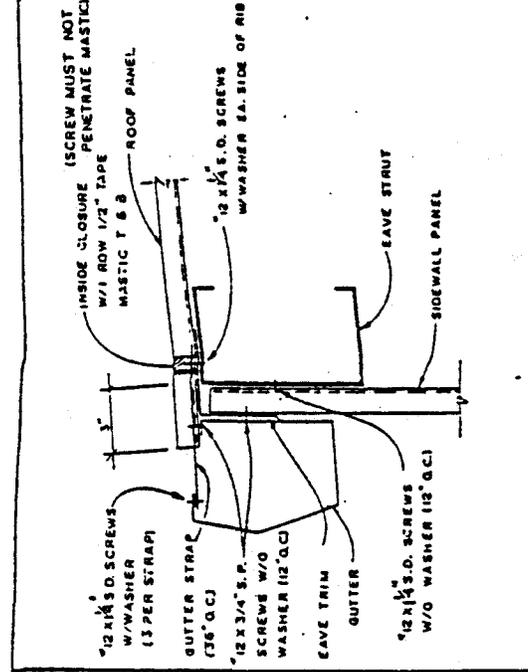
**Preston**  
STEEL BUILDING CO.  
GREELEY CO.

CUSTOMER: SATELLITE/ROCK FLATS  
LOCATION: G. LOEN, CO  
DATE: 2/26/62  
DWG. BY: KLT  
SCALE: NTS  
CL. BY: US

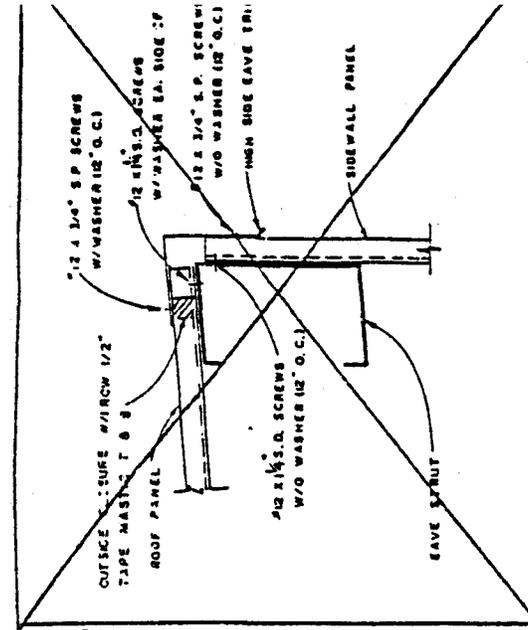




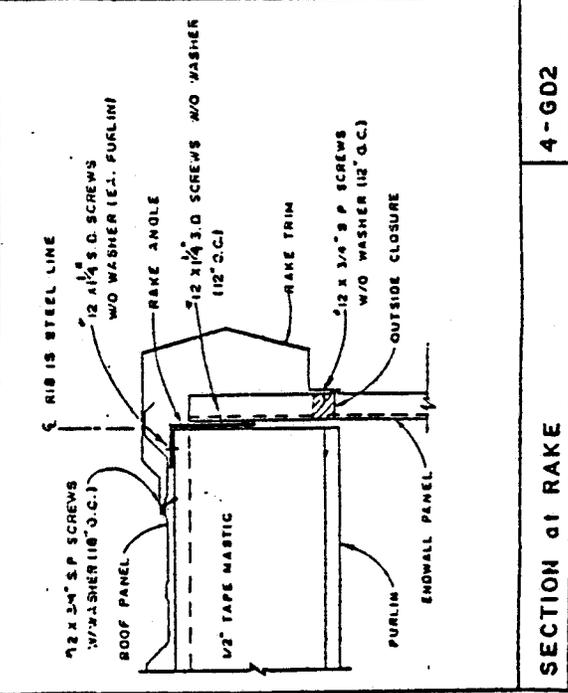
SECTION of RAKE 4-GD1



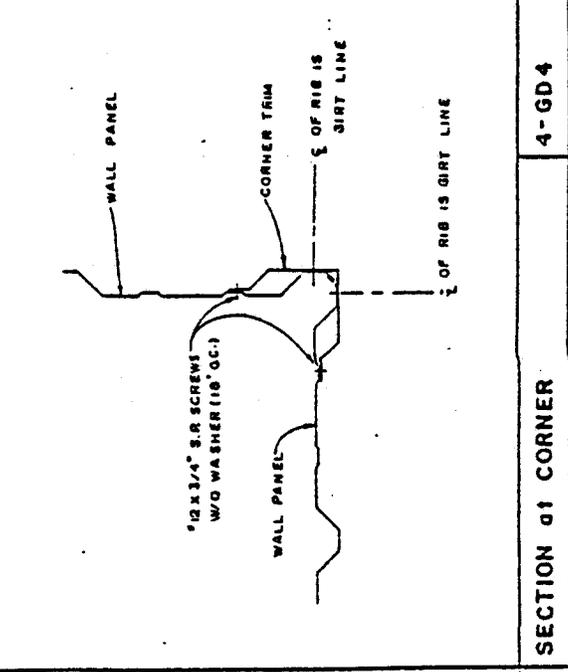
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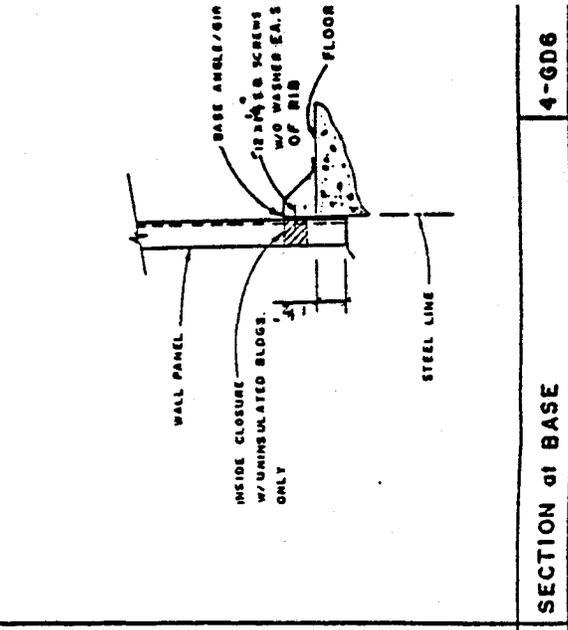
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SECTION of RAKE 4-GD2



SECTION of CORNER 4-GD4



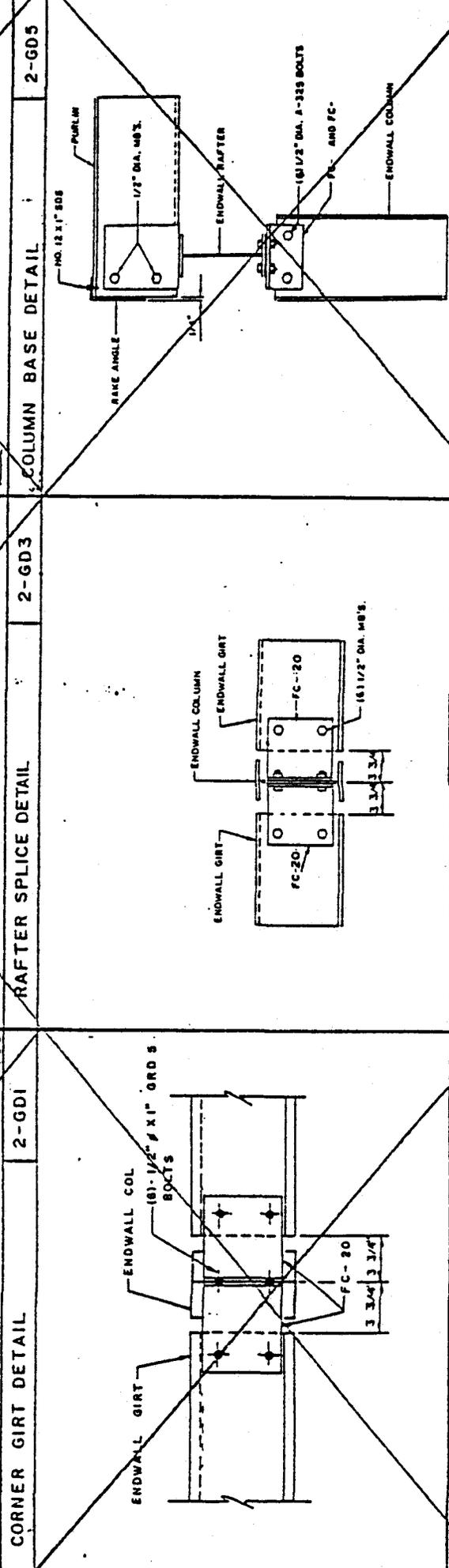
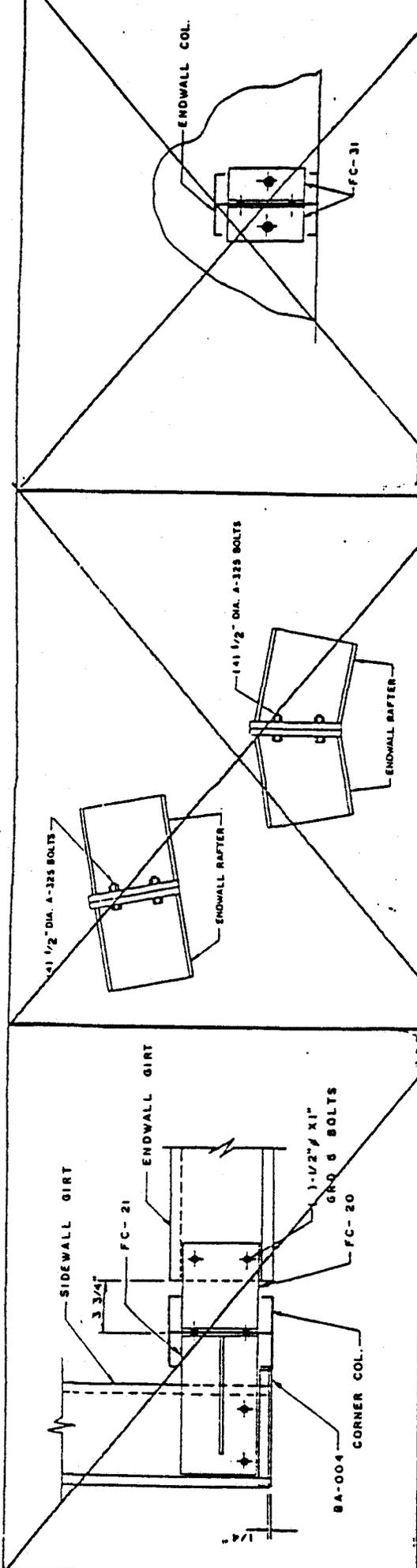
SECTION of BASE 4-GD6

NOTES:  
 DESTROY PREVIOUS EDITIONS  
 REVISIONS  
 NO. DATE REV. BY

**Preston**  
 STEEL BUILDING CO.  
 GREENEY CO.

CUSTOMER: **SATELLITE/ROCKY FLATS**  
 LOCATION: **GALDEJA CD**  
 DATE: **27 JUN 71**  
 DWG. BY: **KLT** SCALE: **N.T.S.** C.C. BY: **UD**





**2-GD5 COLUMN BASE DETAIL**

**2-GD6 ENDWALL COLUMN TO RAFTER CONN.**

**NOTES:**

**DESTROY ALL PREVIOUS PRINTS**

**REVISED**

**REVISED PREVIOUS PRINTS**

NO.	DATE	REV. BY

**REVISIONS**

**CUSTOMER: SATELLITE/ROCKY FLATS**

**LOCATION: GOLDEN, CO**

**DWG. BY: KLT**

**CHECKED BY: [Signature]**

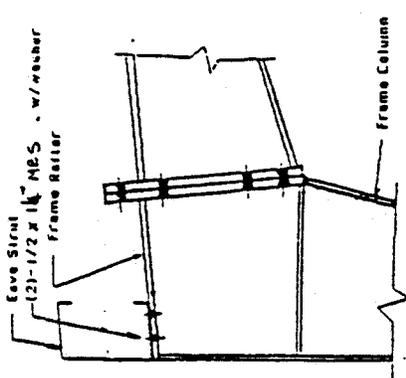
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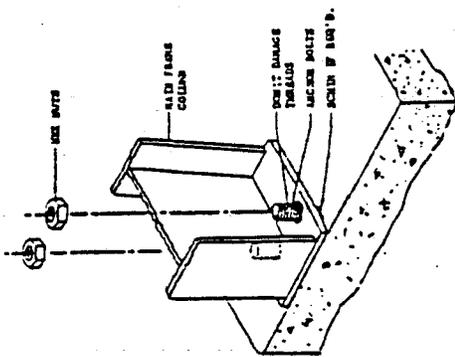
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**PRESTON STEEL BUILDING CO. GREELEY, CO.**



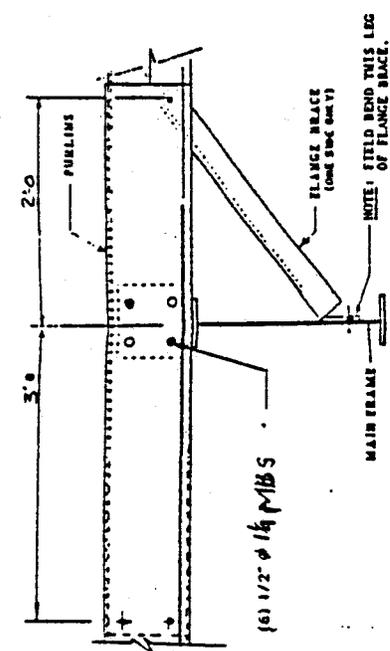
EAVE STRUT CONN. DETAIL

1-GD1



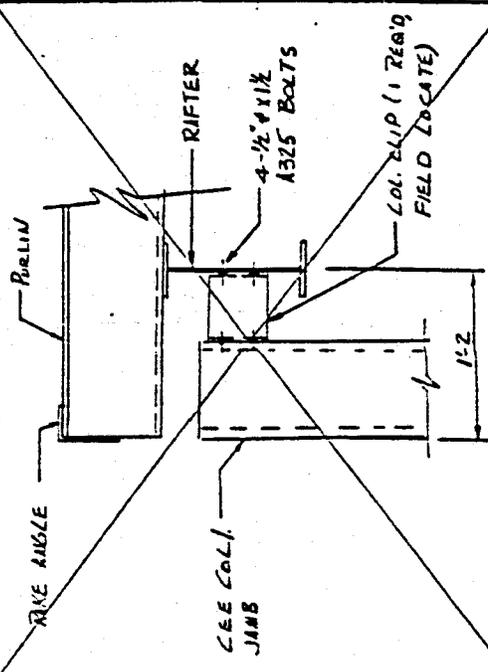
COLUMN BASE CONN.

1-GD2



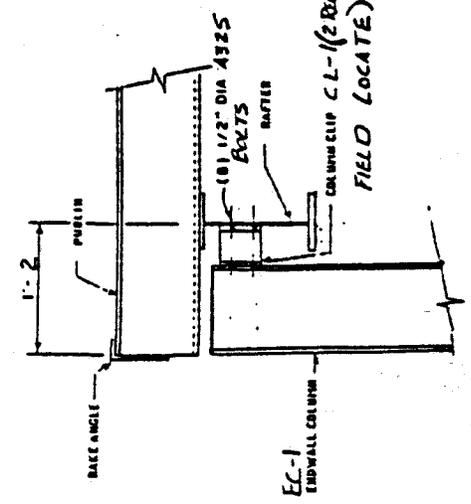
PURLIN OR GIRT TO FRAME CONN.

1-GD3



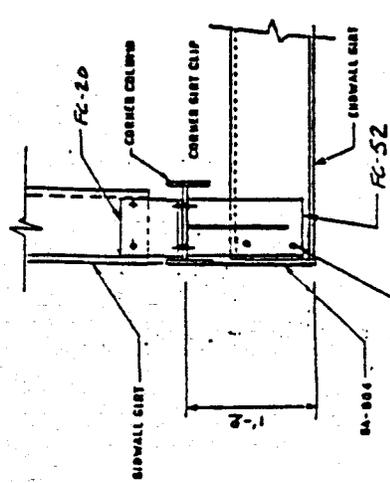
EW COLUMN TO RAFTER CONN

1-GD5



EAVE STRUT CONN. DETAIL

1-GD6



CORNER GIRT DETAIL

1-GD6

NOTES:

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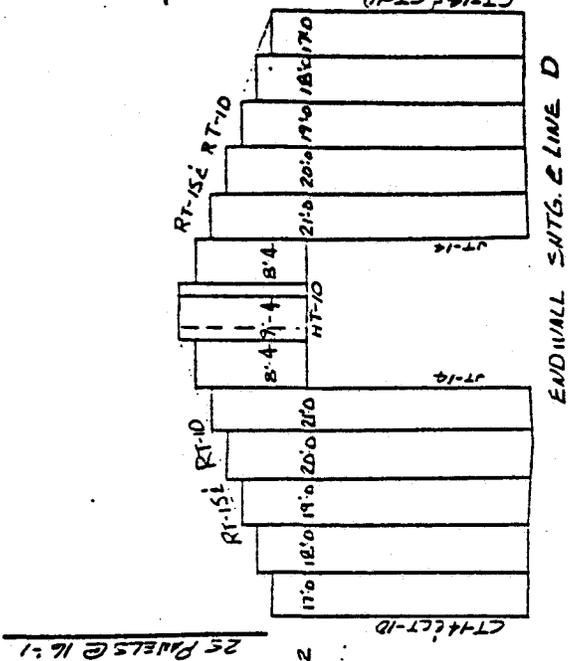
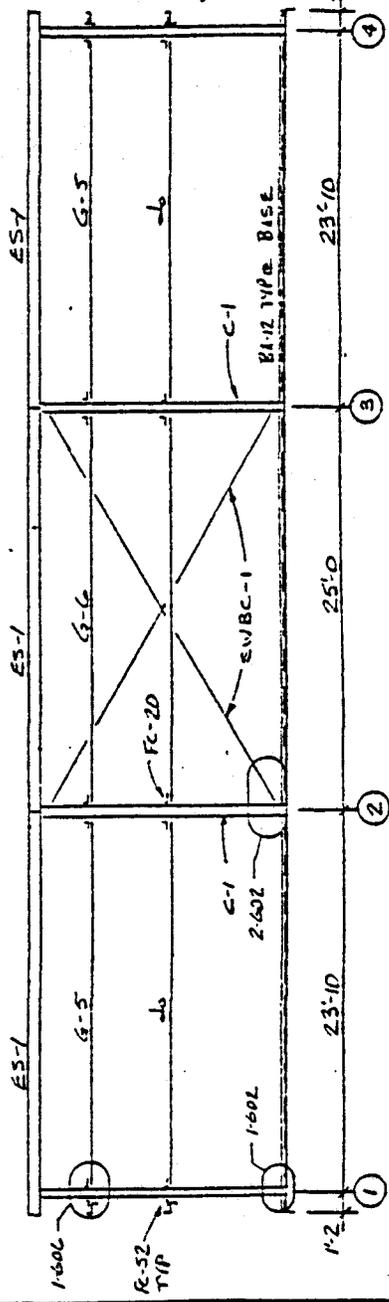
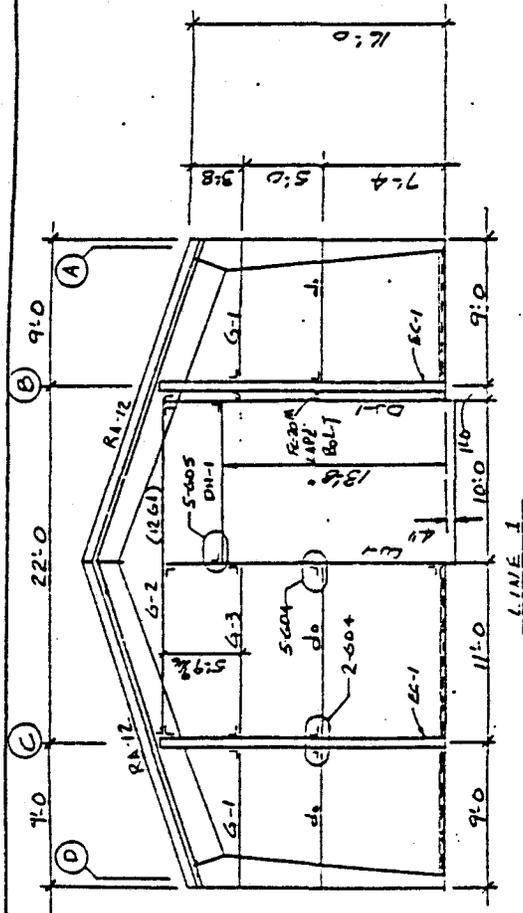
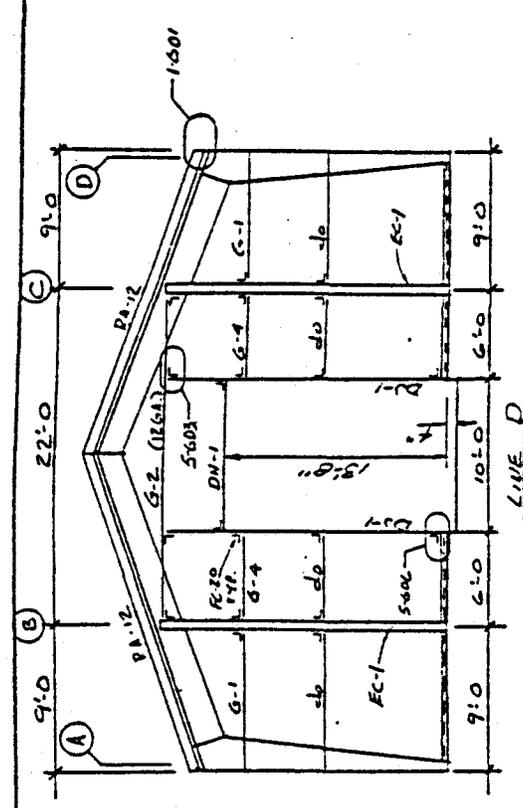
PRESTON  
STEEL BUILDING CO.

CUSTOMER: SATELLITE/ROCKY FLATS  
LOCATION: GOLDEN, CO  
DATE: 21 June 88  
SCALE: 1/8" = 1'-0"

REVISIONS

PRESTON

CUSTOMER: SATELLITE/ROCKY FLATS  
LOCATION: GOLDEN, CO  
DATE: 21 June 88  
SCALE: 1/8" = 1'-0"

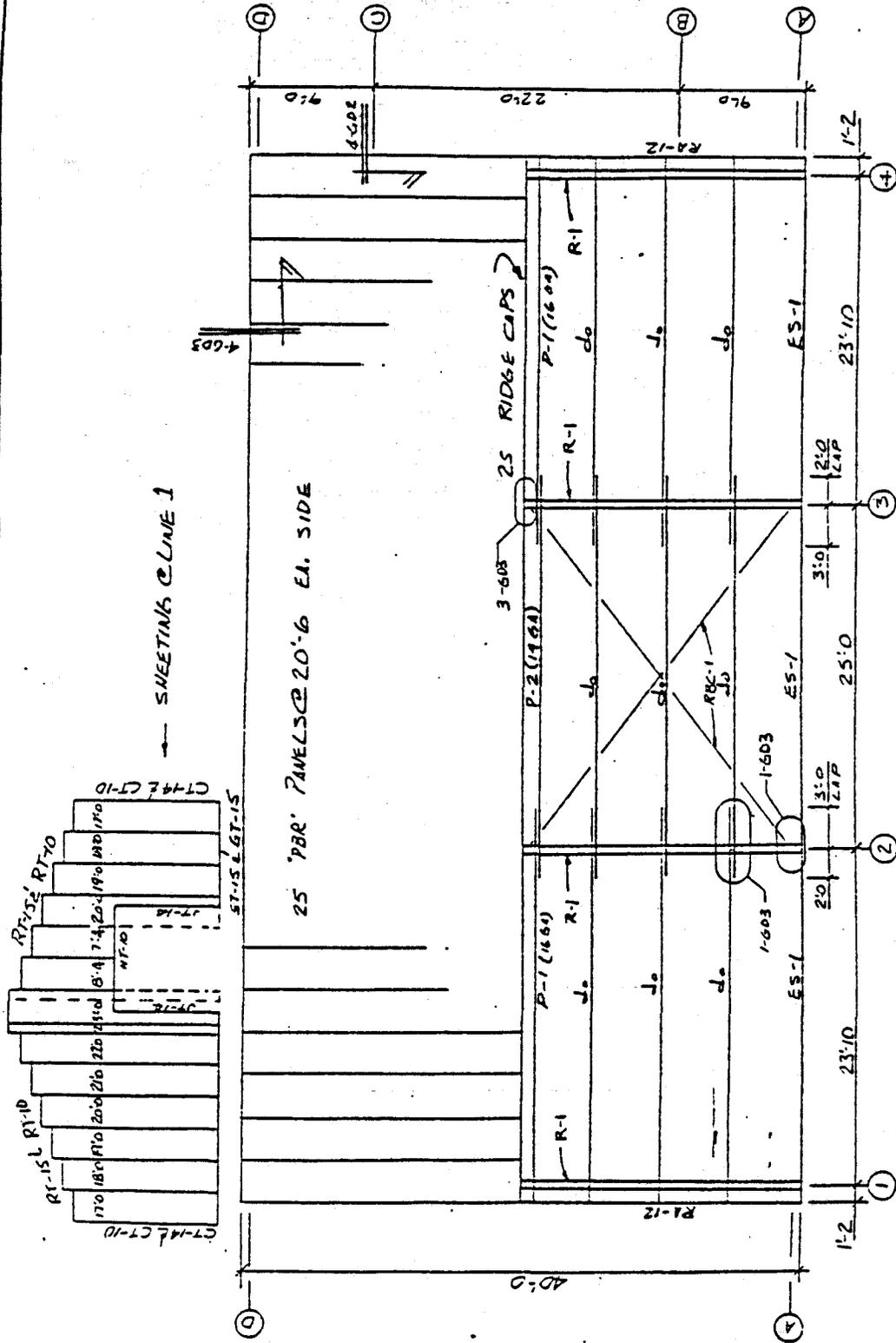


**REVISED  
DESTROY PREVIOUS PRINT.**

NOTES: 7/8" x 1/4" CABLE IN SIDEWALL BC 3 1/2 X 12 GA. DOOR JAMES BZ 2 1/2 X 12 GA. ENDWALL GIRTS U.N. 107 2 1/2 X 12 GA. ENDWALL GIRTS U.N.		REVISONS		CUSTOMER:	
NO.	DATE	DATE	DATE	SATTELLITE / ROCKY FLATS	
1	3-1-58	3-1-58	3-1-58	LOCATION:	GOLDEN, CO.
				DWG. BY:	KLT
				SCALE:	NTS
				DATE:	24 JUN 58
				CR. BY:	US

**Preston**  
STEEL BUILDING CO.

REVISED  
DESTROY PREVIOUS PRINTS



CUSTOMER: SATELLITE / Rock FLATS  
 LOCATION: GOLDEN, CO  
 DATE: 24-JUNE-80  
 Dwg. BY: JTS SCALE: NTS  
 CKD BY: VS

**Preston**  
 STEEL BUILDING CO.

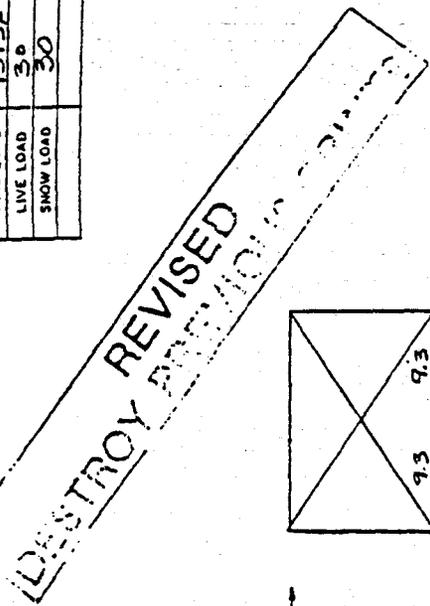
REVISIONS		REV. BY
NO.	DATE	
1	20-JUL-80	KCT

NOTES: 5/16"  $\phi$  CABLE BRACING  
 82 2 1/2 X 16 TYP. END BAY PURLINS  
 82 2 1/2 X 14 TYP. INT. BAY PURLINS



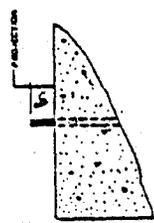
BLDG. DESIGN LOADS	
WIND LOAD	45 PSF
LIVE LOAD	30
SNOW LOAD	30

ANCHOR BOLT SCHEDULE			
QTY	"A"	"B"	"C"
8	1/2" DIA.	8"	2"
24	3/8" DIA.	12"	3"
	3/4" DIA.	18"	4"



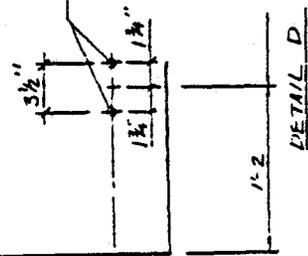
9.3

15.6  
AT BRACED BAY

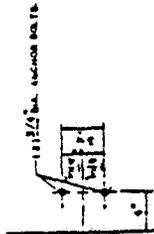


PROJECTION DETAIL

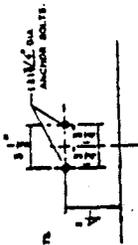
(2) 3/8" DIA. ANCHOR BOLTS



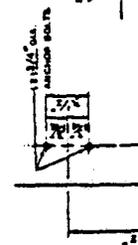
DETAIL D



DETAIL C



DETAIL B



DETAIL A

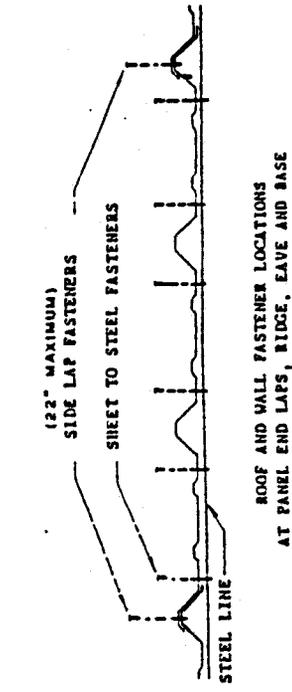
FRAMED OPENING DETAIL

CUSTOMER:	SATELLITE / ROCKY FLATS
LOCATION:	GOLDEN, CO
DATE:	23 JAN 88
DWG. BY:	KCP
SCALE:	NPS
JOB NO.:	17318
DWG. NO.:	18-2

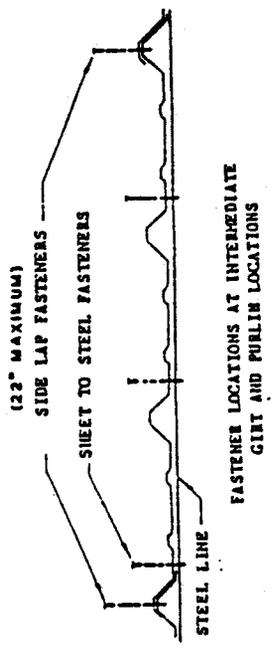
**Preston**  
STEEL BUILDING CO  
GREELEY CO.  
(303) 339-3310

REVISIONS		NO.	DATE	REV. BY
1	ADD BOLTS	30 JAN 88	KCP	

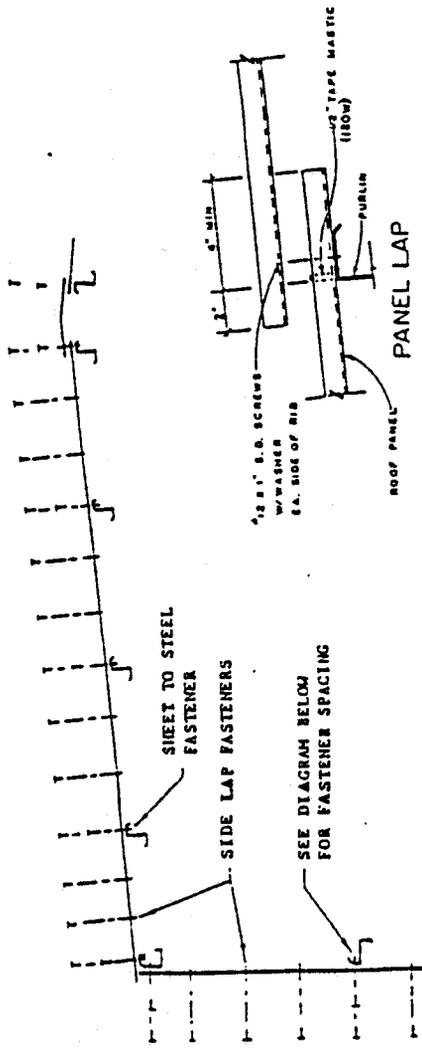
- NOTES:
- ALL ANCHOR BOLTS TO BE PLACED AT THE SAME ELEVATION UNLESS NOTED.
  - ALL CONCRETE DESIGN AND CONSTRUCTION IS NOT BY PRESTON STEEL BUILDING CO.
  - ALL ANCHOR BOLTS AND IMBEDDED ITEMS ARE NOT SUPPLIED BY PRESTON.
  - CONSULT A LOCAL ENGINEER FOR DESIGN OF FOUNDATION IN ACCORDANCE WITH LOCAL SOIL CONDITIONS.
  - ALL REACTIONS ARE GIVEN IN KIPS (1000 LBS)
  - ALL WALK DOORS AND WINDOWS TO BE FIELD LOCATED.



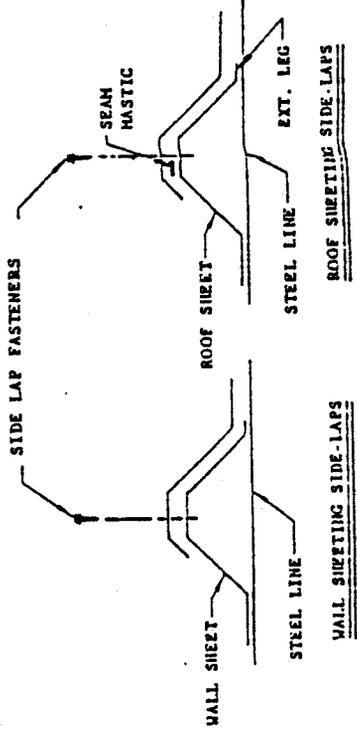
ROOF AND WALL FASTENER LOCATIONS  
AT PANEL END LAPS, RIDGE, EAVE AND BASE



FASTENER LOCATIONS AT INTERMEDIATE  
GIRT AND PURLIN LOCATIONS



PANEL LAP



NOTES:

REVISIONS

NO.	DATE	REV. BY

CUSTOMER: **SATELLITE/ROCKY RAIS**

LOCATION: **GOLDEN, CO**

DWG. BY: **KLJ** SCALE: **N.T.S.**

DATE: **2/2/68**

CK BY: **VJ**

**Preston**  
STEEL BUILDING CO.  
GRIFFIN, CO.

ROY PREVIOUS

## SECTION 15050

### EQUIPMENT INSTALLATION

#### PART I: GENERAL

- 1.1 DESCRIPTION: This Section covers the relocation, moving, installation, alignment, grouting, leveling, and testing of the equipment as shown on the Drawings.
- 1.2 QUALITY ASSURANCE: The Contractor shall be responsible for providing all lifting, skidding, jacking, roller equipment, and labor to install the equipment.
- 1.3 SUBMITTALS: The Contractor shall furnish to the Buyer a general arrangement drawing showing necessary moving equipment which will be used in installing the equipment. The Contractor shall furnish upon request of the Buyer necessary proof that the moving equipment is in a safe operating condition and that the moving equipment is capable of handling the loads to be imposed upon it. The Contractor shall furnish the Buyer the procedure of which the equipment shall be moved.

#### PART II: PRODUCTS

- 2.1 MATERIALS: General: The Contractor shall furnish and install adequate leveling plates, blocks, dowels, and shims. Plates and blocks shall be steel plate stock with sheared edges. Stock may be flame cut. All shim and dowel stock shall be cold-drawn steel. Dowels shall be straight with provisions for pulling.

#### PART III: EXECUTION

##### 3.1 EQUIPMENT INSTALLATION:

- A. General: Equipment, both Contractor and Buyer furnished, shall be installed and fastened as indicated on the Drawings complete with all appurtenances in place, aligned, tensioned (V-belt trans.), grouted, tested, and ready for operation.

- B. Workmanship:

1. After moving equipment into place, the Contractor shall carefully uncrate, assemble, and install the equipment.

All work shall be performed by skilled, qualified mechanics working at their trade under experienced supervision. Equipment shall be completely assembled and all work shall be the product of first-class workmanship. Any defective or unsatisfactory installation work shall be corrected by the Contractor at the Contractor's expense.

2. Packing material shall be removed from the premises and disposed of as directed by the Buyer.

C. Lifting and handling:

1. All lifting and handling shall conform to OSHA safety practices. All handling and positioning techniques employed, including lifting, skidding, and jacking, shall be performed in a manner that will avoid subjecting the equipment to undue flexure and stress. Hooks and slings shall not be attached in any manner that can possibly result in bending, damaging, or breaking any part of the equipment. Lifting attachments shall be provided as required for lifting and setting in place and shall be approved by the Contractor.
2. Pallets, cradles, and skids shall be used wherever necessary to safely handle equipment. Lifting eyes and lugs provided on the equipment shall be used in making lifts. Any saddles, spreader beams, or other special lifting equipment required shall be provided by the Contractor.
3. Any damage to the equipment which was not present prior to installation shall be repaired by the Contractor at no additional cost to the Buyer.

D. Foundation Preparations: All caulking and dirt shall be removed from the anchor bolts and sleeves for freedom of movement. The surfaces of the foundation shall be cleaned with water before grouting. The Contractor shall make no adjustments to anchor bolts except as directed or approved by the Buyer.

E. Grouting: Grouting shall be in accordance with Section 03300 and the manufacturer's instructions using nonshrink grout.

F. Leveling: All equipment specified in room shall be precision leveled as described below and as set forth in the American Society of Mechanical Engineers B5.16 Standard. All other equipment shall be set true and level.

1. Equipment to be set true and shall be leveled both in the longitudinal and axial direction with a 36-in. carpenter's level. These levels shall be approved by the Buyer.
2. Equipment which requires precision leveling shall be leveled within 0.0005 in. in 12 in. in two directions using a four-way "Fells" precision level. The level shall be located on the work table surface or on the longitudinal ways and cross sideways as applicable. The leveling surfaces shall be clean and free of nicks and

burrs. At least three repeat readings shall be taken, without an intervening failure, rotating the level 180 degrees between readings. The Buyer shall observe the readings and will record the readings on each machine.

- G. Operational Check: All spindles, drive motors, and accessory equipment such as fans, pumps, vacuum units, etc., are to be checked for proper rotation and operation before equipment is placed into service.
- H. Touchup Paint: Surfaces of equipment installed hereunder, which are damaged or scratched during installation, shall be properly repaired and repainted to match existing paint used on the machine. The Contractor shall furnish all materials and labor required to accomplish this purpose.

END OF SECTION

SECTION 15175

INFLUENT TANKS

PART I: GENERAL

1.1 DESCRIPTION: This section covers the installation of the four (4) Government Furnished tanks (T-201, T-202, T-203, T-204). The tanks will be furnished by the Buyer, and tank details are presented shown in Section 3 for Government Furnished Equipment.

PART II: PRODUCTS

2.1 PROCESS VALVES: The following valves shall be supplied by the Contractor for attachment to each of the four (4) tanks

- 2" plug valve on drain
- 1/2" spigot on sample port

2.2 INSULATION: Tank insulation and aluminum jacket will comply with Section 15180.

PART III: EXECUTION

3.1 Tanks shall be installed as shown on the Drawings and as specified in Section 15050.

3.2 Piping shall be connected as shown in the Drawings and as specified in Sections 15060, 15099 and 15400.

3.3 The tanks shall be insulated as specified in Section 15180.

END OF SECTION

## SECTION 15180

### PIPE AND INFLUENT TANK INSULATION

#### PART I: GENERAL

- 1.1 DESCRIPTION: This section covers the furnishing and installing of the insulation on exposed and buried above freezing zone (approximately five (5) feet of cover) influent and effluent piping, domestic cold water piping, and the four (4) outdoor installed ground water storage tanks as indicated on the Drawings. The installed insulation shall completely insulate the systems as required for freeze protection.
- 1.2 SUBMITTALS: Submit Shop Drawings, catalog data, and descriptive literature of all items in accordance with requirements described in Division 1 of these Specifications.
- 1.3 STORAGE AND HANDLING: All materials to be used shall be protected from the elements during storage. Materials shall be stored and handled in a manner so as to prevent damage. Any insulation exposed to moisture prior to installation shall be rejected by the Buyer.

#### PART II: PRODUCTS

- 2.1 General: Insulation shall be suitable for both indoor and outdoor use for temperatures ranging from -20 degrees F to 400 degrees F. The insulation shall have ratings not to exceed flame spread of 25, smoke development of 50, and fuel contribution of 50 when tested to American Society for Testing and Materials (ASTM) E-84 and Underwriters' Laboratories, Inc. (UL), 723.
- 2.2 Closed-Cell Insulation: Expanded closed-cell insulation shall be flexible, elastomeric thermal insulation, 4 PCF density, supplied in tubular form 1 1/2" thick for piping and flat sheets 2" thick for influent tanks. Thermal conductivity shall not exceed  $K=0.25$  BTU x in./hr. x ft<sup>2</sup> x degrees F at 0 degrees F mean temperature per ASTM C177, water vapor permeability less than 0.17 perms per ASTM E 96 procedure E, water absorption less than 6% by weight per ASTM D 1056. The closed cell insulation shall be as manufactured by Armstrong Armaflex, Thermazip, Certain Teed or approved equal.
- 2.4 Jacketing: Fitting coves and jacketing for piping and tanks shall be aluminum alloy 3003-H14 per ASTM B209, thickness 0.025 in., fabricated to exact dimensions. Structural members, if used for reinforcement shall be alloy 6061-T. Clamps for underground applications shall be stainless steel and underground gasket material shall be neoprene.
- 2.5 Non-Shrinking Caulk: Suitable for outside application with temperature range from -30 degrees F to 100 degrees F.

### PART III: EXECUTION

#### 3.1 GENERAL:

- A. All necessary testing on piping and tanks shall be completed prior to installation of insulation.
- B. Install all materials according to the approved recommendations of the manufacturer and conforming to the Drawings and Specifications.
- C. All insulation shall be installed over clean, dry surfaces.
- D. Pipes and tanks to be insulated shall be as indicated on the Drawings.
- E. Work shall be done by a Contractor who is thoroughly familiar with insulation applications. Contractor shall exercise extreme care while backfilling insulated piping to protect jacket.

3.2 ABOVE GROUND INSULATION: Pipe insulation shall be 1 1/2" thick and tank insulation shall be a total of 2" thick. Molded pipe insulation shall be slit lengthwise and snapped over clean and dry piping already connected and/or slipped onto piping before it is connected. Fitting insulation shall be premolded or fabricated from 1 1/2" thick miter-cut tubular form or from 1 1/2" thick sheet insulation held in place with 16 gauge wire. Tank insulation shall be fabricated from 2" thick sheet. In all cases, butt joints and seams shall be sealed with manufacturer recommended contact adhesive. Both surfaces to be joined shall be coated with adhesive.

3.3 APPLICATION OF JACKET: Aluminum sheets for tanks and aluminum tubing for piping and/or fittings shall be joined in the field and sealed vapor tight with non-shrinking caulks. Structural reinforcement; when used, shall be attached to jacket with aluminum fasteners.

3.4 BELOW GROUND INSULATION AND JACKET: Pipe insulation and jacket shall be applied as above except that the jacket shall have a bottom aluminum boot completely sealed around the pipe to prevent any moisture intrusion. Each boot shall be secured to the pipe with a stainless steel clamp isolated from the aluminum jacket with a neoprene gasket. An identical gasket shall be provided between the pipe and aluminum boot to isolate dissimilar metals.

END OF SECTION

## SECTION 15400

### PLUMBING

#### PART I: GENERAL

- 1.1 DESCRIPTION: This section covers the furnishing, installing, adjusting, and testing of the piping systems as outlined herein and as indicated on the drawings.
- 1.2 SUBMITTALS
- A. Shop drawings, catalog data, and descriptive literature of all items in accordance with requirements described in Division 1 of these specifications.
  - B. This data shall indicate overall dimensions, weights, metal gages, materials, construction details, certified capacities and ratings, full nameplate ratings, pressure ratings, and all other information necessary for the evaluation of the materials and/or equipment.
- 1.3 INSTALLING OF EQUIPMENT
- A. Equipment that is to be removed and reinstalled shall be suspended or supported to be set true and level. It shall be the Contractor's responsibility to furnish and install necessary shims to level the equipment.
  - B. The equipment shall be suspended or supported so that it may be easily disconnected and removed for service. All components requiring lubrication shall be properly serviced and lubricated with the proper amount of the equipment manufacturer's recommended lubricant. The testing of the piping systems shall be before starting the equipment.
  - C. The Contractor shall notify the Buyer at least 7 days in advance as to when the equipment is to be started in order that the manufacturer's servicing engineer will be onsite to start up and adjust the equipment.
- 1.4 INSTALLING OF GOVERNMENT-FURNISHED EQUIPMENT: The Contractor shall be responsible for setting of the Government-furnished equipment (GFE) tanks. The tanks shall be set true and level. It shall be the Contractor's responsibility to furnish and install necessary shims to level these tanks. It shall not be necessary to lag these tanks to the floor.

PART II: PRODUCTS

2.1 MATERIALS

- A. General - Piping materials and fittings shall be new and as specified unless otherwise noted on the drawings.

Plastic pipe shall only be used when absolutely necessary. At such time written approval shall be obtained from the Fire Protection Engineer.

B. Piping and Fittings

1. Natural Gas - with a maximum working pressure of 125 psig and maximum temperature of 200°.

Pipe

3 in. and smaller      Schedule 40 black butt weld or continuous welded steel to ASTM A-120

Fittings

3 in. and smaller      150# galvanized malleable iron screwed to ASTM A-153

Unions

3 in. and smaller      150# galvanized malleable iron screwed bronze to iron, ground joint

Ball Valves

3 in. and smaller      600# bronze, screwed, chromium plated ball

Apollo 80/81-100      600# UL-listed  
Watts B-6000

Pressure Regulating Valves

2 in. and smaller      Aluminum casing and body, screwed  
Fisher S250              synthetic rubber diaphragm and disc  
60 psi inlet pressure/10 to 13 in.  
Rockwell                w.g. outlet pressure with over-  
Sprague                 pressure protection up to 125 psig

### Natural Gas Meter

American Meter	AC-250	One-piece die-cast aluminum body,
Rockwell	R275	duramic diaphragm, self-lubricating
Sprague	S250	bearings, reinforced frag rods, adjustable tangents. max. capacity 250 cfh 1 in. connections max. working pressure 5 psi

2. Domestic hot water (potable), domestic cold water (potable) above ground, with a maximum working pressure of 125 sig and a maximum temperature of 200°F:

### Pipe

2 in. nom. and smaller	Type K or L hard-copper water tube to ASTM B-88
2 1/2 in. to 6 in.	Schedule 40 galvanized butt weld or continuous welded steel to ASTM A-120

### Fittings

2 in. nom. and smaller	Wrought copper solder joint to ANSI B16.22	
2 1/2 in. to 6 in.	150# galvanized malleable iron screwed to ASTM A-197 and ANSI B16.3	
2 1/2 in. and larger	125# IBBM flanged	
Lunkenheimer	1123	125# SWP @ 450°F - 200# WOG
Crane	351	C.I. body renewable bronze seat
Walworth	906F	Bronze cone-type disk
Jenkins	613	Rising stem, OS&Y bolted bonnet

### Check Valves

2 in. and smaller	125# bronze soldered	
Lunkenheimer	2145	125# SWP saturated
Crane	1342	Bronze body integral seat
Walworth	406SJ	Screwed cap
Powell	1825	125# IBBM flanged
2 1/2 in. and larger		
Lunkenheimer	1790	125# SWP @ 450°F - 200# WOG
Crane	373	Ratings 14 in. and up - see manufacturer's catalogs
Walworth	928F	C.I. body, renewable bronze seat

Jenkins	624	Brass-faced disk
Powell	59	Bolted cap

Pressure Reducing Valves

3 in. and smaller		150# screwed 200# WWP @ 200°F set at 50# outlet
Watts	25 AUB	bronze body, stainless steel seat, stainless steel strainer, 0-160# pressure gauge
Wilkins	500YSBR	

Backflow Preventing Valves

Watts	909SQT	175# WWP @ 140°F, screwed bronze body, stainless steel seats
Febco	825Y-BV	shafts and bolts

Unions

2 in. nom. and smaller		Wrought copper solder joint to ANSI B16.22
2 1/2 in. and larger		Use flanges

Gaskets

All sizes		150# 1/16-in. full-faced punched non-asbestos sheet
-----------	--	---

Bolting

Regular square-head machine bolts with heavy hex nuts to ASTM A-307 Grade B. ANSI B1.1 coarse thread series, Class 2B fit.

Flanges

2 1/2 in. to 6 in.		125# galvanized cast iron threaded, flat-faced, ASTM A-197
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Gate Valves

2 in. and smaller		125# bronze soldered
Lunckenheimer	2133 or 2132	125# SWP saturated
Crane	1342 or 1334	Bronze body integral seat
Walworth	4SJ or 55-SJ	Solid wedge
Powell	1822 or 1821S	Screwed 125# Bonnet

2 1/2 in. and larger	125# IBBM flanged
Lunkenheimer 1430	125# SWP @ 450°F - 200# WOG
Crane 465 1/2	Ratings 14 in. and up - see manufacturer's catalogs
Walworth 726F	C.I. body, renewable bronze seat
Powell 1793	OS&Y bolted bonnet

Globe Valves

2 in. and smaller	150# bronze soldered
Crane 1310	150# SWP saturated
Lunkenheimer 126	Renewable composition disk (specify)
Walworth 95SJ	Rising stem, inside screw
Powell 1823A	union bonnet

Water Meter

Badger TR	150# screwed
Hersey MHD	bronze body, magnetic drive for cold water up to 120°F, hard rubber disc, normal flow 5-100 gpm, with gear train adapter and Easy-Read totalizing/reset register in gallons

Piping Insulation

Knauf	type B, semi-rigid fiberglass board
Manville	in roll form faced with a factory approved ASJ or FSK vapor retarder
Owens-Corning	1 in. thickness, conductivity K = 0.26, BTU/hr Ft <sup>2</sup> °F

3. Underground Water with a maximum working pressure of 150 psig.

Pipe

2 in. and smaller	Type K soft-copper water tube to ASME B-88
3 in. to 12 in.	Ductible iron, 150 psi, Tyton joint, to ANSI A21.51 (AWWA C-151) and Federal Spec. WW-P-421C

Fittings

2 in. and smaller	Cast flare couplings, Mueller brass Style WW-812
-------------------	--

3 in. to 12 in. Grey iron, bell ends, 250 psi, Tyton joint, to ANSI A21.10

#### Valves

2 in. and smaller Shall not be used unless specified elsewhere

3 in. to 12 in. IBBM gate, AWWA, 200 psi cold water belled ends for slip-on joint ends, with slip-on gasket for use with Tyton ductile iron pipe, Kennedy #901-X

#### Valve Box

Buffalo type, label "water," depth to suit valve installations with top of box 6 in. above existing grade.

#### 4. Sanitary Waste, Sanitary Vent, and Roof Drains

a. For sanitary waste above ground or inside building:

#### Piping

1 1/2 in. and smaller Schedule 40 galvanized buttweld or continuous welded steel to ASTM A-120

2 in. and smaller Service cast iron, hub and spigot soil pipe to ASTM A-74 or hubless to CISPI 301

#### Fittings

1 1/2 in. and smaller Cast iron, black screwed drainage fittings to ASTM A-126 and ANSI B16.12

2 in. and larger Service cast iron, hub and spigot soil pipe fittings to ASTM A-74 or hubless to CISPI 301

#### Cleanouts

Cleanouts for cast iron pipe shall consist of a tapped, extra heavy cast iron ferrule, calked into cast iron fittings, and extra heavy brass tapered screw plug; cleanouts for steel pipe shall consist of extra heavy brass screw plugs in drainage fittings.

Cleanouts shall be provided at or near the foot of each vertical soil or waste stack. The distance between cleanouts in horizontal piping shall not exceed 50 ft for 3 in. or less in size and not over 100 ft for 4 in. and over in size. Cleanout shall also be provided in each branch line to fixtures and at each change of direction greater than 45 degrees.

The cleanout shall be of the same nominal size as the pipes to serve up to 4 in. in diameter and not less than 4 in. for larger piping.

Each cleanout shall be installed so that it opens in a direction opposite to the flow of the soil or waste or at right angles thereto and, except in the case of wye branch and end-of-line cleanouts, vertically above the flow of the pipe.

Cleanouts turning out through walls and up through floors shall be made with long sweep ells or wye and one-eighth bends with plugs and face or deck plates to conform to the architectural and/or mechanical drawings; wall plates shall be chrome-plated cast brass and floor plates shall be nickel bronze.

Cleanouts installed in finished floors to be covered by tile or composition flooring material shall be Zurn ZN-1405-7 or ZN-1400-7, with nickel bronze recessed inlay-type access cover. Cleanouts installed in finished walls shall be Zurn ZN-1440-1 or ZN-1460-8, with nickel bronze cover with securing screw.

Cleanouts installed in concrete floors other than mechanical rooms, garages, or heating tunnels shall be ZN-1405-2 or ZN-1400-2 furnished with nickel bronze top and adjustable to finished surface of floors.

Cleanouts installed in concrete floors in mechanical rooms, garages, or heating tunnels shall be Zurn Z-1423-27 or Z-1420-27.

b. For sanitary waste and sanitary vent below ground:

Piping

All sizes	Service cast iron, coated, hub and spigot soil pipe to ASTM A-74
-----------	--

Fittings

All sizes                      Service cast iron, coated, hub and spigot soil pipe fittings (use standard radius bends) to ASTM A-74 or ASTM C-564 and CISPS 301

c. For sanitary vent above ground:

Piping

3 in. and smaller              Schedule 40 galvanized butt weld or continuous welded steel to ASTM A-120

4 in. and larger                Service cast iron, hub and spigot soil pipe to ASTM A-74 or hubless to CISPS 301

Fittings

3 in. and smaller              Cast iron, black, screwed drainage fittings to Astm A-126 and ANSI B16.12

4 in. and larger                Service cast iron, hub and spigot soil pipe fittings to ASTM A-74 or hubless to CISPI 301

d. For roof drains:

Piping

6 in. and smaller              Schedule 40 galvanized butt weld or continuous welded steel to ASTM A-120

Fittings

6 in. and smaller              150# galvanized malleable iron screwed to ASTM A-1917 and ANSI B16.3

5. Gas Vents:

Rernor                              24 ga galvanized steel sheetmetal,  
Breident L                          single-wall type B, UL-listed round flues for gravity draft, sealed with aluminum or teflon tape suitable for 550°F temperature.

2.2 PIPE HANGERS, ANCHORS, AND SUPPORTS

A. Existing hangers and pipe racks will be used where approved by the Buyer and where noted on the drawings.

- B. The materials of supports shall be compatible with the characteristics of the piping material so that neither shall have a deteriorating action on the other.
- C. Supports shall be dimensionally compatible with the outside diameter of the pipe and/or insulation.
- D. Pipe hangers, anchors, and supports and all their components shall be the standard products of a manufacturer. Straps, wire, and "all-threaded" rods shall not be used in potentially plutonium-contaminated areas. The materials of all pipe hanging and supporting elements shall be in accordance with Manufacturers' Standardization Society (MSS) SP-58.
- E. Hanger and support components shall be selected from Table 1 of MSS SP-69 within the system classification. All domestic cold water and hot water shall be from 60° to 220°F.

2.3 ESCUTCHEONS: Grinnell Figure 13, chromium plated.

2.4 TEST FLUIDS: Acceptable bubble test fluids are American Gas and chemical Inc., "Leak-Tec;" Cargille Scientific, Inc., "Sho Gas;" Flamort chemical Company, "Detect-A-Leak;" or Highside Chemicals, Inc., "Leak Finder Foam." Substitute test fluids shall be approved in writing by the Buyer.

## 2.5 EQUIPMENT

- A. The following plumbing fixture catalog numbers are taken from the American Standard catalogs. The Vendor shall submit a portfolio in six copies showing fixtures and trimmings to the Buyer for his approval before releasing fabrication and/or shipment.
- B. All exposed, flush, waste, and supply pipes at the fixtures shall be chromium-plated brass pipe, iron pipe size. The faucets, stop valves, pop-up waste, traps, etc., shall be heavy cast brass, chromium plated. Supplies to all individual fixtures shall be equipped with high-grade, chromium-plated stop valves. All chromium plating shall be applied over a nickel-plated base.
- C. W-1 Water Closet
  - 1. Fixture - American Standard 2477.016 "Afwall" white vitreous china, wall hung, siphon jet, elongated bowl, and 1 1/2 in. to spud.
  - 2. Flush Valve - Sloan Royal 115 FQYV with vacuum breaker, 1-in screwdriver stop, and flush connection.
  - 3. Seat - Olsonite No. 10, white solid plastic, extended back, open front, elongated rim seat with check hinge, and less cover.

4. Carrier - Zurn, Josam, Wade, or J. R. Smith to suit required installation. All carriers shall be fully adjustable type.

D. L-1 Lavatory

1. Fixture - American Standard 0350.132 "Lucerne" white vitreous china, 20- X 18-in. rectangular basin, front overflow, wall hung.
2. Supply Fitting - American standard 2238.392 Heritage spread faucet, 8-in. centers, 8-in. gooseneck sprout with aerator, renewable seats, 4-in. handles, pop-up drain with 1 1/4 in. tailpiece.
3. Supply Pipe - American Standard 2302.115 3/8-in. IPS angle supply with stop, annealed vertical risers with loose key stop escutcheon.
4. Trap - American Standard 4401.014 cast brass adjustable "P" trap with cleanout, waste to wall, and escutcheon.
5. Carrier - Zurn, Wade, Josam, or J. R. Smith concealed arms carrier to suit installation. Carrier shall be capable of supporting 300 lb.

E. EEW-1 Emergency Eye Wash and Shower

HAWS 8301	Combination of drench shower and eye wash hand or foot operated, 1 in. IPS stay-open ball valve, stainless steel bowl, 10 in. impact resistant shower head.
Bradley S19-310 AC	

F. WHA-1 Water Hammer Arrestors

Zurn Shocktrol	Stainless steel one-piece drawn body precharged, with male threaded stainless steel nipple, for flow not less than 80 gpm.
Smith Hydrotrol	

G. WH-1 Water Heater

Chronomite Labs S-30L/208	Tankless 3 kw instantaneous water heater, UL-listed with flow restrictor for a single faucet.
ITS MDT	

H. HB-1 Hose Bibb

Fixture shall be Chicago Faucet 387 sill faucet, 3/4-in.-size female-flanged with 3/4-in. hose thread on outlet, rough nickel-plated. Hose bibb shall be antisiphon design or have an approved vacuum breaker installed.

## PART III: EXECUTION

### 3.1 GENERAL

- A. The general arrangement of the piping shall be as indicated. Departures due to actual field conditions or other causes shall be approved by the Buyer. The Contractor shall carefully examine the drawings and shall be responsible for the proper fitting of materials and equipment, as indicated, without substantial alteration.
- B. The Contractor shall provide all material and labor required and shall make all connections to equipment having pipe connections and which are herein specified or shown on the drawings. Piping provided for future connection to equipment shall be terminated with removable plugs, blind flanges, or caps.
- C. Pipe shall be cut accurately to measurements established at the site by the Contractor and shall be worked into place without springing or forcing. Piping shall be run parallel with the lines of the building unless otherwise indicated. A clearance of not less than 1 in. shall be kept between pipe and other work or the different piping services. Brace connections and changes in pipe size shall be made with standard pipe fittings. Change in direction shall be made with fittings.
- D. Screw joints shall be made with tapered threads properly cut conforming to ASME 82.1. Joints shall be made tight with thread sealing and lubricating compound or Teflon tape applied to male threads only.
- E. Welding shall be performed according to the requirements of ANSI Standard B31.1, entitled "Power Piping" (Code for Pressure Piping).
- F. Tubing shall be accurately cut to measure using the proper tools to ensure a square cut. Burrs shall be removed by using a reamer or file specifically designed for this purpose. Surfaces to be joined shall be thoroughly cleaned to remove any oil, grease, or heavy oxides. Tubing that is out of round shall be brought to true dimensions and roundness by use of a sizing tool. Apply flux to both the end of tubing and the socket of the fitting as quickly as possible after cleaning. Assembled joints that have not been soldered within 3 hr shall be disassembled, cleaned, and refluxed before proceeding. If a joint is overheated to the extent of burning the flux, the joint shall be opened, recleaned, and refluxed. Surplus solder alloy shall be removed by wiping upon completion of each joint while it is still hot. Excessively large fillets will not be permitted.

- G. Cast iron pipe joints shall be made by caulking with two strands of tarred oakum, finishing the joint with molten lead bedded with hammer and caulking tool, using for each joint not less than 12 oz per inch of diameter. Each joint shall be filled with one pouring of the lead. The lead shall not be covered with paint or putty.

At the option of the Contractor, joints for cast iron pipe and fittings may be by the use of elastomeric compression-type joints.

- H. Connections to existing piping of dissimilar material shall be made with dielectric unions.

3.2 PIPE PENETRATIONS AND SLEEVING: Pipe penetrations shall conform to Section 07901.

3.3 PIPE IDENTIFICATION

A. Definitions

1. Piping Systems - For the purpose of this section, piping system shall include fittings, valves, and piping accessories. Pipes are defined as conduits for the transport of gases and liquid.
2. Identification - Identification of piping system content (flow media) shall be a lettered legend giving the name of the contents in full (no abbreviations) as called out in the drawing legend.

B. Application

1. Location

- a. All exposed or concealed piping in finished or unfinished areas shall be identified. Underground piping shall be expected.
- b. Identification and supplementary information legends shall be applied close to all valves, branches, changes in direction, on both sides of each floor, wall, or barrier through which the line passes, every connection to equipment, and at a maximum of 20-ft intervals on straight runs of piping.

## 2. Method

- a. Pipes shall have identification clearly lettered with the aid of stencils. Stenciling shall be accomplished with paint materials only; tapes and "stick-on" labels and materials are not permitted. Pipe not otherwise painted shall be painted with a white patch of sufficient length and width to receive the legends. black stenciling shall also be used on white patches. Legends shall be clear, sharp, and legible.
  - b. Pipe or coverings less than 3/4-in. actual outside diameter shall have identification and supplementary information legends on 1/2-in.-wide aluminum tape, such as DYMO, banded in place. See the following sketch.
3. Orientation of Legends - Attention shall be given to the orientation and visibility of identification legends. The legends shall be arranged and located so as to be easily readable by a person standing on the floor or at the normal access location to the pipe. Stenciled legends shall generally be arranged parallel with the axis of the pipe.
4. Letter height shall be as follows:

<u>Pipe or Covering Actual Outside Diameter</u>	<u>Height of Lettering</u>
3/4 in. to 1 1/2 in.	1/2 in.
Over 1 1/2 in. to 2 in.	3/4 in.
Over 2 1/2 in. to 6 in.	1 1/4 in.

### 3.4 FIELD QUALITY CONTROL

- A. Cleaning - Piping shall be clean, free of scale, and thoroughly blown free of all foreign matter with dry compressed air. Valves and equipment shall be thoroughly cleaned. Each item and length of pipe shall be cleaned before assembly.
- B. Testing
  1. General - Testing of underground piping shall be accomplished before piping is covered. All labor, materials, and equipment used for tests shall be provided by the Contractor. If improper assembly is the cause for test failure, piping shall be reassembled and retested at no additional expense to the Government.
  2. Domestic cold water shall be tested at normal working pressure. The only test required shall be a visual inspection of the piping. The test medium shall be water.

3. Sanitary sewer and vents shall be tested by the following methods:
  - a. Test pressure shall be attained by filling the vent to over-flowing.
  - b. Use clean water as the test medium.
  - c. Remove trapped air.
  - d. Hold the test pressure for 1 hour and make a visual leak inspection. Water level loss shall not exceed 1 in.
  
- C. Sterilization of domestic Water Piping - After installation and testing, flush water pipe clean, then sterilize with a solution containing not less than 6 oz by weight of calcium hypochlorite (68 percent available chlorine) per 500 gal of water. Allow solution to remain in system for a period of 8 hr. During this period, open and close valves and faucets several times. After sterilization, flush system with clean water until chlorine content is not greater than 0.2 parts per million. Solution shall be introduced after the shutoff valve.

END OF SECTION

DIVISION 15800

AIR DISTRIBUTION

PART I: GENERAL

- 1.1 DESCRIPTION: This section covers the furnishing, installing, adjusting, and testing of the heating, ventilating, air conditioning, exhaust systems, as outlined herein and as indicated on the drawings. The project drawings show the general requirements as to capacity, size, and arrangement of the equipment and systems. Equipment shall fit into the space allotted and shall allow adequate and acceptable clearances for entry, servicing, and maintenance. Equipment shall be provided in an arrangement that will not necessitate cutting of structural members, that will not interfere with lighting fixtures or doors, and that will present the best appearance possible.
- 1.2 QUALITY ASSURANCE: The Contractor shall be responsible for conducting the examinations and tests required to qualify the performance of the air balancing professionals.
- A. Performance qualification and testing shall be conducted in accordance with Associated Air Balance Council (AABC).
  - B. The Contractor shall submit certified records of performance qualification and testing to the Buyer for approval 7 days before starting air balancing.
- 1.3 SUBMITTALS:
- A. Shop drawing, catalog data, and descriptive literature of all items in accordance with requirements described in Division 1 of these specifications.
  - B. This data shall indicate overall dimensions, weights, metal gages, materials, construction details, certified capacities, and ratings (at 6,000 ft altitude), brake horsepower, motor horsepower, friction drops, pressure ratings, full nameplate ratings, and all other information necessary for the evaluation of the materials and/or equipment.
- 1.4 INSTALLING OF EQUIPMENT
- A. Equipment that is to be installed shall be suspended or supported to be true and level. It shall be the Contractor's responsibility to furnish and install necessary shim to level the equipment. Motors shall be properly aligned with their direct-driven or belt-driven equipment.

- B. The equipment shall be suspended or supported so that it may be easily disconnected and removed for service. All bearings and other components requiring lubrication shall be properly serviced and lubricated with the proper amount of the equipment manufacturer's recommended lubricant. The testing of the duct systems shall be complete and approved by the Buyer before starting the equipment.

1.5 HVAC SYSTEM DESCRIPTION AND OPERATIONS:

- A. Heating and Ventilation System Description and operations for Process Area - Indoor temperature shall be maintained above 55°F (fields adjustable) by means of gas fired unit heater as specified in paragraph 2.02 of this Section. The unit heater shall be controlled by field setting thermostat. When heating demand is satisfied, thermostat automatically shuts off gas valve. The fan will run continuously. Exhaust air fan (EF-1) installed on the roof shall be interlocked with wall mounted cooling only, single stage thermostat for general ventilation. Fresh air will enter the room through roof mounted gravity intake ventilators equipped with backflow dampers.
- B. Office Room - When required, the office room will be air conditioned by cooled air supplied by (HP-1) unit serving the room. The heat pump will maintain slightly positive pressure in office room. Warm air will be exhausted by (EF-2) exhaust fan and relieved through undercut door into the restroom.
- C. Restroom - Ceiling mounted fan (EF-2) provides a min. of 12 air changes/hour for the restroom and ventilates adjacent office room. EF-2 unit will be interlocked with variable speed controller with on-off feature.

- 1.7 GUARANTEE: The Contractor shall furnish a written guarantee to the effect that all material and work furnished under this section is guaranteed for (1) year to be free from defects and faulty workmanship, and that any defective material or work shall be promptly repaired or replaced without additional cost to the Buyer. Guarantee period shall start at substantial completion of project as defined in the Conditions of the Contract. This shall include the refrigerant charge for the air conditioning unit, 5 year warranty on the compressor, 5 year warranty on all aluminum construction exhaust fan units, and 5/10 year warranty on gas-fired unit heaters. The Contractor shall secure optional 5 year warranty on Acme fans prior to the bid.

## PART II: PRODUCT

### 2.1 MATERIAL

#### A. Ductwork

1. Exhaust Ductwork - Sheet metal used in ductwork shall be new carbon steel, shall conform to ASTM A-569, and shall be 11 gage suitable for welded construction.
2. Tape for duct joints and terminations shall be Johns-Manville No. 357, 4-inch-wide vaporproof tape. Tape shall be UL-approved and UL-labeled.
3. Hangers, brackets, and supports shall conform to Low Velocity Duct Construction Standards of the SMACNA. All-threaded rods shall not be used.
4. Birdscreen - Birdscreen shall conform to Low Velocity Duct Construction Manual of SMACNA.
5. Insulation - Insulation for exhaust air sheet-metal ductwork shall be fiberglass flexible sheet with aluminum foil FSK vapor barrier of density 1.5 pcf, R-value minimum 4.4 installed of minimum 2 inch thickness. Insulation shall be UL-listed in compliance with HH-1-5588 Government Standard, STM E84, ASTM C553 type I, NFPA-90A, and NFPA-90B. Accepted manufacturers are: Manville, 812 Spin-Glass, Owens-Corning, Knauf or approved equal.

### 2.2 EQUIPMENT

- #### A. Powered Exhaust Air Fans - Exhaust Fans shall be direct-driven centrifugal type having the capacities and model types as specified herein and shown in drawing equipment schedules. Fans shall be Loren-Cook, Acme Models, sizes and types, quality of construction and performance ratings for buildings, designated, or approved equal. Units shall bear the AMCA label and shall be UL-listed.
1. All parts exposed to weather shall be aluminum, or as indicated. All external fastener bolts shall be stainless steel. The entire drive assembly and wheel shall be removable as a complete unit without disassembling the external for housing.
  2. Roof fan (EF-1) shall be complete with aluminum bird screens, back draft dampers, and NEC electrical disconnecting means beneath the hood, or attached for inside area.

3. Ceiling space toilet fan (EF-2) shall be Gemini horizontal discharge vertical inlet and independently suspended from roof structure, Loren Cook, Acme, or approved equal. Unit shall be complete with factory built-in backdraft damper and wall mounted jack with aluminum or stainless steel bird screen.
  4. Securely bolt exhaust fan and ventilators to roof curb bases. See Architectural and Structural Details.
  5. Motors and Drives - Motors shall be TEFC and shall have standard NEMA frame size and permanently lubricated ball bearings. Drives shall have 1.50 or greater safety factor based on motor horsepower. Motor and drive assembly shall be mounted on neoprene vibration isolators, where indicated.
  6. Fan Bearings - All fan and blower bearings shall be permanently sealed and permanently lubricated ball type capable of over 200,000 hours of bearing life.
- B. Gas Fired Indoor Unit Heaters (UH-1) and UH-2) - The contractor shall provide complete and operating high efficiency gas fired indoor fan type unit heaters. The heaters shall be as manufactured by Reznor model FE-25, Trane or approved equal of input of 25 Mbtu/hr minimum, design-certified by AGA for 80 percent thermal efficiency burning natural gas. The units shall be equipped with a 24V transformer for controls, single-stage regulated combination redundant gas valve, intermittent spark-ignited pilots with electronic flame supervision, all limit and safety controls including combustion air pressure switches to verify power vent flow before allowing operation of gas valves, aluminized heat exchangers and burners with orifices for elevation of 56,000 ft, two point threaded hanger connection, total safety fan guards, discharge louvers with horizontal and vertical blades. The units shall have propeller fans with 120V-1Ph-60Hz motors with internal overload and contractors. Units shall come with 10/5 year extended warranty on the heat exchanger and all electrical and mechanical operating components, respectively.
- C. Electric Unit Heater (UH-3) - The Contractor shall provide a complete and operating 2kW, 208V, single phase, 60hz current unit heater equipped with integral thermostat, overheat protector disconnect, power disconnect switch, built-in fan delay switch, and permanently lubricated, totally enclosed motor. The heater shall be constructed of 16 gauge steel finished with baked enamel cabinet with heavy-duty steel bar grille, and steel fanned metal sheath electric heating element with low sheath temperatures. Unit shall be Emerson Chromalox type AWH-4208 or approved UL-listed equal.

- D. Heat Pump (HP-1) - Through-the-wall GE heat pump model AJT 08DA or Carrier approved equal including wall size, quality, performance rating for cooling, heating on reverse cycle end resistance heating, electrical rating, EER rating and UL-listing. The unit shall deliver 7,800 Btu/hr cooling capacity, 7,400 Btu/hr heating capacity on the reverse cycle of the heat pump, and 8,400 Btu/hr heating capacity from resistance heaters.

The unit shall be equipped with 10 position built-in thermostat, auto-reset heater protector, 3-speed indoor fan with fan only position, energy saver switch. Wall case shall be heavy gauge, four-sided galvanized steel finished with baked enamel for maximum corrosion resistance. The heavy-gauge aluminum grille shall be factory assembled to the wall case. All welded areas shall be coated with a sealing compound to prevent rust. The condensate drain shall be provided with discharge to lavatory tail-pipe. For material of the drain see Plumbing, Section 15400 of these Specifications. Install the unit in strict compliance with manufacturer's instruction.

- E. Gravity Ventilators - Gravity intake air ventilators shall have bird screen and roof curb base with flashing, complete with backdraft dampers designed for air intake only, secured to base with stainless steel bolts. Ventilator shall be spun aluminum relief type PR as manufactured by Loren-Cook Size 12, Penn Aurette or approved equal. Units shall be complete with aluminum backdraft dampers type LI designed for intake service equipped with poles, chains, or other approved, simple means to allow for complete closing and lock for winter season from the floor level.
- F. Variable Speed Controller - Exhaust Fan (EF-2) shall be equipped with solid state variable speed controller allowing operation of the exhaust fan from 100 percent capacity down to approximately 50 percent with on-off feature. Speed controller shall be as manufactured by Loren-Cook Model FSC, Acme Model SSC or approved equal suitable for (EF-2) electric motor amperage.

### PART III: EXECUTION

#### 3.1 PREPARATION

- A. Field Measurements - Existing duct and duct transition dimensions as shown on drawings are approximate and shall be confirmed in field by Contractor. The general arrangement of the ductwork shall be as indicated. The Contractor shall carefully examine the drawings and shall be responsible for the proper fitting of materials and equipment, as indicated, without substantial alteration.

- B. Ductwork - All ductwork shall be fabricated and installed in accordance with Low Velocity Duct Construction Standards Manual of SMACNA and as otherwise specified herein. Joints shall be made substantially leaktight. Unless otherwise approved, ducts shall conform accurately to the dimensions indicated and shall be straight and smooth on the inside and joints shall be neatly finished. Ducts shall be anchored securely to the building in a manner approved by the Buyer and shall be so installed as to be completely free from vibration under all conditions of operation. Laps shall be made in the direction of airflow. Edges and slips shall be hammered down to leave a smooth interior duct finish.
- C. Hangers, Bracket, and Supports Spacing - Hanger, bracket, and support spacing shall conform to Low Velocity Duct Construction Standards Manual of SMACNA.
- D. Apparatus Connections - Where sheet metal connections are made to fans or where ducts of dissimilar metal are connected, a flexible connection shall be installed. Flexible connections shall be securely fastened by sheet metal screws.
- E. Equipment Supports
  - 1. Equipment supports shall be provided as indicated on the drawings.
  - 2. Equipment shall be set true and level. All bearings and other components requiring lubrication shall be properly serviced and lubricated with the proper amount of the manufacturer's recommended lubricant.
- F. Duct penetrations and sleeves shall conform to Section 07901.

3.2 OPERATIONAL REQUIREMENTS: The following are requirements for final acceptance.

- A. Place systems in operation for one day and instruct the Buyer's operating personnel on operational requirements and systems functions, and demonstrate the operation of systems in the presence of the Buyer and to the Buyer's satisfaction.
- B. Provide (6) sets of Service Manuals covering all operating equipment, including service parts lists and operating sequences and controls diagrams, as per Article 1.11 with recommendations of minimum spares requirements.
- C. Submit a letter stating that the control system has been installed per heater manufacturer's requirements and has been adjusted, tested under operating conditions and left in satisfactory condition. The letter shall also state that the control manufacturer provides a service and parts guarantee for one (1) year from the date of installation acceptance without additional costs to the Buyer.

3.3 MAINTENANCE AND OPERATIONAL INSTRUCTIONS: Upon completion of the final testing of operating systems, the Contractor shall place a competent man in charge who shall instruct the Buyer's Operator in all details of operation and maintenance. Arrangements shall be made through the Buyer to have a representative of the maintenance department concerned present for instruction.

END OF SECTION

## DIVISION 15900

### AUTOMATIC TEMPERATURE CONTROL

#### PART I: GENERAL

- 1.1 Controls utilized in this specification are of an electric type.
- 1.2 The control system shall consist of all thermostats, temperature transmitters, controllers, dampers, damper operators, and valves for a complete and operable system. All control equipment shall be fully proportioning, except as noted otherwise.
- 1.3 SUBMITTALS: Submit shop drawings, catalog data, and descriptive literature of all items in accordance with requirements described in Division 1 of these specifications.

#### PART II: PRODUCTS

##### 2.1 MATERIAL

###### A. Thermostats

1. Process Room unit heaters shall have wall-mounted thermostats with temperature setting lever.

Single stage, room thermostats shall be heating only, controlling gas fired unit heater/ventilator (UH-1) and (UH-2) in Process room. The heating only, single stage, thermostat shall be 24V, as manufactured by Honeywell model T B22D 1685 with range 35°F to 65°F, low voltage, Barber-Coleman model TC-1103 with range 25°F to 105°F, Rezn or approved equal. Provide two (2) thermostats for Process Room.

2. Process Room exhaust fan shall be controlled by a wall-mounted thermostat with temperature setting lever.

Single stage, room thermostat shall be cooling only 120V line voltage, as manufactured by Barber-Coleman model TC-1153, Honeywell model T 42 J 1094 (Celsius model) or approved equal. Provide one (1) unit for (EF-1) in the Process Room.

3. Office Room heat pump shall have built-in electric 24-volt (V) thermostat. Thermostat shall be ten-stage cooling and ten-stage heating.

## PART III: EXECUTION

### 3.1 DRAWINGS AND BROCHURES

The Contractor shall prepare two complete brochures containing the complete engineering drawings of the system with a complete sequence of operation. Brochures shall contain specifications and maintenance data sheets of each control device used in this system. Four additional copies of the drawings shall be supplied and sent with the brochures to the Contracting Officer for approval before startup and installation.

### 3.2 POST INSTALLATION INSTRUCTIONS

Upon completion of the work, the automatic control Contractor shall instruct operating personnel on the operation of the system. This instruction and operating time shall not be less than 8 hours.

### 3.3 SERVICE AND GUARANTEE

After completion of the installation, System Operations shall adjust all thermostats, control valves, motors, and other equipment provided under this contract. Systems Operations shall place the system in complete operating condition subject to the approval of the Contracting Officer. If the equipment herein described is proved to be defective in workmanship or material, it will be replaced free of charge by the Contractor.

### 3.4 CONTROL SEQUENCES

- A. Office Room Heat Pump - Solid-state temperature control shall be integral with unit. The selection of one of ten available operating modes will be manual.
- B. Process Exhaust Fan - Exhaust fan shall be controlled using a single stage, wall-mounted thermostat. When the space temperature exceeds 80°F, the exhaust fan will be started.
- C. Gas-Fired Unit Heaters - Heaters shall be controlled using wall-mounted thermostats. Thermostats shall cycle burner and fan motor automatically if space temperature drops below 55°F. Heaters are for emergency freeze protection.

END OF SECTION

## SECTION 16010--ELECTRICAL

### PART 1: GENERAL

#### 1.1 GENERAL REQUIREMENTS

- A. The installation of all electrical equipment shall comply, as a minimum requirement, with the applicable rules of the latest additions of the National Electrical Code (NEC) and the National Electrical Safety Code. Where code requirements are exceeded on the drawings or in this specification, drawings and specifications shall apply. Where a conflict exists between code requirements and drawings and specifications, the most stringent requirements shall apply.
- B. The contract drawings indicate the extent and general arrangement of the conduit, wiring, and equipment installation. Exact field mounting, routing, and installation details, where not explicitly shown on the drawings and not indicated in these specifications, shall be determined by the Contractor. The Contractor shall execute the work in a neat journeyman-like manner using approved materials and methods and at no additional cost to the Buyer.
- C. No portion of the permanent wiring and electrical system shall be utilized until all final inspections have been performed.

### PART II: PRODUCTS

#### 2.1 MATERIALS

- A. All electrical materials shall be new and as listed by the Underwriter's Laboratories, Inc., (UL) except as otherwise specified in these specifications.
- B. All electrical equipment shall be rated and suitable for use and operation at an altitude of 6000 feet.

### PART III: EXECUTION

#### 3.1 ELECTRICAL SAFETY

- A. The Contractor shall take all necessary precautions in the performance of work to safeguard persons from an electrical hazard. The Contractor shall comply with all applicable safety regulations and requirements. The Contractor shall submit an electrical safety program and implementation plan as part of his overall safety program submittal as required in the general provisions of this specification.
- B. Electrical safety regulations referenced in this specification encompass the minimum provisions considered necessary for the safety of personnel. In addition to the Secretary of Labor's "Safety and Health Regulations for Construction," 29 CFR 1910, listed in the

general provisions of this specification, the Contractor shall comply with the American Public Power Association "Safety Manual for an Electrical Utility" and the "National Electrical Safety Code" (NESC) ANSI-C2 for work on electrical systems over 600 VAC. The Contractor shall comply with the "National Electrical Code" (NEC), the NESC, and the Rocky Flats Plant Health, Safety, and Environment (HS&E) Manual. In case of conflict, the most stringent requirements shall apply.

- C. The Contractor shall not perform work on energized electrical systems without prior approval from the Buyer or his designated representative. The Contractor shall submit for approval a written, detailed plan of operations for work to be performed on energized electrical systems.

3.2 REPAIR OF EXISTING WORK: The work shall be carefully laid out in advance. Where any penetrations are necessary for the installation, support, or anchorage of conduits, raceways, or other electrical work, this work shall be accomplished with a minimum of disturbance to existing structures and systems. Any damage or loss incurred to buildings, piping, or equipment shall be repaired and/or replaced at no expense to the Buyer.

### 3.3 INSPECTION AND ELECTRICAL TESTS

- A. The Contractor shall, under the supervision of the Buyer or his designated representative, provide all required test equipment and materials and test all wiring and electrical connections for continuity and grounds. Upon direction by the Buyer, the Contractor shall demonstrate by Megger test, the insulation resistance of any circuit or group of circuits. Where such insulation tests indicate faulty insulation, the Contractor shall replace the faulty material with new material and demonstrate by Megger test that the new material is sound.
- B. All ground rods or grounding terminals shall be tested and recorded in accordance with these specifications using a double scale (0-30 and 0-300 ohms) Null Earth Tester.
- C. All 480 VAC power circuits shall be Megger tested just prior to being placed in operation.
- D. The Contractor shall provide all test equipment and materials and perform appropriate high potential tests on all power cables rated 2.4kV and above.
- E. After the interior wiring systems are completed and at such time as the Buyer may direct, the Contractor shall conduct an operational test on wiring systems and equipment. Equipment shall be demonstrated to operate in accordance with the functional intent of the design and the requirements of these specifications.

END OF SECTION

## DIVISION 16050

### BASIC MATERIALS AND METHODS

#### PART I: GENERAL

##### 1.1 GENERAL REQUIREMENTS

- A. The installation shall comply, as a minimum requirement, with the applicable rules of the latest edition of the National Electrical Code (NEC), except where code requirements are exceeded as specified on the drawings or in this specification.
- B. All electrical materials shall be new and as listed by the Underwriters' Laboratories, Inc. (UL), except as otherwise specified herein.
- C. All lamps shall be Government-furnished but installed by the Contractor.
- D. The contract drawings indicate the extent and general arrangement of the conduit and wiring systems.
- E. No portion of the permanent wiring system for the building shall be utilized until the final inspection is performed.

#### PART II: PRODUCTS

- 2.1 PRODUCT REQUIREMENTS: All electrical equipment shall be suitable for operation at an altitude of 6,000 ft.
- 2.2 CIRCUIT BREAKERS: Circuit breakers for 120/208 V and 480 V shall be suitable for use in the panelboard or motor control center (MCC) in which they are installed. Circuit breaker shall be new and UL listed.
- 2.3 CONDUCTORS
  - A. General - All conductors shall be sized according to the American wire gage (AWG) standard. All conductors shall be copper. All conductors shall be stranded. Minimum size shall be No. 14. Wire sizes No. 14-1 shall be sized at a conductor temperature rating of 60°C. Wire sizes No. 1/0 and larger shall be sized at a conductor temperature rating of 75°C.
  - B. Conductors 250 MCM and larger shall be stranded, 600 volts, and Type RHW.
  - C. Conductors smaller than 250 MCM shall be stranded, 600 volt and Type THW, type THWN, or Type XHHW.

D. High Voltage Cables shall be 15 KV, Type MV-90, 133 percent insulation level, rated 90° centigrade continuous, 130° centigrade emergency overload and 250° centigrade short circuit. The cable shall be delivered reeled and in one continuous length with ends sealed. The cable shall be stranded copper with strand screen, ethylene-propylene rubber insulation, insulation screen, copper shield and polyvinyl chloride jacket. The cable shall be Okonite "Okoguard Okoseal", Rome XLR, or equal.

E. Other - All conductors for other than general use shall be as specified on the drawings.

2.4 CONDUIT AND FITTINGS: Rigid steel conduit shall be zinc-coated and shall be 3/4 inc. minimum size.

## 2.5 IDENTIFICATION

A. The Contractor shall be responsible for identification and labeling of all electrical power equipment as required by the latest revision of RFP SE-104 "Standard for the Identification of Electrical Power Systems". Incorporated herein by Reference.

## PART III: EXECUTION

3.1 REPAIR OF EXISTING WORK: The work shall be carefully laid out in advance. Where any penetrations are necessary for the installation, support, or anchorage of the conduit, raceway, or other electrical work, this work shall be carefully done. Any damage to buildings, piping, or equipment shall be repaired at no expense to the Buyer.

3.2 CIRCUIT BREAKERS: Any installation, preparation, inspection, or performance requirements are included in Part II. Refer to this section for applicable execution requirements. The NEC shall be used as a minimum requirement.

## 3.3 WIRE AND CABLES

### A. General

1. Wires and cables for power, lighting, and control shall, as far as practicable, be continuous from origin to destination without running splices in intermediate pull boxes or outlet boxes. Slack shall be left in all pull boxes and sufficient slack at equipment to allow for neat, workmanlike termination.

2. A wire-pulling lubricant must be used when pulling conductors. If a pulling compound is used, it shall be Minerallac pull-in compound 100 or Ideal Yellow 77.

3. All wires shall be color-coded. The following color code shall be followed explicitly:

a. Electrical branch circuit and interior supply-side circuit conductors shall be suitably color-coded, or otherwise labeled, in such manner to be consistent with NEC requirements and with any existing color-coding or labeling system used at the site for ungrounded circuit conductors. This coding or labeling shall identify voltage levels, the grounded conductors, the equipment grounding conductors and ungrounded single-phase or polyphase conductors. The color-coding for low voltage electrical systems, shown below, shall be used, provided it does not conflict with existing color-coding with color-coded tape banding. Phase colors shall be:

	<u>120/208-240</u> Volts	<u>277-480</u> Volts and Above
Phase 1-A	Brown	Black
Phase 2-B	Orange	Red
Phase 3-C	Yellow	Blue
Neutral	Gray	White
Ground	Green	Green

Single-phase circuit power conductors shall be color-coded per phase as indicated. Neutral conductor shall be white or gray, depending on system.

- b. Motor control conductors (generally No. 14) shall be multi-conductor cables with the individual conductor color coded as per the drawings.
- c. Lighting circuit conductors shall be black for phase conductor, white for the neutral conductor, and red for switch leg.
- d. Grounding conductors shall be insulated and green in color.

B. Splices and Terminations

- 1. In connecting wire and cable to equipment, various methods may be used depending upon the local condition. In general, the use of solderless pressure connectors for terminals, taps, and splices is recommended. Buchanan or Stakon PT series splices are acceptable on wire size up to 1/0 and for 1/0 and larger, Burndy KSV Servits shall be used.

2. Lugs may be T&B, Stakon, or T&N method squeeze connector or Burndy Hi Press. All splices shall be made with solderless squeeze-type connectors whenever possible.
3. All motor lead connections shall be made by bolting the lug of the motor lead back to back with the conductor lug, bolting together with proper size machine screws and using flat washers. Motor connections shall be covered with several layers of rubber and friction tape for vibrating equipment or Scotch No. 33 for other equipment, then a shrink-type cover applied.
4. All taped splices 1/0 and larger, except high voltage, shall be taped with several layers of rubber and sufficient wraps of Scotch No. 33 to equal wire insulation, then a shrink-type cover applied.
5. High-voltage splices shall be made with 3M Company resin pressure splice or tape splice approved for voltage rating. The Contractor shall furnish the Buyer the material list and splice drawing for approval before making splices. Outdoor terminations with shielded cable shall be installed using resin-pressure method for stress cones and Scotch cast terminal shields, or cable manufacturer's approved method may be submitted for approval.

### 3.4 CONDUIT AND FITTINGS

#### A. Conduit

1. Conduit systems shall be installed in accordance with the applicable provisions of the NEC.
2. Conduits shall be concealed within the walls, ceilings, and floors where indicated and shall be kept at least 6 in. from parallel runs of steam pipes or hot water pipes. Exposed runs of conduit shall be installed with runs parallel or perpendicular to walls, structural members, or intersections of vertical planes and ceilings with right-angle turns consisting of cast metal fittings or symmetrical bends. Bends and offsets shall be avoided where possible, but when necessary, shall be made with an approved hickey or conduit-bending machine. the use of pipe tee or vise for bending conduit will not be permitted. Conduit that has been crushed or deformed in any way shall not be installed. Crushed or deformed conduit shall be replaced at no cost to the Buyer at the discretion of the Buyer. Expansion fittings or other approved

devices shall be used to provide for expansion where conduit crosses expansion joints.

3. Wooden plugs inserted in masonry or concrete wall shall not be used as a base to secure conduit supports. Conduit shall be supported on approved types of galvanized wall brackets, ceiling trapeze, or strap hangers. Expansion anchors shall be used in concrete or brick, machine screws on metal surfaces and wood screws on wood construction. Nails shall not be used as the means of fastening boxes or conduits. Conduit shall be installed in such a manner as to prevent the collection of trapped condensation. All runs of conduit shall be arranged so as to be devoid of traps wherever possible. The Contractor shall exercise the necessary precautions to prevent the lodgment of dirt, plaster, or trash in conduit, fittings, and boxes during the course of installation. A run of conduit that has become clogged shall be entirely freed of these accumulations or shall be replaced. Conduit shall be securely fastened to all sheet metal outlet, junction, and pull boxes with galvanized locknuts and one bushing installed in accordance with standard practice. Care shall be observed to see that the full number of threads project through to permit the bushing to be drawn tight against the end of the conduit, after which the locknut shall be sufficiently tightened to draw the bushing into firm electrical contact with the box. Wiring shall not be installed in telephone system conduits unless otherwise specified. All conduits for telephone or future electrical installation shall be provided with pull wires.
4. Empty conduit systems for telephone systems shall be installed with pull wires.
5. All telephone conduit sizes shall be verified with the telephone company before installation.

- B. Conduit Fittings - Outlets shall be installed in the locations shown on the drawings. The Contractor shall study the general building plans in relation to the spaces surrounding each outlet in order that his work may fit the other work required. When necessary, the Contractor shall relocate outlets so that when fixtures or other fittings are installed, they will not interfere with other work or equipment. Only zinc-coated or cadmium-plated sheet steel boxes shall be used. Boxes shall be installed in a rigid and satisfactory manner, either by wood screws on wood, expansion anchors on masonry, or machine screws on steel work. One-piece gang boxes not less than 2 in. deep shall be utilized where necessary.

### C. Wall Penetrations

1. Conduit seals shall be used when routing conduit from a potentially contaminated (hot) area to a noncontaminated (cold) area. The seal shall be located on the potentially contaminated side.
2. Surfaces of joints to be sealed shall be clean, dry, and free from oil, dirt, frost, and foreign matter. Fresh concrete at joints to be sealed shall have cured for at least 7 days prior to sealing.
3. Ambient temperature shall be above 40°F and below 100°F when sealant is applied.
4. Clean metal surfaces of corrosion by wire brushing or using chemical cleaners.
5. Sealant shall be uniformly smooth and free of wrinkles.
6. Apply caulking sufficiently convex to result in a filled joint that is flush after the sealant has dried.
7. Clean all sealant from adjacent surfaces.
8. Follow manufacturer's recommendations.
9. Silicone sealant, General Electric silicone white Silpruf sealant, shall be installed in accordance with manufacturer's recommended procedure.

### 3.5 IDENTIFICATION

#### A. Equipment to be identified includes but is not limited to:

1. Disconnecting devices that are located in the area.
2. Control panels, starters, pushbutton stations, and other control devices.
3. Receptacles and light switches.
4. Instruments and associated devices.
5. Conduit systems.

#### B. Legends

1. The Contractor shall be responsible for electrical identification as directed in paragraph 2.5 of this section of these specifications.

### 3.6 INSPECTION AND ELECTRICAL TESTS

- A. The Contractor shall test, under supervision of the Buyer or his designated representative, all wiring and connections for continuity and grounds, and when directed, he shall demonstrate, by Megger test, the insulation resistance of any circuit or group of circuits. Where such insulation resistance tests indicate the possibility of faulty insulation, the Contractor shall locate the point of fault, replace same with new materials, and demonstrate by further test the elimination of such fault.
- B. All grounds shall be tested and recorded in accordance with the specifications by a double-scale Megger ground tester.
- C. All 480-V 3-phase feeder and feeds shall be given a Megger test and rotation check before being put into operation. The Contractor shall furnish the test equipment.
- D. Records of each inspection and test, together with complete data and readings associated therewith, shall be entered on a form furnished by the Buyer for this purpose. Test data taken and compiled during the inspections shall be certified by the Contractor and Buyer witnessing the tests. Records of the inspections and tests, together with the complete data on all readings taken, shall be made and incorporate into a formal report by the Contractor.
- E. Meggar testing shall be conducted by the Contractor as follows:
  - 1. After installation and before connecting, splicing or terminating, a continuity check shall be performed on each wire.
  - 2. After installation and before connecting, splicing or terminating, a "Meggar" test shall be performed on each insulated conductor used at voltages greater than 150 volts.
  - 3. Where "Meggar" testing is required, the tests shall be made between one disconnected, insulated, conductor, and ground with all other conductors grounded. Each insulated conductor shall be tested in the same manner. The test shall be performed for at least 30 seconds using the 1,000 V setting on the "Meggar". The 100 megohms. Any wire having a "Meggar" reading lower than average by 50 percent or more, even though meeting the minimum requirements, shall be replaced.

- F. After the interior wiring system installation is completed, and at such time as the Buyer may direct, the Contractor shall conduct an operating test for approval. The equipment shall be demonstrated to operate in accordance with the requirements of this specification.

END OF SECTION

## SECTION 16140

### WIRING DEVICES

#### PART I: GENERAL

Refer to Section 16010, Part I, for applicable requirements.

#### PART II: PRODUCTS

2.1 RECEPTACLES: 120-V receptacles shall be as follows or as shown on drawings:

- . Three-wire, 15-A, 125-V, regular
- . Hubbell No. 5261 (single)
- . Hubbell No. 5262 (duplex)

2.2 SWITCHES: For 120-V, single-pole, 20-A, 125-V, Bryant Catalog Item 5861 or Hubbell Catalog Item 9805; for fluorescent lighting loads of 1,200-1,800 W, use Bryant Catalog Item 5431, 30-A, "T" rated, or Bryant Item 4901.

For 120-V, three-way, 20-A, 125-V, Bryant Catalog Item 4967, or Hubbell Catalog Item 9903; for fluorescent lighting loads of 1,200-1,800 W, use Bryant Item 5433, 30-A, "T" rated, or Bryant No. 4903.

#### PART III: EXECUTION

Refer to Section 16010, Part III, for applicable requirements.

END OF SECTION

DIVISION 16150

ELECTRICAL POWER EQUIPMENT

PART I: GENERAL

1.1 MOTORS

A. Rating

<u>Horsepower</u>	<u>Voltage</u>	<u>Phase</u>
1/2 to 150 (inclusive)	230/460	3
Less than 1/2*	115/230	1

\* All 3600-rpm motors, and any requiring high-starting torque or where the continuity of operation is vital, shall be 460 V, 3 phase.

Motors smaller than 1/2 hp furnished on machine tools, or other equipment having a 460-V main drive motor, shall be as normally furnished by the manufacturer and shall include any accessories required to operate from the main power supply.

B. Enclosures - All motors shall be open type, unless otherwise specified.

Motors shall be only one of the following, unless otherwise specified:

1. Drip-proof.
2. Totally enclosed fan cooled (TEFC) or totally enclosed non-ventilated (TENV). Where frame size and price are the same, the nonventilated is preferred.
3. Combination of any one of the above enclosures with a totally molded, vacuum-impregnated, encapsulated winding.

C. Frames

1. All motor frames and end-bells shall be National Electrical Manufacturers Association (NEMA) standard.
2. Polyphase motors 1 hp and larger with frames larger than frame 256 shall have cast iron or fabricated steel and end-bells and frames.

- D. Bearings - All motors shall have antifriction ball bearings unless otherwise specified, except fractional horsepower motors which may have sleeve bearings.
- E. Connection Boxes - All polyphase motors 1 hp and larger shall have conduit connection boxes of cast iron or cast aluminum (with threaded opening) or steel plate. On fractional horsepower motors, where the connections are made in the end-bell space rather than in an attached connection box, a screwed conduit connection shall be provided in the end-bell. Where sheet metal terminal boxes are provided, they shall include knockouts for conduit terminations.
- F. Refer to Section 16050, Part I, for additional requirements.
- G. Motor information required of equipment manufacturer:
  - 1. Manufacturer;
  - 2. Voltage rating;
  - 3. Horsepower;
  - 4. Full load speed revolutions per minute;
  - 5. Full load current;
  - 6. Frame number;
  - 7. Enclosure;
  - 8. Mounting (horizontal or vertical);
  - 9. Base (flange or foot);
  - 10. Slide rails (V-belt driven);
  - 11. Temperature rise °C;
  - 12. Insulation class;
  - 13. Rotation (viewed from shaft end);
  - 14. Duty cycle;
  - 15. Location of terminal box; and
  - 16. Special modifications.

## 1.2 MOTOR CONTROL

- A. Single-Phase Manual Starters - Single-phase manual starters shall consist of a toggle switch, single or double pole, with a thermal overload heater element capable of interrupting the circuit in case of overload. These manual motor starters shall be furnished with a NEMA Type 1 enclosure unless otherwise specified.
- B. Magnetic Motor Starters - Magnetic motor starters shall be installed in all cases where remote control is required and "no-voltage" or "undervoltage" protection is required. Three overload relays, for installation of interchangeable overload relay heaters, shall be furnished with each starter. Operating coil voltage, enclosure, number and position of auxiliary contacts. NEMA size, and all starter modifications shall be as shown on the drawings.

## 1.3 MOTOR CONTROL CENTERS

- A. Enclosure - Motor control centers shall consist of one or more sections 90 in. high, 20 in. wide, and 20 in. deep. Each section shall include top, bottom, and side wireways; horizontal and vertical bus bars; movable unit support bars; pan-type, gasketed, pin-hinged doors with pressure-type fasteners; and provisions for locking. Each section shall conform to NEMA standard enclosures for NEMA Type 1. Each section shall have standardized construction, dimensions, and all provisions for replacement or addition of vertical sections to either side without adjustments, alterations, or structural changes. Each section shall be provided with removable sections for maintenance and inspection of all interior component parts. All sections shall be cleaned, primed, and painted with standard color.
- B. Bus Bars - Horizontal bus bars shall be rated for 1,000-A capacity with a 50°C rise, silver-plated, and braced for 25,000-A rms fault current. Vertical bus bars shall extend full length of the working area. Each bar shall be silver plated and be braced to withstand 25,000-A rms fault current.
- C. Control Units
  - 1. Motor control centers shall be a combination of standardized combination starter units of NEMA Sizes 1 through 5. The smallest acceptable modular size shall be 12 in. high. Each unit shall be semienclosed and electrically isolated. Each unit shall be equipped with handles for removal from the section. Cam-type or screw-type latches shall positive latch units in operating, test, disconnected, and removed positions.

2. Silver-plated stab-on power connectors shall be furnished, on the back of each unit, to connect the line side of the unit to the vertical bus bars. Load side connections shall be equipped with pressure connectors. Pushbuttons and indicating lights shall be assembled to the control unit. Each control unit shall have all load and control connections wired to a terminal board at the side of the unit. All wiring shall conform to NEMA Class C.

D. General

1. All spare compartments shall be furnished complete with a bus, unit supports, and a matching blank door. All compartments, which contain control units, shall have doors with built-in reset button operators, and circuit breaker operators, in the door. Doors shall have cover interlock latches to prevent the opening of the unit door when the circuit breaker is on. A screwdriver interlock bypass shall be incorporated to permit opening of the door for inspection without interrupting the power. All circuit breaker operators shall be capable of being locked in the open position. All motor controls with remote operators shall have 120-V control systems.
2. Complete shop drawings, schematic, and elementary wiring diagrams shall be approved by the Buyer before purchase of the equipment.

1.4 REMOTE CONTROL UNITS

- A. Pushbuttons, automatic selector switches, and pilot lights shall be of the Allen-Bradley Bulletin 800T oil-tight type.
- B. Limit switches, unless otherwise specified, shall be Allen-Bradley Bulletin 802T oil-tight units.

PART II: PRODUCTS

2.1 MOTORS: Reference this section, Part I.

2.2 MOTOR CONTROL

- A. Single-Phase Manual Starters - Single-phase manual starters shall conform to Allen-Bradley Bulletin 600.
- B. Magnetic Motor Starters - Starters shall conform to the following:
  1. Full-Voltage Starters - Allen-Bradley Bulletin 709.

2. Combination circuit Breaker and starter - Allen-Bradley Bulletin 713.

2.3 MOTOR CONTROL CENTERS: Motor control centers shall be as manufactured by Cutler Hammer, Allen-Bradley, or Westinghouse Electric company and shall comply with Part I, Section 1.3, above.

2.4 REMOTE CONTROL UNITS

A. Refer to Allen-Bradley Bulletin 800T for oil-tight-type pushbuttons, selector switches, and pilot lights.

B. Refer to Allen-Bradley Bulletin 800T for oil-tight-type limit switches unless otherwise specified.

PART III: EXECUTION

Refer to Part III of Section 16050 for applicable requirements.

END OF SECTION

## DIVISION 16160

### PANELBOARDS

#### PART I: GENERAL

Refer to Section 16050, Part I, for applicable requirements.

#### PART II: PRODUCTS

2.1 Lighting and appliance branch panelboard as defined as any branch circuit panelboard having more than 10 percent of it's overcurrent devices rate 30 ampers or less for which neutral connections are provided.

- A. Enclosures - Cabinet boxes shall be constructed of zinc-coated sheet steel and shall conform to the requirements of the Underwriters' Laboratories, Inc. (UL), Standard for Cabinets and Boxes. Boxes shall be zinc-coated after fabrication. Trims and doors shall have a suitable primer coat and a finish coat of a color specifically designated by the Buyer. Cabinets for panelboards shall be provided with not less than 5-in.-wide wiring gutters at the sides, 6 in. wide at the top and bottom, and 5 3/4 in. deep. Surface-mounted cabinets shall be door-in-door construction. Both doors shall have hinges on the same side. The smaller door covering all overcurrent protective device handles with a combination lock latch. All locks shall be keyed alike. The larger trim door will expose the wire gutter in the panelboard and shall be secured in the closed position with a minimum of three bolts. A directory holder shall be provided on the inside of the smaller door. A neatly typed director, properly identifying each circuit, shall be mounted in the directory holder.
- B. Interiors - Panelboard interiors shall be made up with reinforced backpan with a means for adjusting in and out. Easy-access covers shall be provided over lug compartment and neutral bar. All bus bars shall be securely supported from backpan with bus bar insulators and shall not depend on branch circuit breakers for support. All bus bars shall be drilled and tapped full length to facilitate changes. Bolt-on circuit breaker panelboards shall be provided.

A minimum of 25 percent spare circuit spaces shall be designed into each panelboard.

All panelboards shall be equipped with a copper ground bus bar kit.

C. Circuit Breakers

1. All branch circuit panelboards shall be equipped with a main circuit breaker. The main shall be an integral part of the panelboard.
  2. Circuit breakers that are being used to switch lights and other loads on and off at the panelboard shall be switch duty-rated (SWD) circuit breakers.
  3. The uses of new thin or slim line circuit breakers is not acceptable.
  4. All panelboard circuit breakers shall have a minimum interrupting capacity and short circuit rating of 10,000 amperes RMS unless otherwise specified.
  5. The total load on any overcurrent protective device located in a single phase panelboard shall not exceed 80 percent of its rating. A 20 amp circuit breaker is the minimum size breaker to be used in panelboards.
- D. Grounding - Panelboard enclosures shall be bonded to the equipment grounding system using conductors sized per the National Electrical Code (NEC).
- E. Panelboard Manufacturers - Complete factory-assembled circuit breaker panelboards for 120/208 volts, 3-phase, 4-wire shall be similar to square "D" type NQOD or Westinghouse Pow-R-Line C or equal. Panelboards shall be equipped with 20 amp branch circuit breakers unless otherwise indicated on the Drawings.

PART III: EXECUTION

Refer to Part III of section 16050 for applicable requirements.

END OF SECTION

## DIVISION 16402

### UNDERGROUND ELECTRICAL SERVICE

#### PART I: GENERAL

Refer to section 16050, Part I, for applicable requirements.

#### PART II: PRODUCTS

- 2.1 SERVICE CONDUITS: Conduits for underground service shall conform to the National Electrical Code (NEC).
- 2.2 DUCTS: Underground ducts shall be heavy walled polyvinyl chloride, fiber duct (Orangeburg), or transite.

#### PART III: EXECUTION

##### 3.1 SERVICE CONDUIT INSTALLATION

- A. Conduits for underground electric service shall be installed as shown on the drawings.
- B. Conduits shall be buried a minimum of 3 ft below finished grade.

##### 3.2 DUCT INSTALLATIONS

- A. Duct runs shall be run in north-south and east-west coordinates. Diagonal runs will not be permitted.
- B. Duct runs shall be installed as straight as possible, with duct supported on spacers designed for that purpose. When bends are necessary, 5-degree couplings shall be used to make large radius bends. A tooling lathe designed for the type of duct being used shall be used to taper all joints. Drawknife or other makeshift arrangements will not be acceptable. Use manufacturer's sealing compound in all joints.
- C. Duct runs shall be encased in concrete with no less than 3 in. of concrete between ducts and no less than 4 in. around the outside periphery.
- D. When multiple duct runs are installed, they shall be banded together with steel banding wire no less than 5 ft on center.
- E. All duct runs shall be tied down in an acceptable manner. The Buyer shall inspect all duct installations before concrete is poured.

- F. A pull wire shall be installed in each duct run. This wire shall be pulled into each duct as it is installed. Under no circumstances shall any amount of duct be installed without pull wire. The pull wire shall be No. 9 steel wire securely fastened at each end or completion of installation.
- G. During construction, duct runs shall be plugged at the end of each working day with duct plugs.
- H. Upon completion of duct runs, the Contractor shall pull a swab through ducts, then a mandrel 1/2 in. less in diameter than the duct to ensure straight, clean unbroken lines. This shall be witnessed by the Buyer. Plugs shall be drilled for pull wire and then installed in spare ducts with pull wire securely attached at each end.

### 3.3 TRENCHING AND BACKFILL

- A. Trenching shall be of size and location as shown on the drawings. All trenching shall be kept free of water, debris, and foreign materials. Care shall be taken that trenches are properly sloped, where depth and job condition indicate a possible safety hazard to personnel, and approved by the Buyer.

The use of shoring and trench bracing may be required by the Buyer at no additional cost to the Buyer.

- B. All backfill shall be done in 6-in. layers with each layer compacted 98% according to the Modified Proctor Method.
- C. The backfill in the immediate area of cable or conduit shall be done with clean sand to a depth of 6 in. above cable or conduit. succeeding layers of backfill may be with fill material compacted after each layer.

END OF SECTION

## SECTION 16450--GROUNDING

### PART I: GENERAL

#### 1.1 WORK INCLUDED

- A. Work under this section includes providing grounding systems as shown on the drawings and as specified herein.
- B. Furnish all labor, materials, tools, and equipment and perform all work and services necessary for or incidental to the erection and installation of the equipment in this section, complete with accessories, as shown on the contract drawings and as specified herein, in accordance with the provisions of the contract documents, and completely coordinated with that of all other trades.
- C. Although such work is not specifically shown or specified, all supplementary or miscellaneous items, appurtenances, and devices incidental to or necessary for a sound, secure, and complete installation of equipment in this section shall be provided as part of this work.

#### 1.2 QUALITY ASSURANCE--REFERENCED SPECIFICATIONS AND DOCUMENTS: Comply with the provisions of the following defined codes, standards, and specifications, except as otherwise noted or specified. Where a conflict occurs, the more stringent requirement shall govern. The publications listed below are referred to in the text by the basic designation only.

- 1) National Electrical Code (NEC), latest edition.
- 2) Institute of Electrical and Electronic Engineers (IEEE) Standard 142, Recommended Practice for Grounding of Industrial and Commercial Power Systems.
- 3) All electrical materials shall be new and as listed by the Underwriters' Laboratories, Inc. (UL), except as otherwise specified herein.

### PART II: PRODUCTS

#### 2.1 GROUNDING ELECTRODES

- A. Grounding electrodes shall consist of 3/4-in. or larger galvanized steel pipe or 5/8-in. or larger galvanized or copper-clad steel rods.
- B. The preferred electrode shall be the copper-clad steel rod, 10 ft long.
- C. The standard length electrode shall be 10 ft. Where electrodes are longer than the standard, their length shall be clearly marked near the top.

- D. The size of the electrode used will depend on its length and the driving quality of the soil. It shall, if possible, be long enough to reach permanently moist earth below the frostline.

## 2.2 CONDUCTORS

- A. Equipment Grounding Conductor--The equipment grounding conductor shall be an insulated (green) copper conductor.
- B. Grounding Electrode Conductor--The grounding electrode conductor shall be copper.

## PART III: EXECUTION

### 3.4 STANDARD GROUNDING SYSTEM OR MAIN LOOP

- A. A standard grounding system or main loop shall consist of a grounded loop of bare stranded copper wire, buried at a depth of at least 3 ft below grade, and completely encircling the building or structure.
- B. The distance between grounds on this loop shall not exceed 50 ft. At least two grounds shall be used, and where only two are required, each shall consist of three ground electrodes driven at the corners of an 8-ft equilateral triangle and banded together. They shall be located on opposite sides of the building, perfectly at opposite corners.
- C. The loop shall be further bonded to the steel of steel frame buildings, all isolated grounds, and where practicable, to metal underground water and sewer piping systems, steel piling, well casings, etc.
- D. The main ground loop, and its connections to driven electrodes and other ground terminals, shall not be smaller than size No. 1/0.

### 3.2 PIPE AND ROD ELECTRODES

- A. Electrodes shall be driven at a distance of not less than 3 ft from the building foundation walls or structure footings.
- B. Where convenient, and with the approval of the Buyer, they may be driven in the bottom of excavations.
- C. Where ground electrodes are part of a loop or standard grounding system, their tops shall be driven below grade.
- D. Pipe electrodes shall be fitted with ground points and caps.
- E. Isolated ground electrodes shall be left with their tops projecting 6 in. above the grade so that the removable connectors are accessible for inspection and testing of ground resistance.

### 3.3 GROUND CONNECTIONS

- A. All ground connections shall be bolted or brazed.
- B. In order to ensure a low-resistance joint, care shall be taken in cleaning and preparing the contact surfaces.
- C. The ground terminal at piping or tanks shall consist of 1/4- X 2- X 2-in. copper bar, brazed to the pipe or tank, to which is bolted a clamp-type terminal plug.
- D. Connections of ground leads to isolated electrodes shall be made with bolted clamp-type connectors to facilitate removal for testing.
- E. Disconnectors shall be installed in group leads to a standard grounding system or main loop.
- F. No ground connections shall be made to gas piping.

### 3.4 EQUIPMENT GROUND SYSTEM

- A. All metallic raceways, electrical equipment, and related enclosures shall be continuously grounded.
- B. A separate equipment-grounding conductor (green wire) shall be installed in all raceways for feeders, branch circuits, etc., regardless of size, location, or length.

### 3.5 STATIC GROUNDING

- A. Any metal surface which a nonconducting static-producing flammable liquid comes into contact with shall be grounded by a continuous metallic path to ground.
- B. Gasketed flanges shall be bonded either by using at least two brass bolts with brass washers against clean faces of flanges or by bare flexible copper wire jumpers, using No. 6 as the minimum wire size.
- C. Parallel pipe lines shall be bonded and grounded at 30- to 40-ft intervals and at every point where they cross within a few inches of each other or as indicated on the drawings.

### 3.6 TESTING GROUNDS

- A. All grounds shall be tested and recorded in accordance with the specifications by a double-scale (0-30 and 0-300 ohm) Megger ground tester, Type MEG, as manufactured by James G. Biddle Company.
- B. Records of each inspection and test, together with complete data and readings associated therewith, shall be entered on a form furnished by the Contractor for this purpose. Test data taken and compiled during the inspections shall be certified by the Contractor and witnessed by the Buyer. Records of the inspections and tests,

together with the complete data on all readings taken, shall be made and incorporated into a formal report.

- C. The lowest possible resistance to ground is desirable. It shall not exceed 5 ohms.

END OF SECTION

## DIVISION 16460

### TRANSFORMERS

#### PART I: GENERAL

- 1.1 CONTROL TRANSFORMERS: Control transformers shall be 50 V-A or larger.
- 1.2 LIGHTING TRANSFORMERS: Lighting transformers shall be dry type, Class "H" insulation; with ratio of 480 V, 3 Phase, delta Primary; 120/208 V, 3 phase, four-wire wye secondary; Westinghouse type "DT-3," with four 2 1/2% fcbn taps.
- 1.3 OUTDOOR TRANSFORMER STATION: An outdoor transformer station shall be furnished by the Buyer for installation by the Contractor at a location outside Building 891 as shown in the Drawings.

#### PART II: PRODUCTS

- 2.1 CONTROL TRANSFORMERS: Control transformers shall be Jefferson Electric Company of equivalent.
- 2.2 LIGHTING TRANSFORMERS: Lighting transformers shall be westinghouse Type "DT-3," with four 2-1/2% FCBN taps.
- 2.3 OUTDOOR TRANSFORMER SUBSTATION: The outdoor transformer station shall be furnished by the Buyer and details of its construction are presented below.

#### PART III: EXECUTION

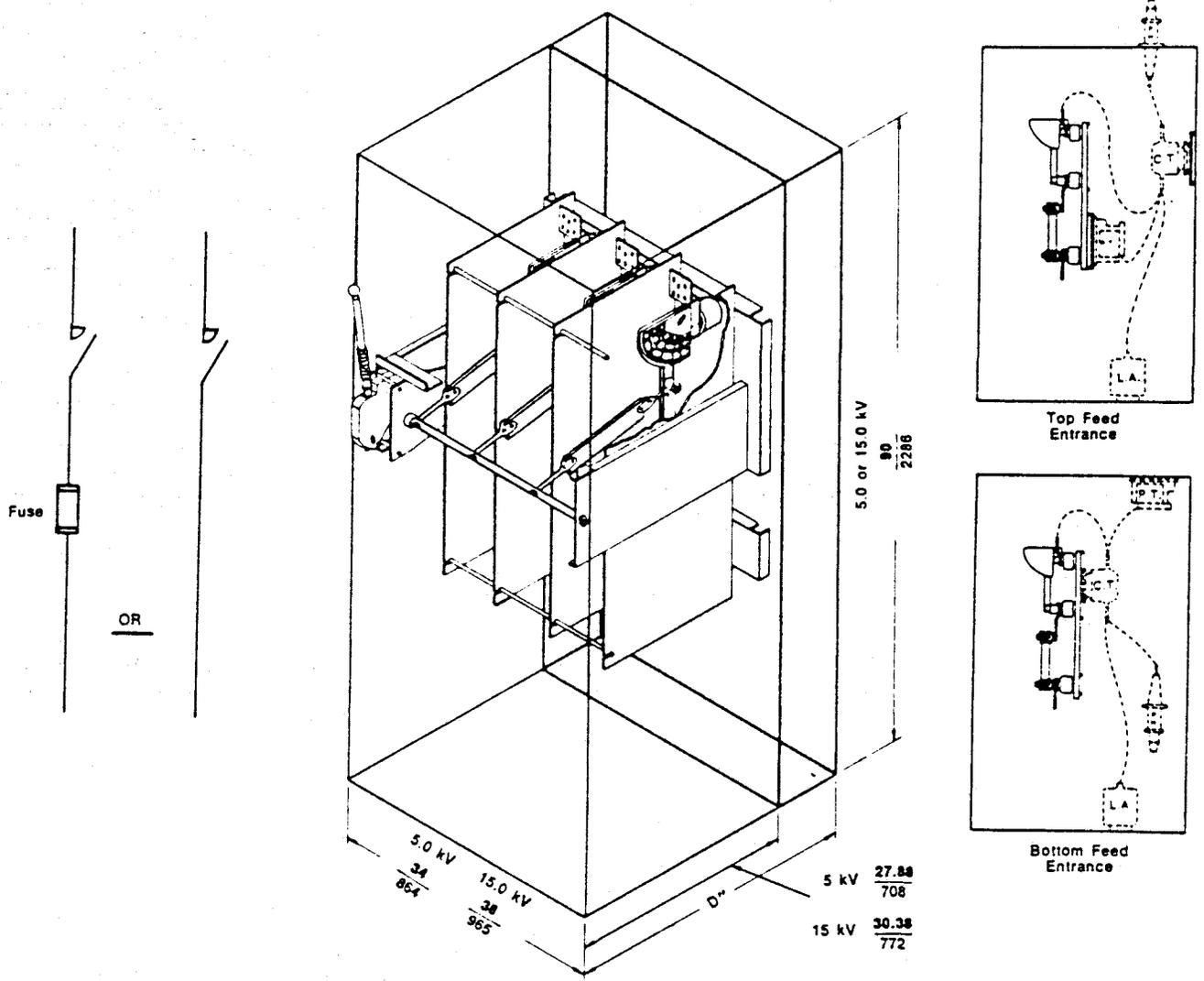
- 3.1 Refer to Section 16050, Part III, for applicable execution requirements.
- 3.2 GENERAL DISTRIBUTION TRANSFORMERS
  - A. Transformers shall be connected to the primary feeder with three single conductor pot heads.

END OF SECTION

# POWER-ZONE<sup>®</sup> HVL LOAD INTERRUPTER SWITCHGEAR

**CLASS  
6040**

**MAIN SWITCH  
5.0 OR 15.0 kV**



**OUTDOOR CONSTRUCTION:** ADD  $\frac{6.5}{165}$  TO THE TOTAL HEIGHT AND INCREASE THE BASE TO THE NEXT LARGER DEPTH DIMENSION EITHER  $\frac{42}{1067}$  OR  $\frac{60}{1524}$

Approximate Shipping Weight Per Bay: Indoor — 1350 Lbs.  
Outdoor — 1850 Lbs.

Dual Dimensions **INCHES**  
Millimeters

### DEPTH DIMENSION OF MAIN SWITCH BAY (INDOOR)

Type	Equipment Nominal kV	Cable Lugs Top or Bottom Entrance				Roof Bushings or Pothead Top Entrance				Pothead Bottom Entrance			
		Without CT's, PT's or L.A.	With L.A.	With CT's & PT's	With CT's, PT's & L.A.	Without CT's, PT's or L.A.	With L.A.	With CT's & PT's	With CT's, PT's & L.A.	Without CT's, PT's or L.A.	With L.A.	With CT's & PT's	With CT's, PT's & L.A.
		D	D	D	D	D	D	D	D	D	D	D	D
Fused or Unfused	5.0	$\frac{38}{914}$	$\frac{54}{1372}$	$\frac{54}{1372}$	$\frac{54}{1372}$	$\frac{48}{1219}$	$\frac{54}{1372}$	$\frac{54}{1372}$	$\frac{54}{1372}$	$\frac{54}{1372}$	$\frac{54}{1372}$	$\frac{54}{1372}$	$\frac{72^*}{1829}$
	15.0	$\frac{48}{1219}$	$\frac{54}{1372}$	$\frac{54}{1372}$	$\frac{54}{1372}$	$\frac{54}{1372}$	$\frac{54}{1372}$	$\frac{54}{1372}$	$\frac{72^*}{1829}$	$\frac{54}{1372}$	$\frac{54}{1372}$	$\frac{72^*}{1829}$	$\frac{72^*}{1829}$

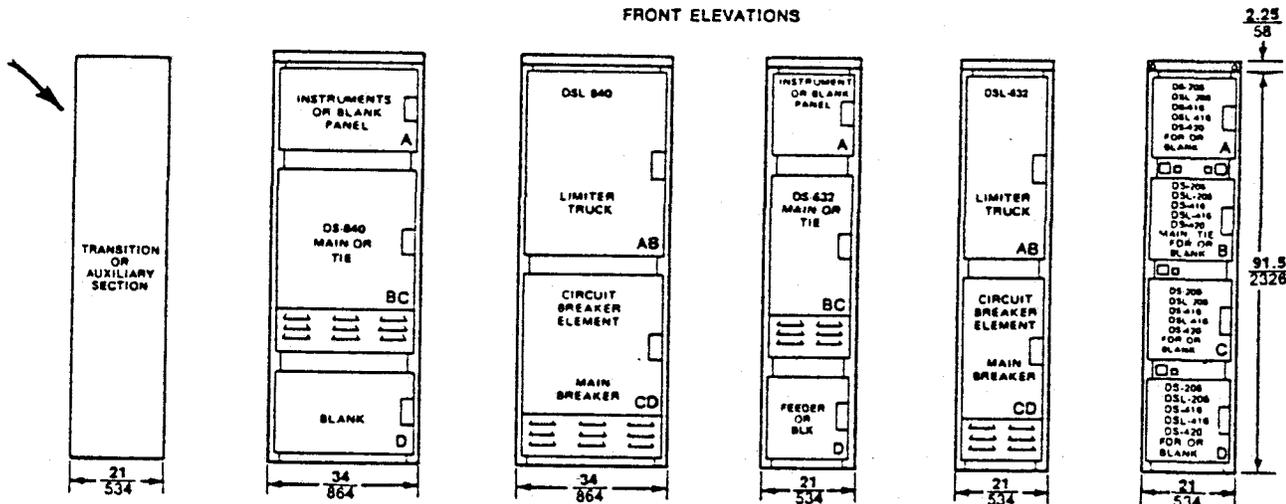
\*This arrangement consists of a full metering section mounted behind a standard switch. Instruments and instrument transformers to be selected by factory. Note—If switch is unfused, current transformers can be mounted directly above the switch and be front accessible.



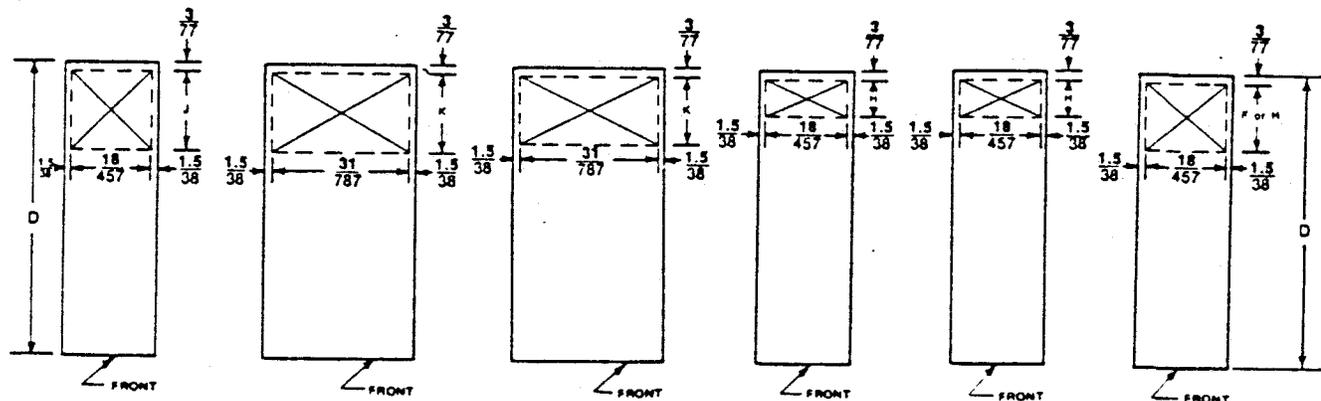
**SQUARE D COMPANY**

**APPLICATION DATA  
DIMENSIONS  
INDOOR CONSTRUCTION  
APPROXIMATE DIMENSIONS—NOT FOR CONSTRUCTION**

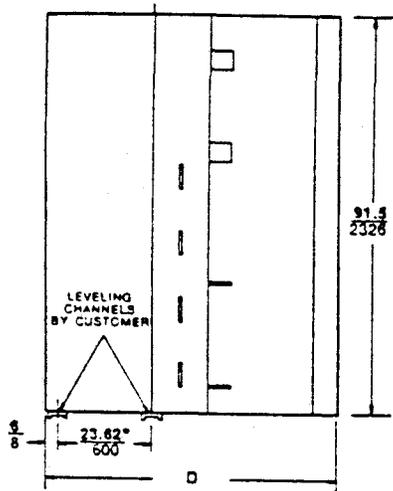
**FRONT ELEVATIONS**



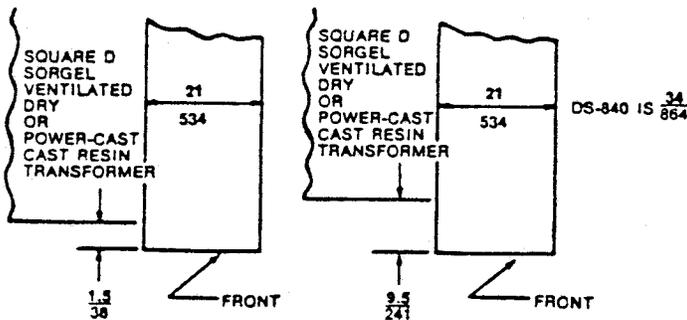
**CONDUIT ENTRANCES**



- Dual Dimensions: INCHES  
Millimeters



\* 31.82 for DSL 803 and DS-840



OFFSET DS (EXCEPT DS-840)      OFFSET DSL, DS-840, AND DSL-840

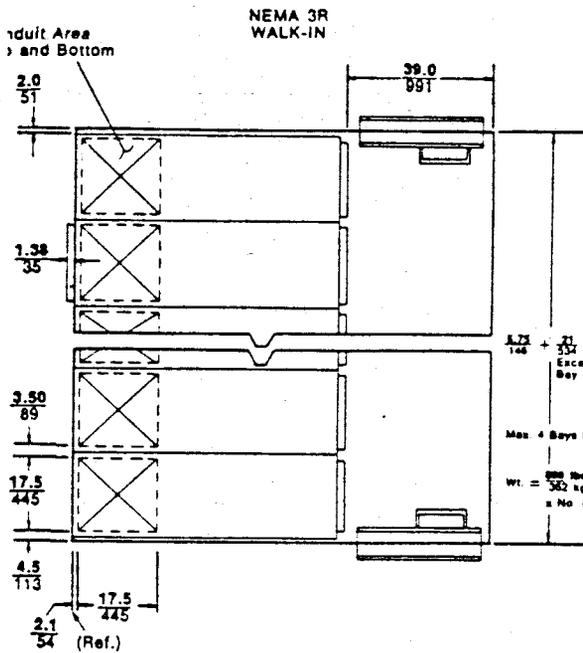
SQUARE D — SORGEL VENTILATED DRY OR POWER-CAST® CAST RESIN TRANSFORMER LINE-UP FLOOR PLAN

FOR SEISMIC MOUNTING:  
CONSULT SQUARE D HEADQUARTERS

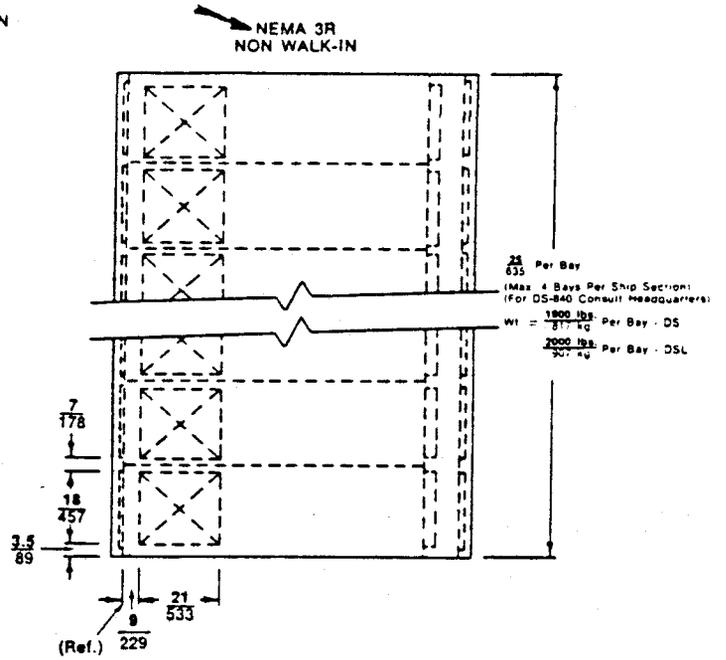


# POWER-ZONE™ II LOW VOLTAGE METAL-ENCLOSED DRAWOUT SWITCHGEAR

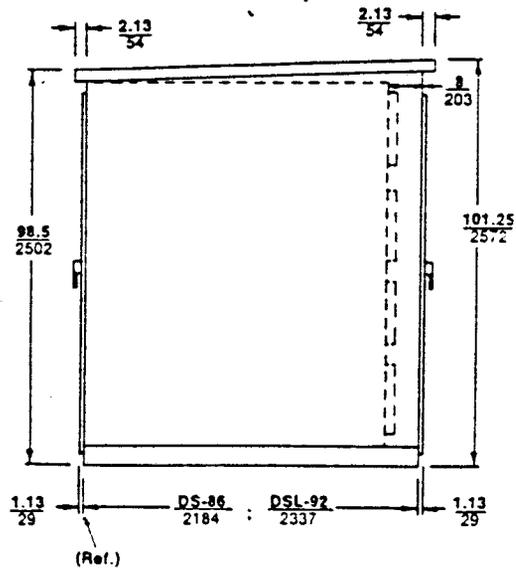
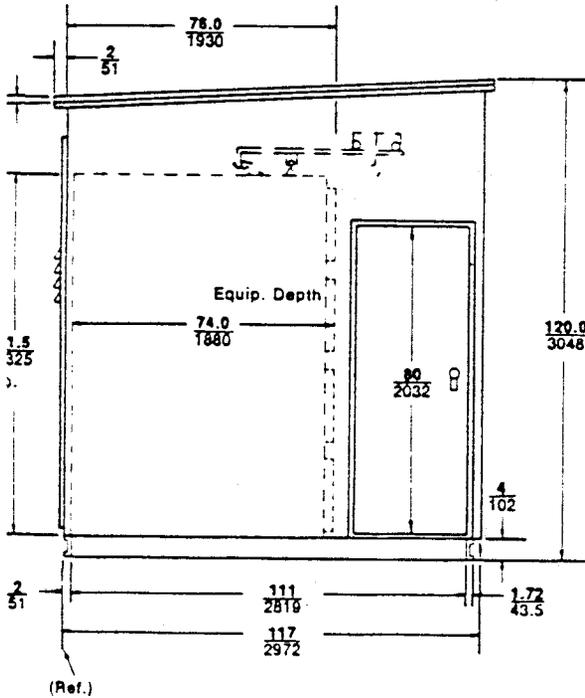
## APPLICATION DATA DIMENSIONS OUTDOOR ENCLOSURES APPROXIMATE DIMENSIONS—NOT FOR CONSTRUCTION



FLOOR PLAN



SIDE ELEVATION



Dual Dimensions: INCHES  
Millimeters



DIVISION 16510

LIGHTING FIXTURES

PART I: GENERAL

Refer to Section 16050, Part I, for other requirements.

1.1 LIGHTING FIXTURE REQUIREMENTS

- A. The Contractor shall furnish and install all lighting equipment and lighting fixtures included in the fixture schedule and for all outlets, as indicated on the drawings.
- B. All lighting fixtures shall bear the Underwriters' Laboratories, Inc. (UL), label, manufacturer's label, and proper union label.
- C. Interior wiring of all fixtures shall be Type "AF" fixture wire of 16 gage for fixtures up to and including 200 W. Fixtures over 200-W capacity shall be wired with 14-gage wire.
- D. All fixtures shall be such that all parts will be continuously grounded.

1.2 FLUORESCENT FIXTURES

- A. All fluorescent lampholders shall be the white phenolic compound, positive spring-action type.
- B. Fluorescent fixtures shall be supported at all points as required for good practice and adequate support. The Contractor shall furnish all supports required, including structural members if required. Unistrut supports are acceptable.
- C. All fluorescent fixtures shall be equipped with thermally protected, high-power-factor ballasts that are UL and Current Bid Monitor approved. All ballasts shall be Type "P" ballasts.

- 1.3 LAMP BULBS: All lamp bulbs for the fixtures shall be government-furnished. The Contractor shall request all lamps required for the job by submitting a complete list of all types and sizes required.

PART II: PRODUCTS

2.1 MANUFACTURERS

- A. Fluorescent Fixtures - Fluorescent fixtures shall be rapid start, manufacturer and catalog number as indicated in the lighting fixture schedule on the drawings.

2.2 EMERGENCY LIGHTING: Emergency lighting shall be Holophane type EH-12.

PART III: EXECUTION

Refer to Section 16050, Part III, for applicable requirements.

END OF SECTION

## SECTION 16537--EXIT LIGHTING FIXTURES

### PART I: GENERAL

#### 1.1 WORK INCLUDED

Exit Lights

#### 1.2 REFERENCE STANDARDS

1.2.1 New installations shall conform to the latest edition of the following standards:

- A. Underwriters' Laboratories (UL 57 & UL 924)
- B. National Fire Protection Association (NFPA Life Safety Code 101)
- C. National Electrical Code (NEC Article 700-16)

### PART II: PRODUCTS

#### 2.1 MATERIALS

- A. Electrical materials shall be new and listed as approved by Underwriters' Laboratories, Inc.
- B. Exit sign shall be self-contained with batteries, battery charger and light-emitting diodes (LED) illuminators.
- C. A Lexan bezel or shield shall be a part of the fixture to protect the exit sign lettering and the lights.
- D. The housing color shall be Dark Bronze.

#### 2.2 EXIT MARKINGS

- A. Lettering shall be black or green on a white background with green light emitting diodes (LEDs) fully configured in the center of each letter.
- B. The word EXIT shall be in plainly legible letters not less than six (6) inches high with the principal strokes of each letter not less than 3/4-inches wide.
- C. When specified, the directional arrows or markers shall be black or green on a white background with green LEDs fully configured in the center of each arrow or marker.
- D. The arrow or marker shall be proportional to the word EXIT and not less than 3/4-inches wide.

## 2.3 ILLUMINATION

- A. Exit signs shall be internally illuminated.
- B. Illumination on the surface of the sign shall meet or exceed the NFPA Code 101 minimum standard of five (5) foot candles.

## 2.4 TECHNICAL REQUIREMENTS

- A. Input supply voltage shall be 120 VAC/277 VAC 1Ø, 60 Hz.
- B. Batteries shall be sealed rechargeable type, capable of supplying the required illumination for a minimum of four (4) hours after loss of primary voltage. (Dry type batteries are not acceptable.)
- C. A transformer/solid state battery charger will be furnished integral to the exit sign capable of fully recharging the batteries to 100% voltage in 72 hours or less.
- D. The automatic transfer from normal supply voltage to internal battery on loss of primary voltage shall be within 0.5 seconds. The automatic return to normal supply voltage on restoration of primary voltage shall also be within 0.5 seconds.
- E. Two (2) indicating lights shall be furnished, one light labeled "EMER. PWR." that will be illuminated when the exit sign is operating on battery power, and one light labeled "BATT. CHG." that will be illuminated during normal operation with the battery charger operating.
- F. A momentary "TEST SWITCH" shall be furnished to simulate failure of normal supply voltage.
- G. All electrical equipment shall be rated and suitable for use and operation at an altitude of 6000 feet.
- H. The following optional features shall be available and as required by this specification.
  - 1. No Directional Arrow
  - 2. Left Directional Arrow
  - 3. Right Directional Arrow
  - 4. Bi-Directional - 2 Arrows
  - 5. Double Faced Sign (front and back)
  - 6. Back Mounting (standard)
  - 7. End Mounting (standard)
  - 8. Top Mounting Canopy

## 2.5 MANUFACTURER

- A. The exit sign shall be "Exitron" Corporation, Model/Series 600 or approved equal.

- B. Approved equal shall be acceptable upon review of submittals by Facilities Engineering.

### PART III: EXECUTION

#### 3.1 INSTALLATION

- A. Back or surface mount, above door in areas with ceiling heights greater than 9'0".
- B. Ceiling mount exit fixtures using top mounting canopy, in front of door and as shown on drawings in areas with ceiling heights 9'0" and less.
- C. Verify that fixture is fully operational on both AC power and DC battery.

END OF SECTION

## SECTION 16780--TELEPHONE SYSTEM SITE PREPARATION

### PART I: GENERAL

#### 1.1 GENERAL REQUIREMENTS

1.1.1 New installations shall comply with the National Electric Code (NEC), Sections 318, 345, 346, 348, and 362, except where code requirements are exceeded as specified on the Drawings or in this Specification.

1.1.2 All materials shall be new and listed by UL or approved by Factory Mutual for the intended use.

#### 1.2 SYSTEM OPERATION

The Contractor shall install all raceways, outlets, backboards and room modifications necessary for the telephone system as defined on the drawings. The actual telephone cable, terminals and equipment will be installed by others.

### PART II: PRODUCTS

#### 2.1 RACEWAY

2.1.1 Underground conduit between buildings shall be 4-inch schedule 40 PVC. Underground elbows shall be PVC coated GRC with 6 foot radius or 3 foot radius for stub-up.

2.1.2 Wireway shall be NEMA 1 type, with dimensions of 4-inches x 4-inches. NEMA 1 wireway shall use friction type closure for hinge door (no screws).

1) Wireway shall be NEMA 12 when used in fissile material buildings.

2.1.3 Cabletray shall be ladder type, 6-inches wide.

2.1.4 Conduit within the building shall be EMT within non-production buildings and office buildings, and rigid type in all other areas. Minimum size shall be 3/4-inch.

2.2 Backboards shall be 3/4-inch thick plywood treated with Koppers Dricon Fire Retardant or Buyer approved equal. Plywood shall be grade B-D or better.

### PART III: EXECUTION

#### 3.1 UNDERGROUND CONDUIT INSTALLATION

3.1.1 Conduit shall be installed at 3 feet below grade minimum or as shown on the Drawings. Reference Section 02200--Earthwork.

3.1.2 Detector tape shall be laid in trench 1 foot above conduit. (GFE)

3.1.3 Upon completion of conduit runs, contractor shall pull a swab thru all conduits. A mandrel, 1/2-inch less in diameter than the conduit, shall be pulled thru to insure clean and unbroken runs. Pull rope and end plugs shall be installed.

3.1.4 A pull rope shall be installed in all conduits.

3.1.5 During construction, all conduit runs shall be plugged at all times except when actively being worked.

### 3.2 BUILDING CONDUIT

3.2.1 A pull rope shall be left in all conduits.

3.2.2 Conduit shall be run at right angles or parallel to building walls.

3.2.3 Wall penetrations shall be made to comply with Rocky Flats Standard SC-107. Where internal conduit sealoffs are required, insure telephone cable installation will happen immediately after conduit installation so that sealoff can be filled.

### 3.3 CABLETRAY/WIREWAY

3.3.1 Wireway shall be installed such that the hinge door is on the side and opens downward. There shall be no obstructions to this opening. Door shall be labeled "Do Not Obstruct Access" at 5 foot intervals.

3.3.2 Cabletray shall be installed with open side up. No obstructions shall exist at less than 6-inches above tray. Contractor shall provide a 12-inch clearance above cabletray where practical.

### 3.4 TELEPHONE TERMINAL BACKBOARD

3.4.1 Backboard shall be secured to wall at all 4 corners and at 4 foot intervals. Self-tapping drywall type screws into wall studs (or red heads into concrete) shall be used.

### 3.5 IDENTIFICATION

3.5.1 1-1/4-inch diameter brass tags shall be installed on all conduits at endpoints and on both sides of wall penetrations. Tags shall be stamped "Telephone". Tags shall be secured to conduit by nylon cable ties or #14 solid copper bare wire.

3.5.2 The terminal board receptacle in the telephone equipment room shall be dymo labeled with panel and circuit number.

### 3.6 INSPECTION AND TESTING

All raceways will be inspected prior to acceptance to insure compliance with this Specification and the Drawings.

END OF SECTION

Drawings for Approval  
 Drawings for Record  
 KVA \_\_\_\_\_  
 High Voltage \_\_\_\_\_ ON  
 Left  Right  Other \_\_\_\_\_  
 High Voltage BIL \_\_\_\_\_  
 High Voltage Taps \_\_\_\_\_  
 Low Voltage \_\_\_\_\_ ON  
 Left  Right  Other \_\_\_\_\_  
 Low Voltage BIL \_\_\_\_\_  
 AA  AA/FFA  AA/FA  
 80°C Rise  115°C Rise  
 Indoor  Outdoor  
 Conductor Material  Copper  Aluminum  
 Finish \_\_\_\_\_  
 Notes \_\_\_\_\_  
 Job Name \_\_\_\_\_  
 Customer \_\_\_\_\_  
 Customer Order No. \_\_\_\_\_  
 Field Engineer \_\_\_\_\_  
 Field Office \_\_\_\_\_  
 Factory Order No. \_\_\_\_\_  
 Drawing No. \_\_\_\_\_  
 Revision \_\_\_\_\_ Date \_\_\_\_\_  
 Notes \_\_\_\_\_

\* OUTDOOR CONSTRUCTION  
INDOOR CONSTRUCTION (NEMA 1)

KVA	4160-13800 VOLTS 60-95 KV BIL CLASS			480 VOLT CLASS 10KV BIL CLASS		
	A	B	D	A	B	D
500	91.50	84.00	66.00	5400	25 X 2.00	25 X 4.00
750	91.50	84.00	78.00	6300	25 X 3.00	38 X 6.00
1000	91.50	84.00	84.00	7500	25 X 4.00	(2) 25 X 6.00
1500	100.00	96.00	84.00	10800	25 X 6.00	
2000	100.00	108.00	84.00	12800	38 X 6.00	
2500	100.00	108.00	84.00	16100	(2) 25 X 6.00	

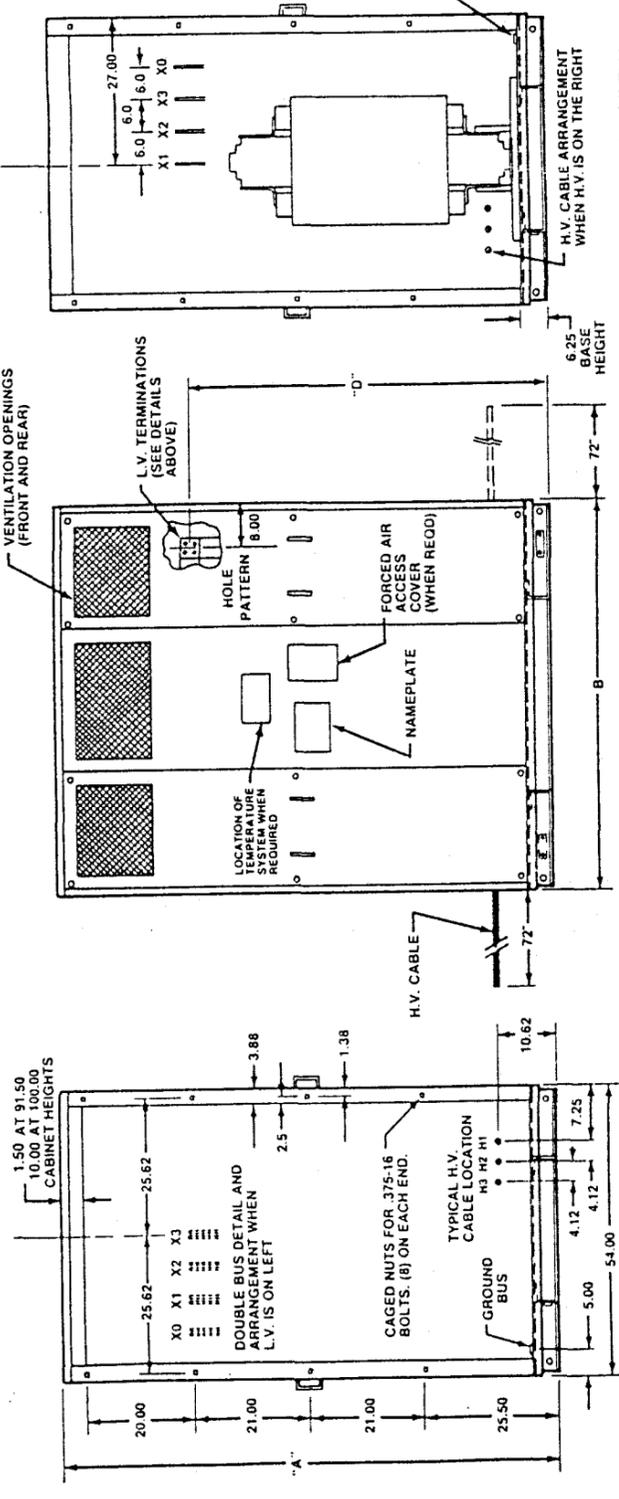
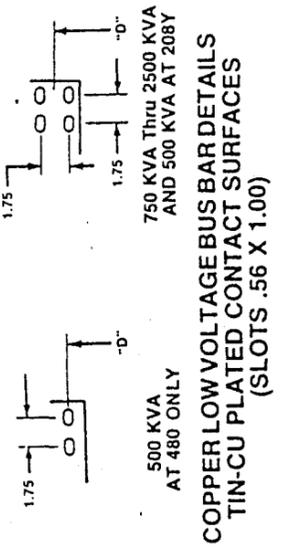
ALL DIMENSIONS ARE IN INCHES

HIGH VOLTAGE CABLE

CABLE SIZE	MAXIMUM FORCED AIR LINE AMPS PER PHASE		
	ø(1)	øø(2)	øøø(3)
2/0	250	500	750
2	150	300	450

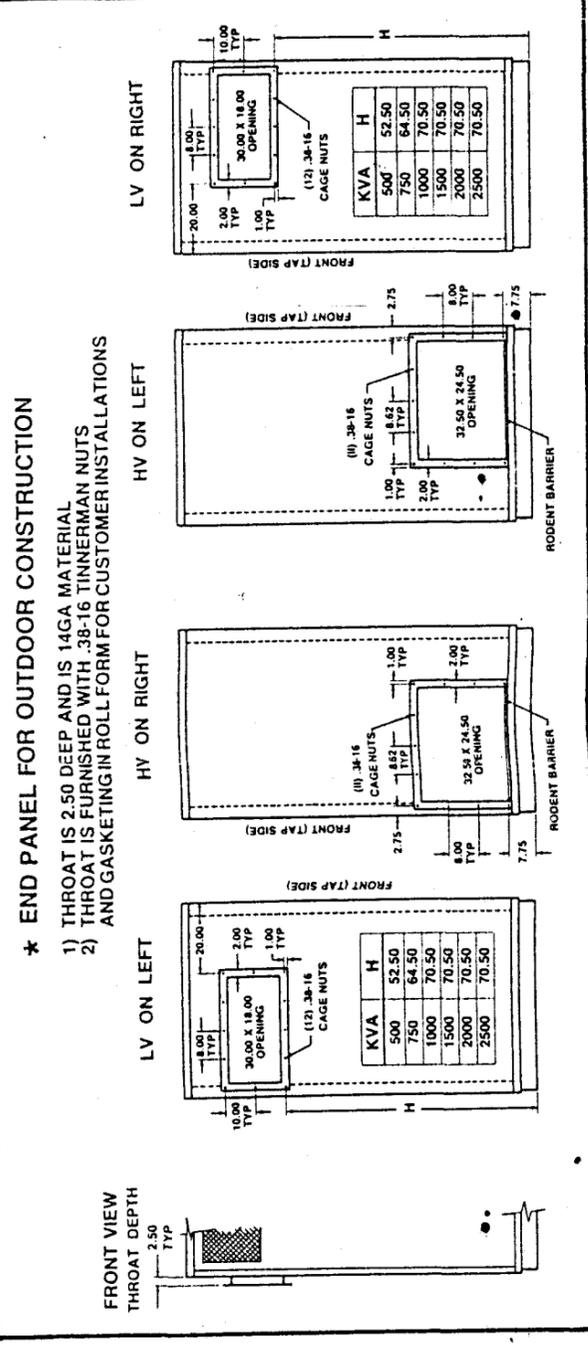
- NOTES:
- LIGHTNING ARRESTERS WHEN REQUIRED WILL BE MOUNTED IN THE HV L SWITCHECTION SECTION.
  - ENCLOSURES
    - ALL ENCLOSURES HAVE (6) PANELS. (4) ARE REMOVABLE. (2) FRONT AND (2) REAR. CENTER PANELS FRONT REAR ARE NOT REMOVABLE.
    - FINISH: ANSINO.49 MEDIUM LIGHT GRAY ENAMEL.
  - DESIGNS ARE BASED NEMA SPEC TR27
    - IMPEDANCE = 5.75% AT 480V, 6.5% AT 208V
    - FA RATING (WHEN SPECIFIED) 133% KVA
    - SOUND LEVELS PER NEMA

### 5-15KV CLASS — 110KV BIL MAX PRIMARY / 600V - 30KV BIL MAX SECONDARY INDOOR AND OUTDOOR CONSTRUCTION LEFT-HAND AND RIGHT-HAND UNIT



### RIGHT END VIEW

### H.V. TAP SIDE FRONT VIEW



### TYPICAL BASE CONSTRUCTION

