National Park Service
Denver Service Center

KLONDIKE GOLD RUSH NATIONAL HISTORICAL PARK

SKAGWAY

ADAPTIVE RESTORATION, MASCOT SALOON GROUP

PROJECT MANUAL



VOLUME 2

KLONDIKE GOLD RUSH NATIONAL HISTORICAL PARK
SKAGWAY
ADAPTIVE RESTORATION, MASCOT SALOON GROUP

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NOTE

IT IS THE RESPONSIBILITY OF THE BIDDER TO VERIFY THAT THE PROJECT MANUAL IS COMPLETE AS LISTED.

PART 1: GENERAL

1-1 DESCRIPTION:

A. The work of this contract consists of the exterior restoration and partial interior rehabilitation of the building historically known as the Mascot Saloon Group, consisting of one and two-story interconnected wood frame structures.

The work includes installation of new site utilities, site improvements, minor concrete work, removal and salvage of existing construction materials, structural improvements, roofing replacement, exterior restoration, new rough-in heating, plumbing, fire suppression, electrical, telephone, fire detection and intrusion detection systems, and partial finishing of the interior.

B. All work will be performed under a single contract.

1-2 LOCATION: Klondike Gold Rush National Historical Park, Skagway Historic District, Skagway, Alaska, on the east side of Broadway, between Second and Third Streets.

1-3 CONTRACTOR'S USE OF PREMISES:

A. Construction Camp: Establishment of Contractor's living quarters within the project boundaries will not be permitted.

B. The building will be closed to the public during construction. However, maintain access for National Park Service administrative and other official business throughout the construction phase.

C. Contractor shall at all times conduct his operations to insure the least inconvenience to the public. Boardwalk closures will be permitted, when required for construction operations, upon specific approval of Contracting Officer.

D. Interruption of Existing Utility Service: Contractor is responsible for all temporary and permanent utility connections to city utilities and for obtaining permits and payment of fees. Coordinate with Contracting Officer.

E. Confine storage of materials to the designated area behind the building and within the building as directed by Contracting Officer.

F. Preservation of Surrounding Structures: Confine all operations within the work limits of the project. Exercise special care to protect surrounding buildings and other structures. Repair of damage to surrounding structures will be at Contractor's expense.

1. Modify Broadway and Third Street boardwalks as shown. Construction will be by city. Coordinate with Contracting Officer.

G. Hauling Restrictions: Comply with all legal load restrictions in the hauling of materials. Load restrictions on park properties are identical to the state and city load restrictions with such additional regulations as may be imposed by the Park Superintendent. Information regarding rules and regulations for vehicular traffic may be obtained from the Office of the Park Superintendent. A special permit will not relieve Contractor of liability for damage which may result from moving of equipment.

H. Contractor shall be responsible for obtaining all required permits.

1-4 CONTRACTOR-FURNISHED ITEMS: All new borrow and aggregate shall be Contractor-furnished as approved by Contracting Officer.

1-5 GOVERNMENT-FURNISHED ITEMS: Existing building materials to be re-installed as indicated.

1-6 SOIL INVESTIGATION REPORTS: Copies of reports are available for examination by Bidders at the office of the Park Superintendent.

PART 2: MATERIALS Not used.

PART 3: EXECUTION Not used.

END

PART 1: GENERAL

1-1 LAYOUT OF WORK:

A. Contracting Officer will set a base line and bench mark for each area of the work. Contractor shall lay out the work by accurately measuring from these controls. All work improperly located due to Contractor's errors or omissions shall be corrected by him at no additional expense to the Government.

B. Contractor shall preserve controls thus established. Controls originally set by Contracting Officer that are destroyed by Contractor will be replaced by Contracting Officer, with the cost of replacement deducted from Contractor's final payment.

C. Locations and elevations shown on the drawings are subject to final field adjustment by Contracting Officer before construction. Contractor shall immediately notify the Contracting Officer of apparent errors discovered on the drawings or in the initial stakeout. If changes in stakeout are required, Contractor shall cooperate with Contracting Officer in prompt establishment of the field control for altered or adjusted work.

D. Existing Monuments: All bench marks, land corners, and triangulation points, established by other surveys, existing within the construction area shall be preserved. If existing monuments interfere with the work, secure written permission before removing them.

PART 2: MATERIALS Not used.

PART 3: EXECUTION Not used.

END

PART 1: GENERAL

1-1 REFERENCED STANDARDS: The following abbreviations, which may be used in the construction specifications, refer to the organizations and specifications of the organizations listed below:

AA - Aluminum Association
AABC - Associated Air Balance Council
AAMA - Architectural Aluminum Manufacturers Association
AAN - American Association of Nurserymen
AASHTO - American Association of State Highway and Transportation Officials
ACI - American Concrete Institute
AGA - American Gas Association
AGC - Associated General Contractors
AIEEE - American Institute of Electrical and Electronics Engineers
AISC - American Institute of Steel Construction, Inc.
AISI - American Iron and Steel Institute
AITC - American Institute of Timber Construction
AMCA - Air Moving and Conditioning Association
ANSI - American National Standards Institute
APA - American Plywood Association
APHA - American Public Health Association
API - American Petroleum Institute
AREA - American Railway Engineering Association
ARI - Air Conditioning and Refrigeration Institute
ARMA - Asphalt Roofing Manufacturers Association
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
AWPA - American Wood Preservers Association
AWPB - American Wood Preservers Bureau
AWPI - American Wood Preservers Institute
AWS - American Welding Society, Inc.
AWWA - American Water Works Association
BBC - Basic Building Code
BHMA - Builders Hardware Manufacturer's Association
BIA - Brick Institute of America
BOCA - Building Officials and Code Administrators International

CBM - Certified Ballast Manufacturers
CDA - Copper Development Association
CGA - Compressed Gas Association
CISPI - Cast Iron Soil Pipe Institute
CRA - California Redwood Association
CRSI - Concrete Reinforcing Steel Institute
CS - Commercial Standards
DEMA - Diesel Engine Manufacturer's Association
DOT - Department of Transportation
EEI - Electrical Edison Institute
ETL - Electrical Testing Laboratories
FGMA - Flat Glass Marketing Association
FHA - Federal Housing Administration
FHWA - Federal Highway Administration
FM - Factory Mutual Laboratory
FPL - U.S. Forest Products Laboratory
FS - Federal Specifications
GA - Gypsum Association
GOAA - General Outdoor Advertising Association
HPMA - Hardwood Plywood Manufacturers Association
ICBO - International Conference of Building Officials
ICEA - Insulated Cable Engineers Association
IEEE - The Institute of Electrical and Electronics Engineers
IFI - Industrial Fasteners Institute
IMIAWC - International Masonry Industry All-Weather Council
IRS - Internal Revenue Service
LIA - Lead Industries Association, Inc.
MBMA - Metal Building Manufacturers Association
MCAA - Mechanical Contractors Association of America, Inc.
MFMA - Maple Flooring Manufacturer's Association
MIA - Marble Institute of America
MIMA - Mineral Insulation Manufacturer's Association
MLSFA - Metal Lath/Steel Framing Association
MS - Military Specifications
MSHA - Mine Safety and Health Administration
NAAMM - National Association of Architectural Metal Manufacturers
NACE - National Association of Corrosion Engineers
NBC - National Building Code
NBFU - National Bureau of Fire Underwriters
NBS - National Bureau of Standards
NCMA - National Concrete Masonry Association
NCPI - National Clay Pipe Institute
NCSA - National Crushed Stone Association
NEC - National Electrical Code
NELMA - Northeastern Lumber Manufacturers Association
NEMA - National Electrical Manufacturers Association
NESC - National Electrical Safety Code

NFPA - National Fire Protection Association
NFPA - National Forest Products Association
NHLA - National Hardwood Lumber Association
NHPMA - Northern Hardwood and Pine Manufacturers Association
NIOSH - National Institute of Occupational Safety and Health
NLA - National Lime Association
NLMA - National Lumber Manufacturers Association
NMWIA - National Mineral Wool Insulation Association, Inc.
NOFMA - National Oak Floor Manufacturing Association
NPA - National Particleboard Association
NPCA - National Paint and Coatings Association
NRCA - National Roofing Contractors Association
NSF - National Sanitation Foundation
NTMA - National Terrazo and Mosaic Association
NWMA - National Woodwork Manufacturers Association
OSHA - Occupational Safety and Health Administration
PCA - Portland Cement Association
PCI - Prestressed Concrete Institute
PI - Perlite Institute
PPI - Plastics Pipe Institute
PS - Product Standard
RCSHSB - Red Cedar Shingle and Handsplit Shake Bureau
RIS - Redwood Inspection Service
SAE - Society of Automotive Engineers
SBCC - Southern Building Code Congress International, Inc.
SCMA - Southern Cypress Manufacturers Association
SDI - Steel Deck Institute
SDI - Steel Door Institute
SFPA - Southern Forest Products Association
SHLMA - Southern Hardwood Lumber Manufacturers Association
SIGMA - Sealed Insulating Glass Manufacturers' Association
SJI - Steel Joist Institute
SMA - Screen Manufacturers' Association
SMACNA - Sheet Metal and Air Conditioning Contractors National Association, Inc.
SPA - Southern Pine Association
SPI - Society of the Plastics Industry, Inc.
SPIB - Southern Pine Inspection Bureau
SSPC - Steel Structures Painting Council
SWI - Steel Window Institute
TCA - Tile Council of America
TPI - Truss Plate Institute
UBC - Uniform Building Code
UL - Underwriters Laboratories, Inc.
WCLIB - West Coast Lumber Inspection Bureau
WPCF - Water Pollution Control Federation
WWPA - Western Wood Products Association

PART 2: MATERIALS Not used.

PART 3: EXECUTION Not used.

END

PART 1: GENERAL

1-1 DESCRIPTION: The intent of this section is to explain, in general, what is and what is not included in a bid item, and the limits or cut-off points where one bid item ends and another begins.

1-2 BID ITEM NO. 1 - BASE BID: This bid item is to cover all costs to perform the work shown on the construction drawings, executed in conformance with the specifications, except for Common Facilities as described in Bid Item No. 2.

1-3 BID ITEM NO. 2 - COMMON FACILITIES: This bid item is to cover the costs to install site utilities which are common to the Boas Tailor and Furrier and the Verbauwhede's Cigar Store and Confectionery buildings as well as to the Mascot Saloon group building. These common utilities include the valve pit with the portions of the fire sprinkler valve system components common to all three buildings, the water supply from the property line to the valve pit, the fuel oil tank, vent, and gauge lines, and the electrical service to and including the main panel at the rear of Verbauwhede's, and electrical service for the valve pit. This bid item does not include services to Boas or Verbauwhede's indicated on the drawings as N.I.C. (Not in Contract). Services to the Mascot Saloon group building from the valve pit (including domestic water and the fire sprinkler valve components for Mascot Saloon), from the fuel oil tank, and from the new site electrical service panel are not included in this bid item, but are included in Bid Item No. 1 (Base Bid). Refer to the drawings for additional information.

PART 2: MATERIALS Not used.

PART 3: EXECUTION Not used.

END

PART 1: GENERAL

1-1 PRECONSTRUCTION CONFERENCE: Before start of construction, Contracting Officer will arrange an on-site meeting with Contractor. The meeting agenda will include the following:

Claim procedures
Correspondence procedures
Designation of responsible personnel
Labor standards provisions
Payroll reports
Changes
Payments to Contractor
Subcontractors
National Park Service regulations
Accident prevention program (including name of responsible supervisor)
Accident reporting
Documents required under the contract
Park rules and regulations
Saturday, Sunday, holiday and night work
Safety program (compliance with Clause 39 of General Provisions)
Tentative construction schedule
Submittal of shop drawings, project data, and samples
Scheduling of meetings during construction

PART 2: MATERIALS Not used.

PART 3: EXECUTION Not used.

END

PART 1: GENERAL

1-1 DESCRIPTION: The work of this section consists of establishing an effective accident prevention program and providing a safe environment for all personnel and visitors.

1-2 QUALITY ASSURANCE: Clause 12 and Clause 39 of the General Provisions. In case of conflicts between Federal, state, and local safety and health requirements, the most stringent shall apply.

1-3 SUBMITTAL OF ACCIDENT PREVENTION PROGRAM:

A. Before on-site work begins, submit for approval an accident prevention program. The Contracting Officer will review the proposed program for compliance with OSHA and project requirements. If the program requires any revisions or corrections, the Contractor shall resubmit the program within 10 days. No progress payments will be processed until the program is approved. The program shall include:

1. Name of responsible supervisor to carry out the program.

2. Weekly and monthly safety meetings.

3. First aid procedures.

4. Outline of each phase of the work, the hazards associated with each major phase, and the methods proposed to ensure safety of the public, National Park Service personnel, and Contractor's employees.

5. Training, both initial and continuing.

6. Planning for possible emergency situations, such as floods, fires, cave-ins, slides, explosions, power outages, and wind storms. Such planning shall take into consideration the nature of construction, site conditions, and degree of exposure of persons and property.

B. Certificates: Provide certificates from a mechanic that all power equipment has been inspected and meets OSHA requirements.

C. Submit a copy of test reports, as required by OSHA, for personnel working with hazardous materials.

D. Submit a report of safety meetings and of inspections.

1-4 ACCIDENT REPOPTING:

A. Reportable Accidents: A reportable accident is defined in Clause 39(d) of the General Provisions and includes fires. Within 7 days of a reportable accident, fill out and forward to the Contracting Officer a DI-134 form, which may be obtained from Contracting Officer.

B. All Other Accidents: The Contractor shall report all other accidents to the Contracting Officer as soon as possible and assist the Contracting Officer and other officials as required in the investigation of the accident.

1-5 QUALIFICATIONS OF EMPLOYEES:

A. Ensure that employees are physically qualified to perform their assigned duties in a safe manner.

B. Do not allow employees to work whose ability or alertness is impaired because of drugs, fatigue, illness, intoxication, or other conditions that may expose themselves or others to injury.

C. Operators of vehicles, mobile equipment, hoisting equipment, and hazardous plant equipment shall be able to understand signs, signals, and operating instructions, and be capable of operating such equipment. Provide operating instructions for all equipment. Newly hired operators shall be individually tested by an experienced operator or supervisor to determine if they are capable of safely operating equipment.

PART 2: MATERIALS

2-1 FIRST AID FACILITIES: Provide adequate facilities for the number of employees and the type of construction at the site.

2-2 PERSONNEL PROTECTIVE EQUIPMENT: Meet requirements of NIOSH and MSHA, where applicable, as well as ANSI.

2-3 BARPIEPS: Section 01530.

PART 3: EXECUTION

3-1 EMERGENCY INSTRUCTIONS: Post telephone numbers and reporting instructions for ambulance, physician, hospital, fire department, and police in conspicuous locations at the work site.

3-2 ESCAPE ROUTES: Provide and maintain adequate escape routes at all times in accordance with the Life Safety Code (NFPA 101). No corridor, aisle, stairway, door, or exit shall be obstructed or used in a manner that interferes with escape routes.

3-3 PROTECTIVE EQUIPMENT:

A. Inspect personal protective equipment daily and maintain in a serviceable condition. Clean, sanitize, and repair, as appropriate, personal items before issuing them to another individual.

B. Inspect and maintain other protective equipment and devices before use and on a periodic basis to insure safe operation.

3-4 SAFETY MEETINGS:

A. As a minimum, conduct weekly 15-minute "toolbox" safety meetings. These meetings shall be conducted by a foreman and attended by all construction personnel at the worksite.

B. Conduct monthly safety meetings for all levels of supervision. Notify the Contracting Officer so that he may attend. These meetings shall be used to review the effectiveness of the Contractor's safety effort, to resolve current health and safety problems, to provide a forum for planning safe construction activities, and for updating the accident prevention program. The Contracting Officer will enter the results of the meetings into his daily log.

3-5 HARD HATS AND PROTECTIVE EQUIPMENT AREAS:

A. A hard hat area will be mutually agreed upon by the Contracting Officer and the Contractor and so designated by a physical barrier.

B. It is the Contractor's responsibility to require all those working on or visiting the site to wear hard hats and other necessary protective equipment at all times. As a minimum, provide six hard hats for use by visitors. Change liners before reissuing hats.

3-6 TPAINING:

A. First Aid: Provide adequate training to ensure prompt and efficient first aid.

B. Hazardous Material: Train and instruct each employee exposed to hazardous material in safe and approved methods of handling and storage. Hazardous materials are defined as explosive, flammable, poisonous, corrosive, oxidizing, irritating, or otherwise harmful substances that could cause death or injury.

END

PART 1: GENERAL

1-1 SUBMITTAL PROCEDURE:

A. At least 30 days prior to his need for approval, Contractor shall forward to Contracting Officer all submittals required by the individual sections of the specifications. Unless a different number is called for in the individual sections, submit five copies of each shop drawing, five copies of all operation and maintenance instructions, and three specimens of each sample requested, all of which will be retained by Contracting Officer. Contractor shall submit, in addition, whatever copies he wants returned to him.

B. Identify all submittals on National Park Service form DSC-1(CS). Contracting Officer will provide a project identification stamp to identify each applicable page of the submittal, and an approval stamp. Imprint the face of each sheet with both stamps and fill in the blanks in the identification stamp.

C. Submittals that are related to or affect each other shall be forwarded simultaneously as a package to facilitate coordinated review. Uncoordinated submittals will be rejected.

D. Contracting Officer reserves the right to require submittals in addition to those called for in individual sections.

1-2 CONTRACTING OFFICER'S APPROVAL: Contracting Officer will indicate his approval or disapproval of each submittal, and his reasons for disapproval. When submittals have been approved, the number of copies Contractor wants for his own use will be returned. Any work done before approval shall be at Contractor's own risk.

1-3 SHOP DRAWINGS:

A. The term "shop drawings" includes drawings, diagrams, layouts, schematics, descriptive literature, illustrations, schedules, performance and test data, and similar materials furnished by Contractor to explain in detail specific portions of the work required by the Contract.

B. Contractor shall coordinate all such drawings, and review them for legibility, accuracy, completeness, and compliance with contract requirements, and shall indicate his approval thereon as evidence of such coordination and review. Shop drawings

submitted to Contracting Officer without evidence of Contractor's approval will be returned for resubmission.

C. Approval by Contracting Officer shall not relieve Contractor from responsibility for any errors or omissions in such drawings, nor from responsibility for complying with requirements of this Contract, except with respect to variations described and approved in accordance with Paragraph D below.

D. If shop drawings show variations from contract requirements, Contractor shall describe such variations in writing, separate from the drawings, at time of submission. All such variation must be approved by Contracting Officer.

1-4 OPERATION AND MAINTENANCE INSTRUCTIONS: Manufacturer's printed instructions shall include installation instructions, operating instructions, schematics for electrical and hydraulic systems, maintenance literature, lubrication requirements, and parts lists.

1-5 CERTIFICATES: For those items called for in individual sections, furnish certificates from manufacturers, suppliers, or others certifying that materials or equipment being furnished under the Contract comply with the requirements of these specifications.

1-6 SAMPLES: Samples shall be of sufficient size to clearly illustrate functional characteristics and full range of color, texture, and pattern.

1-7 PROGRESS SCHEDULE: As soon as possible after receiving Notice of Award and before any work is begun, submit four copies of a Progress Schedule (normally in bar chart form) showing estimated starting and completion dates for each part of the work. The first progress payment will not be issued until the progress schedule is submitted.

1-8 SCHEDULE OF VALUES:

A. Submit a schedule of dollar values for the various portions of the work. The schedule shall be based on the specification, C.S.I. (division, section) format and shall include all specification sections.

B. Each lump-sum bid item and each unit price bid item that involves a series of operations shall be broken down into component parts for which progress payments are desired by Contractor. The dollar value of each component part shall include a directly proportional amount of overhead and profit.

The total costs for the component parts shall equal the amount bid by the Contractor for that item, and the total cost of all items shall equal the contract sum.

C. When requested, show dollar values with data to show their correctness. The Schedule of Values will form the basis for progress payments as provided in Clause 7 of the General Provisions.

1-9 REVIEW OF SCHEDULES: Submit Schedule of Values and Progress Schedule as a package. Both the Progress Schedule and the Schedule of Values shall be subject to review by Contracting Officer both for format and content.

PART 2: MATERIALS Not used.

PART 3: EXECUTION Not used.

END

PART 1: GENERAL

1-1 DESCRIPTION: The work of this section consists of providing temporary services required for Contractor's performance of the Contract.

PART 2: MATERIALS

2-1 GENERAL: Materials may be new or used, but must be adequate in capacity for the required usage, must not create unsafe conditions, and must not violate requirements of applicable codes and standards.

2-2 SANITARY FACILITIES: Sufficiently lighted and ventilated toilet facilities in weatherproof, sightproof, sturdy enclosures.

2-3 FIRE PROTECTION EQUIPMENT: UL Class 2A, 2-1/2 gallon water type, stored pressure extinguisher and UL Class 10, Type I, 15 pound B:C carbon dioxide extinguisher.

PART 3: EXECUTION

3-1 ELECTRICITY AND LIGHTING:

A. Make arrangements with utility company (Alaska Power and Telephone) and pay all costs.

3-2 HEATING AND VENTILATING: Provide and maintain adequate approved facilities, as required for safety and construction requirements, during the progress of the work. Provide ample clearance around stoves and heaters and all chimney and vent connections to prevent ignition of adjacent combustible material.

3-3 TELEPHONE: Make arrangements with telephone company (Alaska Power and Telephone) and pay all costs.

3-4 WATER:

A. Arrange with the City of Skagway to provide water for construction and pay all costs.

B. Furnish cool, potable water for construction personnel in locations convenient to work stations.

3-5 SANITARY FACILITIES:

A. Place in approved locations where facilities will be secluded from public observation and convenient to work stations. Relocate as work progress requires.

B. Completely remove sanitary facilities on completion of work.

3-6 FIRE PREVENTION AND PROTECTION:

A. Hazard Control: For minimum standards, see NFPA 241. Take all necessary precautions to prevent fire during construction. Provide adequate ventilation during use of volatile or noxious substances.

B. Store allowable flammable and combustible liquids in approved facility outside the building.

C. Locate internal combustion equipment so that exhausts discharge well away from combustible materials.

D. Locate service areas a minimum of 20 feet from buildings. Shut down equipment before refueling.

E. Smoking: If smoking is permitted within the building, safe receptacles shall be provided for smoking materials.

F. Welding: Cutting by torch or welding shall be performed only when adequate fire protection is provided and only with specific approval of Contracting Officer.

3-7 PROTECTION EQUIPMENT REQUIRED:

A. Buildings: Furnish a minimum of one extinguisher for each 1,500 square feet of area or major fraction thereof. Travel distance from any work station to the nearest extinguisher shall not exceed 75 feet.

B. Vehicles and Equipment: Provide one extinguisher for each vehicle or piece of equipment.

END

PART 1: GENERAL

1-1 DESCRIPTION: The work of this section consists of furnishing, installing, and maintaining suitable barriers to protect existing facilities and the public from construction operations.

PART 2: MATERIALS

2-1 GENERAL: Material may be new or used, but shall be suitable for intended purpose. Barriers shall be structurally adequate and neat in appearance.

2-2 BARRICADES AND SIGNS: ANSI/ANSI D6.1-78 (MUTCD), Part VI.

2-3 WOOD PLANKING: Lumber, free of nails, large knot holes and splinters.

2-4 BARRIER TAPE: Banner Guard, imprinted with "CAUTION: CONSTRUCTION AREA", as manufactured by Reef Industries, Houston, Texas, or approved equal. Furnish a minimum of one roll.

PART 3: EXECUTION

3-1 PROTECTION OF PUBLIC:

A. Barricade or otherwise block off the immediate work area to prevent unauthorized entry to the work area.

B. Erect and maintain barricades, lights, danger signals, and warning signs in accordance with ANSI/ANSI D6.1-78.

C. Illuminate barricades and obstructions at night; keep safety lights burning from sunset to sunrise.

D. Adequately barricade and post open cuts in or adjacent to thoroughfares.

E. Protect pedestrian traffic by guardrails or approved barricades.

F. When pedestrian traffic is detoured into a roadway, provide temporary walkways with any necessary protection at ends and

overhead. For walkways, use lumber running parallel to direction of traffic movement and provide ramps at changes of elevation.

G. Cover pipes, hoses, and power lines crossing walkways with troughs using beveled edge boards.

3-2 BARRIER TAPE: Install where directed by Contracting Officer.

3-3 REMOVAL: Completely remove barriers no longer needed and when approved by Contracting Officer.

END

PART 1: GENERAL

1-1 DESCRIPTION: The work of this section consists of providing temporary controls.

PART 2: MATERIALS Not used.

PART 3: EXECUTION

3-1 HOUSEKEEPING:

A. Keep project neat, orderly, and in a safe condition at all times. Store and use equipment, tools, and materials in a manner that does not present a hazard. Immediately remove all hazardous rubbish. Do not allow rubbish to accumulate. Provide on-site containers for collection of rubbish or dispose of it at frequent intervals during progress of work.

B. Wet down dry materials and rubbish to prevent blowing dust.

C. Keep volatile wastes in covered containers.

D. Utilize excavated material as soon as possible.

3-2 DISPOSAL:

A. Do not burn or bury refuse within the historic district. Dispose of waste materials legally at public or private dumping areas outside the historic district.

B. Dispose of excess excavated material (including rocks and boulders) that cannot be used in construction outside the historic district.

3-3 AIR AND WATER POLLUTION CONTROL:

A. Take all necessary reasonable measures to reduce air and water pollution by any material or equipment used during construction.

B. Do not dispose of volatile wastes or oils in storm or sanitary drains.

PART 1: GENERAL

1-1 DESCRIPTION: The requirements of this section consist of furnishing, locating, and removing temporary structures.

PART 2: MATERIALS

2-1 GENERAL: Temporary structures shall be of noncombustible construction, or located a minimum of 30 feet away from other structures.

2-2 CONTRACTOR'S FIELD OFFICE: If Contractor elects to establish an office for his own use, the size, location, and construction shall be subject to approval.

2-3 CONTRACTING OFFICER'S FIELD OFFICE: Provided by the Government.

2-4 STORAGE SHEDS: Provide temporary weathertight sheds or other covered facilities for storage of materials subject to weather damage. Number and size of structures shall be subject to Contracting Officer's approval.

PART 3: EXECUTION

3-1 Provide structures when required by Contracting Officer. Locate structures at designated locations. Relocate as required by progress of work. Remove structures at completion of work.

END

PART 1: GENERAL

1-1 MANUFACTURER'S INSTRUCTIONS:

A. When contract documents require that installation of work shall comply with manufacturer's printed instructions, provide two copies of instructions to Contracting Officer. Maintain one set of complete instructions at the project site during installation and until completion.

B. Perform work in accordance with manufacturer's instructions.

1-2 TRANSPORTATION AND HANDLING:

A. Arrange deliveries of materials in accordance with construction schedules; coordinate to avoid conflict with work and conditions at the site. Deliver materials in undamaged condition, in manufacturer's original containers or packaging, with identifying labels intact and legible.

1-3 STORAGE AND PROTECTION:

A. Store materials in accordance with manufacturer's instructions, with seals and labels intact, legible and accessible for inspection.

1. Store products subject to damage by the elements in weathertight enclosures.

2. Maintain temperature and humidity within the ranges required by manufacturer's instructions.

B. Exterior Storage:

1. Store fabricated products above the ground, on blocking or skids; prevent soiling or staining. Cover products which are subject to deterioration with impervious sheet coverings; provide adequate ventilation to avoid condensation.

2. Store loose granular materials in a well-drained area on solid surfaces to prevent mixing with foreign matter.

C. Protection After Installation: Provide adequate coverings as necessary to protect installed materials from damage resulting

PART 2: MATERIALS Not used.

PART 3: EXECUTION Not used.

END

PART 1: GENERAL

1-1 DESCRIPTION: The work of this section consists of the disinfection of all portions of the water system, including valves and stops and any portion of the existing connecting system that might have become contaminated during construction activities.

PART 2: MATERIALS

2-1 CALCIUM HYPOCHLORITE: HTH, by Olin Chemicals, Olin Corporation, 120 Long Ridge Road, Stamford, Connecticut 06902, or similar commercial product having approximately 70 percent available chlorine.

2-2 MIXTURE: A 5-percent solution shall be made by mixing 5 percent of powder with 95 percent water, by weight, first into a paste, then thinning to slurry by the addition of water.

PART 3: EXECUTION

3-1 DOSAGE: Place enough disinfecting material in the system to insure a chlorine dosage of 50 parts per million. This is equivalent to 10 ounces of commercial hypochlorite powder to each 1,000 gallons of water.

3-2 FILLING SYSTEM: Fill entire system with the chlorine solution. Open all taps and valves and leave open until a strong odor of chlorine is noticeable in the water coming from the outlets, after which close the taps and valves.

3-3 TEST PERIOD: Allow chlorinated water to remain in the system a minimum of 24 hours, then thoroughly flush the system. During retention period, operate all valves, stops, and other appurtenances to assist this disinfection.

3-4 DISPOSAL OF CHLORINATED WATER: Disposal of chlorinated water into the sewer main is permitted with the approval of the Contracting Officer.

3-5 BACTERIOLOGICAL EXAMINATION: After the system has been thoroughly flushed, take samples from representative points in the system, in sterile bottles, and submit to proper authorities as directed for bacteriological examination. If the report is

unsatisfactory, repeat the disinfection procedure until satisfactory results are obtained.

END

PART 1: GENERAL

1-1 DESCRIPTION: The work of this section consists of testing building piping systems to assure they are complete, operable, and ready for use.

1-2 QUALITY ASSURANCE: Notify Contracting Officer at least 48 hours before testing. Provide test equipment including test pumps, gauges, instruments, and other equipment required. Pressure gauges shall be graduated in increments not greater than 5 psi and shall have range of approximately twice test pressure. Use only gauges and instruments recently calibrated.

PART 2: MATERIALS None.

PART 3: EXECUTION

3-1 GENERAL: Perform tests in accordance with following schedule. Unless otherwise specified below, tolerance shall be no pressure drop, except that due to temperature change, in 24-hour period.

System	Test Medium	Test Pressure	Tolerance
Heating Water	Water	150 psig	
Domestic Water	Water	150 psig	
Soil and Waste	Water	10 foot head or top of vent	No leaks/ 2 hours
Vents	Water	10 foot head or top of vent	No leaks/ 2 hours
Air	Air	1-1/2 times working pressure	

3-2 PIPING: Test before concealing piping. Before testing, remove all equipment from system that would be damaged by test pressure. Replace removed equipment after testing. Systems may be tested in sections as work progresses; however, any previously tested portion shall become a part of any later test of composite system. Correct leaks by remaking joints with new material; makeshift remedies will not be permitted. Test time will be accrued only while full test pressure is on system.

3-3 VALVES:

A. Check valve bonnets for tightness and external leaks. Test manual and solenoid operated valves from closed-to-open-to-closed position while valve is under test pressure.

B. Test automatic valves, including expansion, water regulating, pressure reducing, pressure relief, safety, and temperature and pressure relief valves at settings shown on the drawings or specified in the individual sections.

C. Test pressure relief, safety, and temperature and pressure relief valves three times.

3-4 PIPING SPECIALTIES: Test thermometers, pressure gauges, and water meters for accurate indication.

3-5 HANGERS AND SUPPORTS: With system in normal operation, test hangers, supports, and rods to insure they are plumb and supporting proper share of load. Additionally support, as required, systems and equipment that sway, crawl, or vibrate.

3-6 EXPANSION TANKS: Check proper water level when system is at working pressure and temperature.

3-7 OTHER MATERIALS AND EQUIPMENT: Test other piping specialties, materials, and equipment as specified, as reccmmended by equipment manufacturer, or as directed.

END

PART 1: GENERAL

1-1 DESCRIPTION:

A. The work of this section consists of leak testing gravity sewer lines, water lines, and related valves and fittings. Rejected work shall be retested.

B. Testing Methods: Gravity sewer lines - water test; water lines - high pressure water test.

1-2 QUALITY ASSURANCE:

A. Flow meters shall record the actual volume plus or minus 2 percent.

B. Air test gauges shall be ANSI/ANSI B40.1, Grade 3A (plus or minus 0.25 percent of full scale accuracy), 15 psi dial range.

C. Water test gauges shall be ANSI/ANSI B40.1, Grade 2A (plus or minus 0.5 percent of full scale accuracy), dial range approximately twice the required test pressure.

1-3 SUBMITTALS: In accordance with Section 01300.

A. Accuracy certification by approved independent testing laboratories for flow meters and test gauges. Certifications shall be dated no more than 90 days prior to actual system testing.

B. Prior to testing, provide the following information:

1. All Tests: Describe precautions that will be taken to protect system equipment that might be damaged under test pressures, and the proposed method for rerouting sewer flows where the system must remain in service.

2. Air Test: Describe the proposed method for testing where existing sewer service laterals enter the main being tested. Describe safety devices on air test equipment, and personnel safety precautions during air tests.

3. High Pressure Water Test: Describe the proposed method for disposal of water used in line testing.

1-4 PRCJECT CONDITIONS:

A. Testing shall not be performed until each system has been flushed or thoroughly cleaned in accordance with procedures in the sections that describe water and sewer line installation.

B. Test potable water lines before disinfecting.

C. Water for flushing and testing is not available from park supplies. Contractor shall arrange with the City of Skagway in providing water for this purpose.

1-5 CCNTRACTOR'S OPTION: For gravity sewer line the Contractor may use either the water leakage or air test.

PART 2: MATERIALS None.

PART 3: EXECUTION

3-1 GENERAL:

A. Perform testing in the Contracting Officer's presence after backfill and proper compaction of trenches. Where lines are installed under roadways and parking areas, perform tests after completion of final subgrade preparation and prior to application of surface courses. Notify Contracting Officer at least 48 hours prior to testing.

B. Prepare each section for testing, using adequate bracing; protect system equipment susceptible to damage by test pressures; make provision for installation of Government pressure gauge in parallel with Contractor's gauge, if so requested; and maintain services where required.

3-2 GRAVITY SEWER SYSTEMS:

A. Water Test: Laterals entering the main line shall be tested. During the 2-hour test period, measured quantities of water shall be added to maintain the test level within 1 inch of the reference point. Maximum allowable gallons of makeup water for pipeline leakage shall be determined by multiplying the nominal pipe diameter in inches by 1.0 gallons per inch, by the number of linear feet of pipe in the test section, and dividing the product by 1,000.

3-3 WATER LINES:

A. Fill line with water; eliminate all air. Allow a minimum standing time of 2 hours for materials to absorb water.

B. Raise the internal pressure by pumping in water to 50 psig above the maximum anticipated service pressure (ignore water hammer) at the point of test gauge attachment.

C. Maintain the test pressure within 5 psig for 2 hours by pumping in metered quantities of makeup water.

D. The line section will have passed the test if the metered makeup water does not exceed that determined by the following formula: Leakage in gallons equals 0.00002 times the nominal diameter of pipe in inches times the length of the test section in feet times the square root of the test pressure in psig.

E. Do not use paints, asphalts, tars, or other types of pipe compounds to eliminate leaks.

F. Replace leaking fittings, nipples, or lengths of pipe.

END

PART 1: GENERAL Not used.

PART 2: MATERIALS

2-1 CLEANING MATERIALS: As recommended by the manufacturer of surface to be cleaned.

PART 3: EXECUTION

3-1 CLEANING:

A. Exterior Cleaning: Sweep boardwalks; rake other surfaces or grounds. Clean building surfaces with recommended products.

B. Interior Cleaning: Vacuum clean interior building areas when ready for painting and continue vacuum cleaning as needed until acceptance of building.

C. Final Cleaning: Remove all tools, equipment, surplus materials, and rubbish. Refinish surfaces of existing facilities that are marred, scratched, or damaged to match original condition. Remove grease, dirt, stains, foreign materials, and labels from interior and exterior finished surfaces. Do any required waxing and polishing. At time of final inspection, project shall be thoroughly clean and ready for use.

3-2 PROJECT RECORD DRAWINGS:

A. Using colored ink, make changes on a set of clean prints of original tracings. Show all changes and revisions to the original design that affect the permanent structures and will exist in the completed work. Reference underground utilities to semipermanent or permanent physical objects. Reference water, sewer, telephone, and electric lines to corners of buildings. Include schematic diagrams for all electrical equipment with terminal numbers shown.

B. Keep record drawings current. Inspection will be made monthly. Certification of accuracy and completeness will be required on monthly submitted payment requisitions. Project record drawings are the property of the Government and shall be delivered to the Contracting Officer before closeout.

3-3 SUBSTANTIAL COMPLETION AND FINAL INSPECTION: Submit written certification that project, or designated portion of project, is substantially complete, and request, in writing, a final inspection. Contracting Officer and Contractor will negotiate a reasonable date for the final inspection.

A. When Contracting Officer determines that the work is substantially complete, he will prepare a list of deficiencies that need to be corrected before final acceptance and issue a Notice of Substantial Completion with the deficiencies noted.

B. If Contracting Officer determines that the work is not substantially complete, he will immediately notify Contractor, in writing, stating reasons. After completing work, Contractor shall resubmit certification and request a new final inspection.

3-4 ACCEPTANCE OF THE WORK: After all deficiencies have been corrected, a Letter of Final Acceptance will be issued.

A. Acceptance may be given before correction of deficiencies that do not prevent operation and use of the facility; however, final payment will be withheld until all deficiencies are corrected.

B. Until receipt of Letter of Final Acceptance, Contractor shall be responsible for the work of this Contract.

3-5 OPERATING INSTRUCTIONS: After equipment and systems are complete and operating, in cooperation with Contracting Officer, train Government personnel how to operate them.

3-6 START-UP: Demonstrate systems and train Government personnel in correct operation. Familiarize them with locations of switches, junction boxes, and circuiting.

3-7 CLOSEOUT SUBMITTALS: Submit before payment request.

A. Project Record Drawings: As specified above.

B. Guarantees and Bonds: As specified in individual sections.

C. Spare Parts and Materials: As specified in individual sections.

D. Keys and Keying Schedule: Submit all keys including duplicates. Wire all keys for each lock securely together. Tag and plainly mark with lock number or equipment identification, and indicate physical location, such as building and room name or

number, or panel or switch number. As specified in Sections 08710, 10800, and Divisions 15 and 16.

E. Operating Handles and Special Tools: Clearly identify as to related equipment.

3-8 POST-CONSTRUCTION INSPECTION: Before expiration of guaranty period, Contracting Officer will inspect project and notify Contractor in writing of all deficiencies.

END

PART 1: GENERAL

1-1 DESCRIPTION: The work of this section consists of removal work and storing salvaged materials.

1-2 SUBMITTALS: In accordance with Section 01300. Submit proposed methods of building protection and materials removal.

1-3 QUALITY ASSURANCE: Comply with the safety requirements for demolition, ANSI/ANSI A10.6-69.

PART 2: MATERIALS None.

PART 3: EXECUTION

3-1 PREPARATION:

A. Provide adequate fire protection.

B. Ensure safety of persons in working area and protect nearby buildings, structures, and utilities.

C. Provide temporary supports and protection for those portions of the structure to remain. Provide temporary closures for openings made in exterior walls and roofs. Complete removal work that might damage new construction before starting new work.

D. Cap or disconnect utilities that will remain in use. Shut off, disconnect, and remove all other utilities.

3-2 PRESERVATION OF HISTORIC FABRIC:

A. Take every precaution to prevent damage to existing structures and surrounding areas. No flame cutting, vibrating equipment, or explosives will be permitted. Should accidental damage cccur, promptly repair damaged area to the satisfaction of the Contracting Officer at no additional expense to the Government.

B. Pemove or cut fabric with approved tools and methods in the presence of Contracting Officer. Remove nails, tacks, and other connectors from materials to be reused or salvaged.

C. Carefully pack materials to be retained or reused.

3-3 IDENTIFICATION AND DOCUMENTATION:

A. Carefully record dimensions and locations, in relation to a control line or point, of existing features to be reproduced in new construction.

B. As each section of historic fabric is removed, Contracting Officer will identify and record the date, location, origin, and original use. Material samples will be obtained by the Contracting Officer for archival purposes.

C. As previously inaccessible areas are exposed, it may be necessary to temporarily halt work for architectural or archeological investigation. When possible, the Contractor shall work elsewhere on the project.

3-4 REMOVAL: Remove items or materials in inverse order of that used in placing. Methods will be changed and supplemented by the Contracting Officer as necessary.

3-5 CUTTING AND PATCHING: Cut fabric carefully to assure minimum damage to surrounding areas. Patch, repair, or replace to match existing or adjacent surfaces.

3-6 BELOW GRADE AREAS AND VOIDS: Fill voids resulting from removal work as directed.

3-7 SALVAGED MATERIALS:

A. Storage: Store salvaged materials in the building or on site in accordance with Section 01600, or as directed by the Contracting Officer.

B. Stockpile windows and doors, as indicated in schedules to be repaired, refinished, reassembled and reinstalled, and any other materials approved for reuse, including sound framing material, sound sheathing and siding, millwork, or hardware.

C. Salvage and store off-site as directed existing shiplap ceiling and wall boards, sound materials not reused in the building, including framing, sheathing, siding, doors, windows, millwork, or hardware, and any other material or equipment designated for salvage.

D. Except for samples as obtained by the Contracting Officer, dispose of linoleum, Celotex and wood batts, wallpaper and cloth, plywood, electrical wiring, fittings, fixtures and panels, piping

and plumbing fixtures, cabinets, chimney masonry, and roofing materials.

3-8 DISPOSAL: Leave area free of rubbish and debris. Dispose of all unsalvageable material as specified in Section 01560. Secure Contracting Officer's approval for disposal of any material.

END

PART 1: GENERAL

1-1 DESCRIPTION: The work of this section consists of excavation, removal and disposal of excess and unsuitable material, and furnishing and placing imported borrow.

1-2 QUALITY ASSURANCE: Testing required to determine compliance for the work of this section will be the responsibility of the Government and at the Government's expense. The Contractor shall cooperate by rerouting equipment or by temporarily closing the immediate work area being tested. Areas where test results indicate noncompliance shall be corrected before placing additional material.

1-3 CLASSIFICATION: All excavation under this section shall be considered unclassified regardless of the nature of material encountered.

1-4 PROJECT CONDITIONS: Maintain fills, slopes, and ditches within the limits of the new construction until final acceptance. Repair areas damaged as a result of storms or construction.

A. The Contracting Officer shall notify utility companies and the Contracting Officer of proposed locations and time he expects to excavate. When a utility is known to be within the area, the Contractor shall be responsible for locating the utility and for preventing damage to the utility. Should damage occur, the Contractor shall be responsible for its repair at no additional expense to the Government.

B. Should a utility be encountered that is not known to exist, the Contractor shall immediately notify the Contracting Officer and shall take all necessary steps to prevent damage to the utility. Should damage have already occurred, the Contractor shall repair the damage and an equitable adjustment will be made in accordance with Clause 4 of the General Provisions.

PART 2: MATERIAL

2-1 GENERAL:

A. All borrow and backfill material will be subject to approval by the Contracting Officer.

B. Before importing borrow, use all suitable material obtained from excavation for construction. Obtain approval from the Contracting Officer before importing borrow.

C. Material shall be free from detrimental quantities of organic materials, and free of all debris, muck, and other unsuitable materials. Frozen material will not be permitted.

2-2 IMPORTED BORROW: Clean fill material as approved by Contracting Officer.

2-3 WATER: Potable. Section 01510.

PART 3: EXECUTION

3-1 STRIPPING AND STOCKPILING TOPSOIL: The Contracting Officer will determine areas to be stripped and depth of stripping, and will designate locations for stockpiles.

3-2 GROUND SURFACE PREPARATION: Before excavating or placing material, complete all clearing and grubbing, and scarify ground surface to provide ample bond between old and new material.

3-3 FILL CONSTRUCTION: Place fill material in layers not exceeding 8 inches loose measurement. Compact each layer before placing the next layer. As the compaction of each layer progresses, continually level and manipulate to assure uniform moisture and density. Add water to obtain specified moisture content.

3-4 DENSITY REQUIREMENT: The top 2.5 feet of fill areas that are to support roadway pavements, walks, and other structures shall be compacted to 95 percent of the maximum density as determined by AASHTO T99 or T180, Method D, at plus or minus 2 percent of the optimum moisture content. All fill below the top 2.5 feet and all fill not supporting roadways, parking areas, walks or other structures shall be compacted to 90 percent of maximum density as determined by AASHTO T99 or T180, Method D, at plus or minus 2 percent of the optimum moisture content. Density testing of compacted material will be made in accordance with AASHTO T191, T205, or other standard accepted field density testing methods.

3-5 SUBGRADE TOLERANCE: The finish subgrade elevation shall not vary above or below the theoretical grade more than 0.1 foot.

3-6 FINISH GRADE: Spread soil on new ground surfaces to a maximum depth of 4 inches. If there is an excess of material, the Contracting Officer will determine areas to receive additional material so as to utilize all material. Remove sticks, clods, and rocks larger than 2 inches in diameter. Hand rake areas inaccessible to construction equipment.

3-7 DISPOSAL: Dispose of all surplus material as designated by Contracting Officer. Dispose of all unsuitable material in accordance with Section 01560.

END

PART 1: GENERAL

1-1 DESCRIPTION: The work of this section consists of trenching and backfilling for the construction and installation of pipelines, conduits and cables. All trenching will be open cut. It includes all clearing and grubbing, drilling, construction of cribbing and cofferdams, dewatering, and incidental work.

1-2 DEFINITION: Materials used in backfill, as shown in trench details, are defined as follows:

A. Bedding (BD): When rock, unstable material or wet trench is encountered at the excavated grade for utility installation, bedding is required. Materials shall be predominantly sand and gravel, having a plasticity index less than 6. Bedding may be omitted if, in the opinion of the Contracting Officer, the excavated trench bottom will adequately support and not damage the utility line.

1. BD-1: Gradation as follows:

Sieve Size	Percent Passing
No. 4	100
No. 8	55- 85
No. 40	15- 30

2. BD-2: Gradation as follows:

Sieve Size	Percent Passing
1/2-inch	100
No. 4	50- 80
No. 40	10- 25

3. BD-3: Gradation as follows:

Sieve Size	Percent Passing
1-1/2-inch	100
1/2-inch	45- 75
No. 40	10- 25

B. Select Backfill (SB): Materials shall be predominantly sand and gravel, having a plasticity index less than 6.

1. SB-1: Gradation as follows:

Sieve Size	Percent Passing
No. 4	100
No. 8	55- 85
No. 40	15- 30

2. SB-2: Gradation as follows:

Sieve Size	Percent Passing
1/2-inch	100
No. 4	50- 80
No. 40	10- 25

3. SB-3: Gradation as follows:

Sieve Size	Percent Passing
3/4-inch	100
3/8-inch	55- 85
No. 40	10- 25

4. SB-4: Gradation as follows:

Sieve Size	Percent Passing
1-1/2-inch	100
1/2-inch	45- 75
No. 40	10- 25

C. Backfill (BF):

1. BF-1: Materials shall be predominantly sand and gravel, having a plasticity index less than 6, and graded as follows:

Sieve Size	Percent Passing
1-1/2-inch	100
1/2-inch	45- 75
No. 40	10- 25

2. BF-2: Soils that contain no rock larger than 6 inches at greatest dimension. If expansive clays are present, such content shall not exceed one-third of the material by volume, and shall be well mixed with noncohesive soils.

1-3 QUALITY ASSURANCE:

A. All compaction testing and gradation analysis will be arranged and paid for by the Government. Contractor shall be present when samples of bedding, select backfill, and backfill materials are gathered for analysis.

B. All references to percent of maximum density will be as determined by ANSI/ASTM D698-78, Method C, at a moisture content determined to be suitable for such density. Moisture-density curves will be prepared in a certified soils testing laboratory.

C. In-Place Soil Density Testing: Procedures used by the Contracting Officer will be in accordance with ANSI/ASTM D1556-64, Density of Soil In Place By the Sand-Cone Method, or ANSI/ASTM D2922-78, Density of Soil and Soil-Aggregate In Place By Nuclear Methods (Shallow Depth). Contracting Officer will perform at least one test within each backfill material zone (BD, SB, BF) at the following maximum intervals:

1. Vehicular Traffic Areas: 50 linear feet of trench.

2. Pedestrian and Lawn Areas: 100 linear feet of trench.

3. Nontraffic Areas: 200 linear feet of trench.

Testing at more frequent intervals may be performed at the discretion of the Contracting Officer.

1-4 SUBMITTALS: In accordance with Section 01300.

A. Written procedure for trench dewatering and disposal of fluidized materials removed.

B. Written description of barricading, shoring, cribbing, bracing, and sloping precautions.

1-5 PROJECT CONDITIONS:

A. Obtain all required permits and licenses before installing utilities under existing roads and follow the rules and requirements of the authority having jurisdiction.

B. Arrange construction sequences to provide the shortest practical time that the trenches will be open to avoid hazard to the public, and to minimize the possibility of trench collapse.

1-6 EXCAVATION CLASSIFICATION: Regardless of the nature of material excavated, all excavation will be considered unclassified.

1-7 HAND EXCAVATION: Contracting Officer will designate and direct the performance of hand excavation beneath or adjacent to buildings.

1-8 PROTECTION OF EXISTING UTILITIES: See Section 02210.

PART 2: MATERIALS

2-1 GENERAL: All backfill material shall be approved before use and be free of cinders, ashes, ice, frozen soil, large hard clods, organic debris, or other deleterious items. Trench excavation materials may be used as approved.

2-2 MATERIALS FOR BACKFILLING: Furnish required bedding, select backfill and backfill materials listed under the appropriate types of utility line in the sections to which this work relates.

2-3 UTILITY LINE MARKING: All utilities shall be marked for location and identified by marking tapes, in accordance with Section 02229.

PART 3: EXECUTION

3-1 TRENCH EXCAVATION:

A. Trenching Guidelines: Excavate the trench to the approximate level of the top of the utility line to be installed, using adequate trench width and side slopes to safely accommodate worker access. Continue excavating for the utility line, to a width not greater than is shown on the appropriate trench detail.

1. Rocky Trench Bottom: Where ledge rock, hard pan, boulders, or sharp-edged materials are encountered, over-excavate a minimum depth of 6 inches below the bottom of the utility exterior wall to permit adequate bedding preparation. The installed utility shall have at least 6 inches of clearance from any rock protrusion.

2. Unstable Trench Bottom: Secure approval of depth of over-excavation and stabilization method. For wet trench construction, use approved method of dewatering through diversion, damming and pumping, well points, or underdrain systems. Dispose of removed fluidized materials as approved.

Use BD-3 material to build a suitable foundation to within 6 inches of finished utility grade, prior to bedding with the specified material. Compact layers to 95 percent of maximum density in not greater than 6-inch layers. Do not proceed with utility installation until wet trench and unstable conditions are under control.

3-2 SHCRING AND SHEETING:

A. Construct and maintain all shoring, sheeting, and slope lay-back necessary to protect the excavation, as needed for the safety of the employees and as required by applicable State and Federal laws.

B. For trenches over 5 feet deep, provide suitable barricades for worker protection. When work area is left open and unattended by Contractor, provide suitable barricades for public safety, regardless of trench depth.

C. For trenches over 4 feet deep, provide suitable exit means in accordance with applicable provisions of OSHA.

D. Do not remove timber or sheeting if it is in a compacted zone. Instead, trim it off at a safe level above that zone.

E. As directed, remove all other sheeting and shoring when safe to do so.

3-3 BACKFILLING:

A. Compaction: Use vibratory compactors for sands and gravels (noncohesive soils). Use mechanical tampers for sand and gravel containing a significant portion of fine-grained material, such as silt and clay (cohesive soils). Hand tamp around pipe or cable to protect the lines until adequate cushion is attained. Puddling or water flooding for consolidation of backfill or compaction by wheel rolling with construction equipment will not be permitted.

B. Bedding: Compact the specified material to 95 percent of maximum density to the finished utility grade.

C. Utility Installation: Shape the trench bottom to assure uniform contact with the full length of the installed line and remove any sharp-edged materials that might damage the line. Compaction shall be maintained beneath the line.

D. Select Backfill: Fill by hand placement around the utility to just over half depth, and compact in a manner to insure against lateral or vertical displacement. Place select backfill to 12 inches above the utility line by hand placement in not more than 6-inch layers. Compact each layer to 95 percent of maximum density.

E. Backfill: Place and compact the specified material as follows:

1. Vehicular Traffic Areas: Fill and compact in 8-inch maximum layers to 95 percent of maximum density.

2. Pedestrian and Lawn Areas: Fill and compact in 8-inch maximum layers to 90 percent of maximum density.

3. Nontraffic Areas: Fill and compact in 8-inch maximum layers to 90 percent of maximum density.

3-4 SURFACE FINISH WORK:

A. Paved Areas: Place and prepare indicated base course for paving.

B. Open and Seeded Areas: Grade all disturbed areas with no abrupt changes in grade or irregularities that will hold water.

C. Drainage Ditches: Restore drainage ditches to appropriate line and grade, using approved surface erosion prevention techniques.

D. Cleanup: Prior to final inspection and acceptance, remove all rubbish and excess material for disposal as approved, and leave area in a neat, satisfactory condition.

END

SECTION 02225 STRUCTURE EXCAVATION AND BACKFILL

PART 1: GENERAL

1-1 DESCRIPTION: The work of this section consists of all structure excavation and backfill required to complete the work. It includes disposal of surplus or unsuitable material.

1-2 QUALITY ASSURANCE: Testing required to determine compliance for the work of this section will be the responsibility of the Government and at the Government's expense. The Contractor shall cooperate by rerouting equipment or by temporarily closing the immediate work area being tested. Areas where test results indicate noncompliance shall be corrected before placing additional backfill.

1-3 CLASSIFICATION: All excavation under this section will be considered unclassified regardless of the nature of material encountered.

1-4 PROJECT CONDITIONS: Take necessary precautions to prevent the entrance of soils and other materials into streambeds or water courses.

PART 2: MATERIALS

2-1 SELECT BACKFILL: Material for backfill shall be fine, readily compactible soil or granular material selected from the structure excavation or from other approved sources, and shall not contain frozen lumps, stones larger than 2 inches, chunks of highly plastic clay, organic or other objectionable material.

2-2 WATER: Potable.

2-3 UTILIZATION OF EXCAVATION MATERIALS: Use suitable material removed from excavation for backfill, fill, or bedding, as directed. Waste no excavated material unless approved by Contracting Officer.

PART 3: EXECUTION

3-1 GENERAL:

A. The Contractor shall obtain approval of the foundation excavation prior to placing pipe or formwork.

B. If unauthorized overexcavation occurs, Contractor shall, at no additional expense to the Government, repair the area by backfilling with approved material and compacting to 95 percent of the maximum density as determined by the AASHTO T99 or T180, Method D, at plus or minus 2 percent of the optimum moisture content.

C. The Contractor shall provide all bracing, shoring, sheeting, pumping, and cofferdams required for proper execution and safety of the work.

D. Upon completion of excavation and prior to placing forms, notify the Contracting Officer, who will inspect the excavation and may take tests to determine soil bearing values. Should foundation material, considered unsuitable by the Contracting Officer, be encountered and require additional excavation below the design elevation, an equitable adjustment will be made in accordance with Clause 4 of the General Provisions.

E. See Section 02210 for existing utility protection.

3-2 EXCAVATION:

A. Structures Other than Building Foundations: When the foundation material is soft, mucky, or otherwise unsuitable, remove the unsuitable material and backfill with approved material. Place foundation fill in 6-inch layers. Compact each layer to 90 percent of the maximum density as determined by AASHTO T99 or T180, Method D.

B. Building Foundations:

1. If, due to soft or other unstable material, a firm foundation is not encountered at grade established remove unstable material and backfill with approved granular material in 6-inch layers. Compact to 95 percent of the maximum density as determined by AASHTO T99 or T180, Method D, at plus or minus 2 percent of the optimum moisture content.

2. Make excavation sufficiently large to permit installation of waterproofing, utility connections, and removal of forms.

3-3 BACKFILL:

A. Remove all trash and debris before placement of backfill. Maintain symmetrical backfill loading and compact each layer by hand tampers or other suitable equipment.

B. Compact each layer of backfill material below 2.5 feet of the finished subgrade to 90 percent of the maximum density as determined by AASHTO T99 or T180, Method D, at a moisture content determined to be suitable for such density. Compact the top 2.5 feet of backfill material to 95 percent of the maximum density. Do not place backfill against concrete walls until concrete has cured sufficiently to accept the load.

3-4 DISPOSAL: Dispose of surplus material as directed by Contracting Officer. Dispose of all unsuitable material in accordance with Section 01560.

END

PART 1: GENERAL

1-1 DESCRIPTION: The work of this section consists of furnishing and installing utility marking.

1-2 SUBMITTALS: In accordance with Section 01300.

A. Samples: 24-inch strips of tape and 2 markers.

B. Certification that the materials used in the tape fabrication meet the requirements of this section.

C. Installation procedure if the cable is installed by plowing.

PART 2: MATERIALS

2-1 MARKING TAPE: Capable of being inductively detected electronically.

A. Construction: Metallic foil laminated between two layers of plastic film not less than 2 inches wide. The adhesive shall be colored and be compatible with the foil and film.

B. Film: Inert plastic. Each film layer shall be not less than 0.0005 inch thick (1/2 mil).

C. Foil: Not less than 0.001 inch thick (1 mil).

D. Imprint: 3/4-inch or larger bold black letters.

E. Legend: The buried utility line tape shall be identified with imprint such as "Caution: Sewer Line Below" and the identification repeated on approximately 24-inch intervals.

F. Detectable marking and warning tape shall be as manufactured by Lineguard, Inc., Paul Potter Associates, all of Wheaton, Illinois, or Griffolyn Company, Inc., Houston, Texas, or approved equal.

PART 3: EXECUTION

3-1 MARKING TAPE:

A. Install tape in backfill directly over each buried utility line, 4 to 8 inches below finished grade, or 2 to 4 inches below finished subgrade in paved areas. Place tape by plowing or place it during the final backfilling operation.

B. Where utilities are buried in a common trench, identify each line by a separate warning tape. Bury tapes side by side directly over the applicable line.

END

PART 1: GENERAL

1-1 DESCRIPTION: The work of this section consists of soil treatment for termite and carpenter ant control.

1-2 QUALITY ASSURANCE:

A. Only experienced or licensed exterminators will be employed.

B. Alternate materials may be used providing they meet requirements as specified; possess acceptable compatibility; are registered with USDA, appropriately labeled listing names and percentages of active ingredients in the formula.

1-3 SUBMITTALS: In accordance with Section 01300, submit the following:

A. Letter or certificate verifying exterminators' qualifications.

B. List of proposed chemicals with technical data for approval.

C. Certificate or letter outlining method of mechanical application.

1-4 PRODUCT HANDLING:

A. Secure written approval prior to delivery of materials.

B. Store in clearly labeled, original, sealed containers secure from humans and animals.

1-5 PROJECT CONDITIONS: Begin soil poisoning only after preparation of foundations is complete. Place no poison on wet soil. Prevent disturbance of treated soil by human or animal contact.

PART 2: MATERIALS

2-1 CHEMICALS: Use no material containing fuel oil. Use Duraban TC by Dow Chemical, Midland, Michigan 48640, or approved equal.

PART 3: EXECUTION

3-1 APPLICATION: Comply with State and Federal requirements and manufacturer's recommended dosage rate. Uniformly apply soil poison in designated area at rate of 1 gallon for each 10 square feet. Along outside of foundations, use 3 gallons for 10 linear feet.

END

PART 1: GENERAL

1-1 DESCRIPTION: The work of this section consists of furnishing and installing water system piping and appurtenances from the lateral to the valve pit.

1-2 DEFINITION: Bedding and backfill material types (BD, SB, BF) are defined in Section 02221.

1-3 SUBMITTALS: In accordance with Section 01300.

A. Manufacturers' literature and certificates of compliance with the reference standards for pipe, fittings, and couplings.

B. Manufacturers' installation instructions or guide.

C. Written procedure for cleaning water lines and disposing of fluidized materials removed.

1-4 PRODUCT HANDLING:

A. Delivery: Handle pipe carefully to insure delivery at the project site in sound, undamaged condition. Contracting Officer will reject damaged pipe on site. Contractor shall replace damaged pipe at no additional expense to the Government.

B. Storage: Do not store materials directly on the ground. Adequately support piping to prevent warpage. Use protective covers where pipe may be damaged by direct sunlight.

PART 2: MATERIALS

2-1 DUCTILE IRON PIPE, JOINTS, AND BACKFILL MATERIAL:

A. Pipe: ANSI/AWWA C151-81. Thickness Class 51 or better for 4-inch diameter pipe. Thickness Class 50 or better for 6-inch diameter or larger pipe.

B. Push-On Joint: ANSI/AWWA C111-80. Single rubber gasket.

C. Mechanical Joint: ANSI/AWWA C111-80. Stuffing-box type with sealing gasket, follower gland, tee-head bolts and hexagonal nuts.

D. Push-On Joint Gasket Lubricant: Manufacturer's standard nontoxic lubricant, approved for potable water systems.

E. Adapters For Flanged Fittings: Use manufactured flange coupling adapters, or threaded flanges on thickness Class 53 pipe. Flange bolts shall be stainless steel or of a corrosion resistant alloy.

F. Cement Mortar Lining: ANSI/AWWA C104-80. For pipe and fittings, minimum 1/16 inch thick.

G. Bedding and Backfill: Section 02221.

1. Traffic Areas: BD-3, SB-4, and BF-1.

2. Pedestrian and Lawn Areas: BD-3, SB-4, and BF-2.

3. Non-Traffic Areas: BD-3, SB-4, and BF-2.

2-2 FITTINGS: Size, grade, joint type, and lining to match pipe, and as recommended by the pipe manufacturer.

2-3 COUPLINGS FOR PLAIN ENDS AND DISSIMILAR PIPES: Sleeve and transition type couplings shall be factory manufactured to assure tight fit and smooth flow transition at the joint.

2-4 CONCRETE: Section 03310.

PART 3: EXECUTION

3-1 GENERAL: Construct the water system to the lines and grades shown or established in the field.

3-2 TRENCHING: Section 02221.

3-3 BEDDING: Section 02221.

3-4 INSTALLATION:

A. Inspection: Inspect pipe for defects before lowering into the trench. Defective, damaged, or unsound pipe will be rejected.

B. Laying: After the trench bottom has been properly prepared for pipe installation in accordance with Section 02221, lay pipe with bells facing in the direction of laying, except as approved. On slopes exceeding 20 percent, bells shall face upgrade and

laying shall proceed upgrade. Where making connections with other lines, bells may face as needed.

C. Cleaning: As work progresses, clear the pipe interior of dirt and other debris by keeping swabs in the pipe and pulling them forward past each completed joint.

D. Pipe Cutting: Cutting for closure or other reasons shall be done neatly by methods recommended by the manufacturer.

E. Jointing: Clean gaskets, seats, and threads of foreign materials prior to joint assembly. Apply lubricant or sealing tape as recommended by the manufacturer.

1. Push-On Joint: Carefully insert the spigot end into the bell to prevent entry of dirt and incorrect entry angle. With suitable fork tool, crowbar, or by hand, make the joint to the insertion depth recommended by the manufacturer. When the selected pipe uses joints not designed for full depth insertion, prevent further closure of previously completed joints by restraining movement of the installed line while making succeeding joints.

2. Mechanical Joint: Carefully center the spigot in the bell and position the gasket evenly in the seat. Tighten bolts alternately to an even torque, causing the follower gland to expand the gasket uniformly for a tight seal.

3. Plain End Jointing: Install factory made couplers in accordance with manufacturer's directions. Center the coupling collar over the joint and tighten bolts evenly.

4. Threaded Joint: Cut threads accurately with sharp dies. Assemble screwed joints after applying Teflon tape to male threads. Once the joint has been tightened, backing off will not be permitted unless new tape is applied to the threads.

5. Flanged End Jointing: Install correct gasket for flange faces used, and tighten bolts evenly.

3-5 DEFLECTION AT DUCTILE IRON JOINTS:

A. Push-On and Mechanical Joints: Deflections from a straight line or grade measured between extended centerlines of the connecting pipe shall not exceed the following:

Size of Pipe in Inches	Deflection per Linear Foot in Inches	
	Push-On	Mechanical
4, 6	1	1-1/2
8, 10, 12	1	1
14, 16	5/8	3/4
18, 20	5/8	5/8

B. If the required alignment necessitates deflection in excess of that specified above, provide either special bends or a sufficient number of shorter lengths of pipe to effect angular deflections within the limits specified.

3-6 DRAIN LINES: Install drain piping as shown. Connect drains at all line low points and extend on a minimum grade of 1 percent to daylight. Install a screened end at the discharge point as shown.

3-7 PIPE ENDS: Valve, plug, or cap future connection stubs, fittings, and taps as shown.

3-8 CONCRETE THRUST BLOCKS: Construct at all bends, tees, crosses, reducers, valves, and dead ends as shown and as recommended by the pipe manufacturer.

3-9 BACKFILLING OF SELECT MATERIALS: Section 02221.

3-10 BACKFILLING: Section 02221.

3-11 WATER LINE MARKING: Section 02229.

3-12 FINAL PIPE CLEANING: Prior to testing, clean all lines to be tested by high pressure water jet or mechanical means. Remove and dispose of fluidized materials as approved.

3-13 TESTING: Section 01666.

3-14 SURFACE FINISH WORK: Section 02221.

3-15 DISINFECTION: After completion of testing and prior to placing in service, disinfect the potable water system as specified in Section 01656.

END

PART 1: GENERAL

1-1 DESCRIPTION: The work of this section consists of supplying materials for and construction of the valve pit. This task completion must result in the pit as shown, complete and ready for use to supply domestic and fire suppression water. The pit contains services common to the Mascot Saloon group, Boas Tailor and Furrier, and Verbauwhede's Cigar Store and Confectionery.

1-2 QUALITY ASSURANCE: Section 15010.

1-3 RELATED WORK: Concrete - Section 03310; plumbing - Section 15400; painting - Section 09901; basic materials and methods - Section 15050.

1-4 SUBMITTALS: In accordance with Sections 01300 and 03310.

A. Submit shop drawings showing location of all equipment and materials.

B. Submit complete list of proposed materials including manufacturer's names, catalog numbers, and descriptive literature.

PART 2: MATERIALS

2-1 ACCESS DOOR: Access door shall be type J-4AL as manufactured by the Bilco Company, New Haven, Connecticut 06505 or approved equal. Door leaf shall be 1/4-inch aluminum diamond pattern plate to withstand a live load of 100 pounds per square foot. Channel frame shall be 1/4-inch aluminum with anchor flange around the perimeter. Door shall be equipped with heavy forged brass hinges, stainless steel pins, spring operators, and automatic hold-open arm with release handle. A snap lock with removable handle shall be provided. A 1-1/2-inch drainage coupling shall be located in the front right corner of the channel frame. Supply unit with bituminous coating applied to exterior of the frame.

2-2 PIPING AND APPURTENANCES:

A. 2-Inch and Smaller Domestic Water Pipe: Copper tubing, hard drawn, Type L, ASTM B88; fittings, wrought copper solder joint, ANSI B16.22.

B. 3-Inch and Larger Water Pipe: Flanged ductile iron pipe and fittings, FS WW-P-421C.

C. Sump Pump Discharge Pipe: Schedule 40 galvanized steel pipe, ASTM A120; fittings, cast iron, ANSI B16.4; galvanizing in accordance with ASTM A153.

D. Domestic Water Accessories: In accordance with plumbing systems, Section 15400.

2-3 SUMP PUMP: Swaby Blue Marlin, or approved equal, as manufactured by Swaby Manufacturing Company, Chicago, Illinois 60639. Unit shall be capable of pumping 3,000 gallons per hour at 12 feet total dynamic head. Motor shall be 1/3 horsepower, 115 volt, single phase, 60 hertz, complete with 8-foot power cable with 3-prong grounded plug. Control shall be enclosed diaphragm switch hermetically sealed in dry chamber of motor housing.

2-4 ELECTRIC HEATER: In accordance with Section 16851.

2-5 RIGID INSULATION: Insulation shall be 1-1/2-inch Styrofoam SM as manufactured by Dow Chemical Company, Midland, Michigan 48640, or an approved equal.

2-6 ALUMINUM GRATING: Aluminum I-bar grating as manufactured by Metalines, Inc., P. O. Box 75427, Oklahoma City, Oklahoma 73107, or approved equal. Bearing bars to be 1-1/2-inch deep at 1-3/16 inches on center, with cross bars at 4 inches on center. Bearing bars to be 6063-T6 aluminum alloy. Cross bars to be 6063-T5 aluminum alloy. Grating shall have mill finish, acidic detergent cleaned. Provide end bands for bearing bars.

2-7 ALUMINUM LADDER:

A. Ladder shall be aluminum, standard channel type, Model 520-CH as manufactured by O'Keefes, Inc., 75 Williams Avenue, San Francisco, California 94124, or approved equal.

B. Rungs shall be 1-1/4-inch size, flat or round in cross section, serrated. Spacing of rungs from top of ladder shall be set so that a rung occurs approximately 3 inches above the pit ceiling to clear the lower wood hatch as shown.

C. Vertical rails shall be channels, 3-inch depth by 0.125-inch wall thickness.

D. Rung, channel, and bracket connections shall be welded.

E. Ladder design, clearance dimensions, connections, and loading capacity shall meet minimum current OSHA regulations.

2-8 MECHANICAL SEALS: Modular mechanical interlocking synthetic rubber links shaped to continuously fill the annular space between

the pipe and sleeve. The sleeve shall consist of EPDM synthetic rubber sealing elements, stainless steel nuts and bolts, and injection molded Delrin plastic pressure plates. Size of seating elements shall be as recommended by manufacturer for the pipe and sleeve sizes involved. Mechanical seals shall be equal to Link-Seal modular wall and casing seal as manufactured by Thunderline Corporation, Wayne, Michigan 48184.

2-9 PIPE SUPPORTS: Unistrut P-1000 or an approved equal.

PART 3: EXECUTION

3-1 Install all equipment as shown and in accordance with manufacturer's recommendations.

3-2 Cover top of valve pit with insulation prior to backfilling.

3-3 Make watertight seals at all concrete wall penetrations as shown. For 2-inch and larger, size of sealing links shall be as recommended by the manufacturer for the pipe outside diameter and sleeve inside diameter. Links shall be loosely assembled with bolts to form a continuous rubber belt around the pipe, with a pressure plate under each bolt head and nut. After the seal assembly is positioned in the sleeve, tightening of the bolts shall cause the rubber sealing elements to expand and provide an absolutely watertight seal between the pipe and wall opening. For pipes smaller than 2 inches, seal penetration with nonshrink grout.

3-4 Support all sprinkler pipe, mains, valves, and appurtenances in accordance with NFPA 13. All other pipes shall be supported with Unistrut P-1000, or an approved equal, at 6-foot centers.

END

PART 1: GENERAL

1-1 DESCRIPTION: The work of this section consists of furnishing and placing concrete, including forming, reinforcement, and curing.

1-2 RELATED WORK SPECIFIED ELSEWHERE: Miscellaneous metals - Section 05120; valve pit - Section 02760.

1-3 QUALITY ASSURANCE:

A. Concrete Mix Design (Ready-Mix):

1. Enforcement of Strength Requirements: Substitute the following for Paragraph 17.1 of ASTM C94-83:

a. If the 28-day strength tests fail to meet the requirements of Paragraph 16.5.2 of ASTM C94-83, Contracting Officer may require either or both of the following:

(1) Additional curing.

(2) That core samples be taken and tested in accordance with ASTM C42-82 at Contractor's expense.

b. If the core tests are below strength, if there is evidence of damage by freezing, or if the concrete fails in other ways to meet specifications, Contracting Officer may require that the defective concrete be removed and replaced at no additional expense to the Government.

B. Concrete Mix Design (Batch Plant Concrete): Concrete mix proportions shall be determined, at no additional expense to the Government, by a qualified testing laboratory under the supervision of a registered professional engineer who shall affix his signature and registration seal to the concrete mix design report. This report shall be submitted before placing concrete and shall specify dry weight of cement, saturated surface dry weights of fine and coarse aggregates, percent of entrained air, weight or volume of mixing water to be used in each cubic yard of concrete, and slump of concrete. Proportions shall comply with maximums and minimums specified.

C. Slump and Air Content Tests: Samples may be required after discharge of 15 percent and 85 percent of load. If slumps differ by more than 2 inches, the mixer or agitator shall not be used

until condition causing this variation is corrected. The equipment for these tests will be furnished by the Government.

D. Compression Tests: Test specimens using standard ASTM 6-inch diameter by 12-inch high cylinders shall be taken by the Contracting Officer. Curing, shipment to, and testing by an independent laboratory shall be at the expense of the Government. The Contractor shall supply 3 cylinders for every 20 cubic yards of concrete placed or for each major placement during the day. These cylinders shall be at the job site before any concrete is placed. Contractor shall also supply one curing box to accommodate 8 cylinders.

1-4 SUBMITTALS: In accordance with Section 01300.

A. Drawings: Submit detailed drawings complying with requirements of ACI 318, detailed in accordance with ACI Detailing Manual SP.66, 1980, and adapted to the proposed placement schedule, indicating size, dimension, bending, placing, and construction joint details. Any error in quantity shown will be the responsibility of the Contractor. Submit drawing showing locations of any construction joints not shown. Drawing shall be on a minimum 18-inch by 24-inch drafting paper. Submit type, size, and location of all slab and bar supports.

B. Certificates and Reports (Ready-Mix Concrete):

1. Concrete Mix Design: Comply with 5.3.2 of ASTM C94-83; furnish statement of composition of concrete mix and evidence that mix will meet quality specified herein.

2. Admixtures: Submit written statement showing chloride content as required.

C. Certificates and Reports (Batch Plant Concrete):

1. Cement: Written statement showing chemical composition of each shipment. Statement shall include percentage of alkalies calculated as the percentage of sodium oxide plus 0.658 times the percentage of potassium oxide.

2. Admixtures: Written statement showing chloride content if chloride was added during manufacture.

3. Concrete Mix Design: Submit report as required.

4. Fine and Coarse Aggregate: Submit report showing compliance with Tables 1, 2, and 3 of ASTM C33-82.

1-5 PRODUCT HANDLING:

A. Delivery: Upon determination of design slump, batch, mix, and transport concrete so slump will not increase nor decrease by more than 1 inch from design slump.

B. Storage: Store cement and aggregates to prevent deterioration or contamination. Store each size of aggregate separately. Do not use cement which has caked, partially set, or deteriorated, or any material which has become damaged or contaminated.

PART 2: MATERIALS

2-1 FORMWORK: Contractor shall be responsible for design, strength, and safety of formwork. Formwork shall be designed to withstand vibrator action.

A. Form Ties: Form ties for concrete shall be constructed so that no metal remains within 1 inch of the surface of the wall after removal of formwork.

B. Formside Materials:

1. Concrete exposed to view shall have smooth form finish. Use lumber, prefabricated wood panels, metal, or plastic lined panels which will produce a smooth, hard, uniform texture on the concrete. Do not use materials with raised grain, torn surfaces, worn edges, patched, dents, or other defects that will impair the surface of the concrete.

2. Concrete not exposed to view may have a rough form finish. No selected form facing materials required.

2-2 REINFORCEMENT: Details of concrete reinforcement not shown shall be in accordance with CRSI Manual of Standard Practice.

A. Reinforcing Steel:

1. All reinforcing shall consist of deformed bars.

2. Reinforcing steel shall comply with ASTM A615-82, including Supplementary Requirement S1, and shall be Grade 40.

B. Welded Wire Fabric: Shall be of gauge and mesh size shown and shall meet the requirements of ANSI/ASTM A185-79 or ANSI/ASTM

A497-79 for smooth wire fabric. Wire fabric shall be free from rust, scale, oil, and frost.

C. Bar supports in structural slabs shall be Class C (plastic protected), as specified in the CRSI Manual of Standard Practice, Chapter 3. Footings and slabs on grade can use concrete bricks for bar supports.

D. Details of concrete reinforcement not shown shall be in accordance with CRSI Manual of Standard Practice.

2-3 CONCRETE:

A. General Requirements:

1. Portland Cement: ASTM C150-83a, Type II. Use cement containing not more than 0.60 percent alkalies (calculated as the percentage of sodium oxide plus 0.658 times the percentage of potassium oxide) in concrete with aggregate that may be deleteriously reactive.

2. Admixtures:

a. No admixtures containing chlorides will be permitted unless approved by the Contracting Officer.

3. Maximum size of coarse aggregate shall be as follows:

For footings, piers, and slabs on grade.....1-1/2 inches
For valve pit walls.....1 inch
For structural slabs.....3/4 inch

4. Strength: 28-day compressive strength shall be 3,000 pounds per square inch minimum.

B. Batch Plant Concrete:

1. Admixtures:

a. Air Entraining Admixtures: ANSI/ASTM C260-77. Other admixtures, ASTM C494-82; approval required.

b. Other Admixtures: Approval required.

2. Mixing Water: Clean, fresh, and free from injurious quantities of oil, acid, alkali, organic matter, or other deleterious substances.

3. Aggregates:

a. General: Aggregate shall have a weighted loss, when subjected to 5 cycles of soundness test, ASTM C88-76, of not more than the following: Fine aggregate sodium sulfate test 10 percent, or magnesium sulfate test 15 percent. Coarse aggregate, sodium sulfate test 12 percent or magnesium sulfate test 18 percent. When air-cooled blast furnace slag is used, the weighted loss is reduced to 8 percent for sodium sulfate test and 12 percent for magnesium sulfate test.

b. Fine Aggregate: The fineness modulus of fine aggregate shall be not less than 2.3 nor more than 3.1 and shall not vary more than 0.20 from the value used in selecting proportions. Amount of friable particles shall not exceed 1 percent by weight of total sample. Fine aggregate shall be graded within the following limits:

Sieve Size	Percent Passing by Weight
3/8-inch	100
No. 4	95-100
No. 8	80-100
No. 16	50- 85
No. 30	25- 60
No. 50	10- 30
No. 100	2- 10

Fine aggregate shall not contain any materials that are deleteriously reactive with the alkalies in the cement in an amount sufficient to cause expansion of mortar or concrete. Fine aggregate shall be free of injurious amounts of organic impurities in accordance with ANSI/ASTM C40-79. Amount of coal and lignite shall not exceed a total of 0.5 percent by weight of total sample.

4. Coarse Aggregate: Gravel, crushed gravel, crushed stone, air-cooled blast furnace slag, or a combination, meeting the requirements of this section. Amount of friable particles shall not exceed 0.25 percent by weight of total sample.

Coarse aggregates shall be graded between the following limits:

ASTM AASHTO Size Number	Percent Passing By Weight							
	1-1/2"	1"	3/4"	1/2"	3/8"	No. 4	No. 8	No. 200
57	100	95-100		25- 60		0-10	0-5	0-1
67		100	90-100		20-55	0-10	0-5	0-1
7			100	90-100	40-70	0-15	0-5	0-1

A combination of the following two sizes of coarse aggregates, which must be kept separate prior to the concrete batching operation, may be used as coarse aggregate in the concrete batch design. The ratio of one size to the other size of coarse aggregate may be varied within the range of 40 to 60 percent by weight to secure the most workable and uniform gradation of the combined material.

ASTM AASHTO Size Number	Percent Passing By Weight								
	2"	1-1/2"	1"	3/4"	1/2"	3/8"	No. 4	No. 8	No. 200
4	100	90-100	20-55	0-15		0-5			0-1
7				100	90-100	40-70	0-15	0-5	0-1

Coarse aggregate shall not contain any materials that are deleteriously reactive with alkalies in the cement in an amount sufficient to cause expansion of mortar or concrete. Coarse aggregate shall be free of any injurious amounts of organic impurities. Amount of coal and lignite shall not exceed a total of 0.5 percent by weight of the total sample. Amount of chert that will disintegrate in 5 cycles of soundness test, ASTM C88-76, sodium sulfate, or 50 cycles of freezing and thawing in water, 0 degrees F to 40 degrees F, or has a specific gravity when saturated surface dry of less than 2.35, shall not exceed 1 percent by weight of the total sample. Aggregate pieces having a length greater than 5 times the average thickness shall not exceed 15 percent by weight of the total sample.

5. Design of Concrete Mix Proportions:

a. Concrete shall be composed of portland cement, water, fine aggregates, coarse aggregates, and entrained air. Proportions shall comply with the following maximums and minimums:

General Concrete Mix

Minimum allowable portland cement per cubic yard	564 pounds
Entrained air as determined by ASTM C231-82 or ANSI/ASTM C173-78	
Minimum	5 percent
Maximum	7 percent
Maximum allowable water cement ratio	5.1 gallons per sack of cement (w/c = 0.45)

Maximum design slump or consistency as measured according to ANSI/ASTM C143-78	4 inches

b. The mix design and resultant concrete, its strength, durability, consistency, and finishability, shall be the responsibility of the Contractor. No assistance or approval rendered shall release the Contractor from this responsibility.

6. Measuring Materials:

a. Cement: Unless otherwise approved, cement shall be measured by weight. Weigh on a scale and in a weigh hopper which is separate and distinct from those used for other materials. Quantity of cement used shall be not less than required amount. With approval, cement may be measured in bags of 94 pounds. No fraction of a bag of cement shall be used unless weighed.

b. Aggregate: Measured by weight. Batch weights shall be based on dry materials and shall be the required weights of dry materials plus the total weight of moisture, both absorbed and surface, contained in the aggregate. When weighed in individual aggregate weight batchers, quantity of the aggregate used in any batch of concrete shall be within 2 percent of required weight. In a cumulative aggregate weight batcher, the cumulative weight after each successive weighing shall be within 1 percent of the required amount.

c. Mixing water consists of water or ice added to the batch, water occurring as surface moisture on the aggregates, and water introduced in the form of admixtures. Measure the added water by weight or volume to an accuracy of 1 percent of required total mixing water. Added ice shall be measured by weight and, when needed, shall replace the mixing water on a pound for pound basis. Any wash water shall be discharged prior to loading the next batch of concrete.

d. Admixtures shall be measured by weight or volume. Measuring accuracy shall be within 3 percent of required weight or volume.

C. Ready-Mix Concrete:

1. Materials: Materials, including cement, aggregates, water, and admixtures, shall meet the requirements of ASTM C94-83.

2. Quality of Concrete: Concrete shall be furnished under Alternative No. 2, ASTM C94-83, whereby the manufacturer assumes full responsibility for the selection of the proportions for the

concrete mixture. Submit statement of composition as specified in Part 1 of this section.

3. Air Content: Entrained air quantities shall comply with the table under Note 6 of ASTM C94-83.

4. Slump: Shall not exceed 4 inches, with tolerances as specified in ASTM C94-83.

5. Manufacture and Delivery: Measurement of materials, batching, mixing, transporting, and delivery shall be as specified in ASTM C94-83. Discharge concrete into forms within 1-1/2 hours after introduction of water to cement. When temperature of concrete is 85 degrees F or above, the time between introduction of water to cement and complete discharge of concrete into forms shall not exceed 45 minutes. If the manufacturer cannot meet these requirements, then the water and cement shall be introduced into the mix at the project site.

2-4 PATCHING GROUT: Neat portland cement, water, and fine sand passing a No. 30 mesh sieve.

2-5 VALVE PIT ITEMS:

A. Waterstops: Provide in construction joints as shown on drawings. Waterstops shall be 9 inches by 3/16 inch nominal thickness, ribbed-centerbulb type, and continuous, molded, or extruded from a polyvinyl chloride compound, manufactured by W. R. Meadows, Inc., Elgin, Illinois, or approved equal.

B. Pipe Sleeves: See Section 02760.

C. Valve Pit Cover: See Section 02760.

2-6 EXPANSION JOINT FILLERS: Pre-molded type, ANSI/ASTM D1751-73. Size, 1/2 inch by depth of slab minus 1/2 inch, as manufactured by W. R. Meadows, Inc., Elgin, Illinois, or approved equal.

2-7 OTHER EMBEDDED ITEMS: Section 05120 and Section 06100. Items encased in concrete shall not be painted.

2-8 EPOXY GROUT: Nonsag, fast set, prepackaged Concresive Epoxy Adhesive as manufactured by Adhesive Engineering Company, San Carlos, California 94070, or approved equal.

2-9 VOID TUBE: Sonovoid, manufactured by Sonoco Products Company, Hartsville, South Carolina, or approved equal.

2-10 SPLASH BLOCKS: Concrete splash blocks for roof drainage shall be approximately 10 inches wide by 3 feet long, as approved by Contracting Officer.

2-11 CURING MATERIALS:

A. Burlap: Burlap is an acceptable material provided it does not come from sacks that have contained sugar.

B. Sheet Materials: ANSI/ASTM C171-69, 4-mil polyethylene film or waterproof paper.

C. Spray Applied White Pigmented Membrane Forming Liquids: ASTM C309-81.

PART 3: EXECUTION

3-1 FORMWORK:

A. Arrange formwork construction to allow for proper sequencing and removal without damage. Use orderly and symmetrical panel arrangement with minimum number of joints. Mount panels on rigid supports to minimize deflection. Before proceeding, secure approval of formwork and procedures.

B. Forms: Sufficiently tight to prevent loss of mortar. Treat nonmetal forms with a nonstaining material to eliminate absorption of water by forms and to act as a form release agent.

C. Thoroughly remove all dirt, mortar, and foreign matter before each use. Where the bottom of the form is inaccessible from within, access panels shall be provided to permit thorough removal of extraneous material before placing concrete.

D. Chamfer all exposed horizontal and vertical edges or outer corners 3/4 inch, both interior and exterior of structures, except where wood framing or floor makes contact with concrete.

E. Permissible deviations from established lines, grades, and dimensions are listed below:

1. Variation From the Plumb: In the lines and surfaces of piers, walls and in arrises: in 10 feet, 1/4-inch.

2. Variation From the Level or From the Grades Shown: In floors: in 10 feet, 1/4-inch; in any bay or 20 feet maximum, 3/8-inch.

3. Variation of the linear building lines from established position in plan and related position of columns, walls and partitions: in 20 feet maximum, 1/2-inch.

4. Variation in the sizes and locations of sleeves, floor openings and wall openings: 1/4-inch.

5. Variation in cross-sectional dimensions of piers, and in the thickness of slabs and walls: minus, 1/4-inch; plus, 1/2-inch.

6. Footings:

a. Variation in dimensions in plan: minus, 1/2-inch; plus, 2-inch.

b. Misplacement or eccentricity: 2 percent of the footing width in the direction of misplacement but not more than 2 inches.

c. Reduction in thickness: minus 5 percent of specified thickness.

F. Earth trench forms for footings below existing and final grades may be used, if approved after inspection of the trenches, provided the sides are clean, even, vertical, true, and provided the bottoms are level, clean, and without fill.

3-2 REINFORCEMENT:

A. Design: The reinforcement design shown on drawings shows only the necessary information for detailing the reinforcement and preparing placing and bending details.

B. Bending: In accordance with CRSI Manual of Standard Practice, Chapter 7.

C. Placement: Place reinforcement accurately as shown. Adequately secure metal reinforcement in position by concrete or metal chairs and spacers, in accordance with CRSI Manual of Standard Practice, Chapter 8. Distance between the steel and the surface, as shown; otherwise, in accordance with Chapter 8. At top of walls, use spacers between form and reinforcement to prevent lateral displacement of reinforcement and to insure proper concrete cover.

D. Splices: Locate splices of reinforcement as shown. For any splices not shown, assume Class C splice. See drawings for splice lengths.

E. Prctect exposed reinforcement bars intended for bonding with future extensions from corrosion by using adequate covering.

F. Inspection: After reinforcement has been placed, it shall be inspected and approved prior to placing the concrete.

G. Condition of Surfaces: At time concrete is placed, all metal reinforcement shall be free from rust, scale, frost, or other coatings that would destroy or reduce the bond.

3-3 JOINTS AND EMBEDDED ITEMS:

A. Construction Joints:

1. Obtain approval for joints not shown and locate them where they least impair the strength of the structure. At least two hours shall elapse after depositing concrete in columns or walls before depositing concrete in supported beams, girders, or slabs. As the new concrete is placed, revibration in tops of columns and walls is desirable. Make joints perpendicular to the main reinforcement.

2. Continue all reinforcing steel and mesh across construction joints.

3. Clean the surface of the concrete at all joints and remove all laitance.

4. When required, obtain bond by roughening the surface of the concrete to the satisfaction of the Contracting Officer.

B. Expansion Joints: Install expansion joint fillers.

C. Waterstops:

1. The design and location of waterstops shall be as shown. Each piece of premolded waterstop shall be of maximum practicable length to minimize the number of end joints. Embed center bulb in the center of joint.

2. Make joints at intersections and at ends of pieces following manufacturer's instructions. Joints shall develop effective watertightness fully equal to that of the continuous waterstop material and shall develop not less than 50 percent of the mechanical strength of the parent section. Do not lap sections

of waterstop. All joints shall be butt spliced using a heat sealing method.

D. Support waterstops securely against displacement by wire tie between the last rib and the end of the waterstop, or method specifically recommended by the manufacturer.

E. Other Embedded Items:

1. Before concreting, place all required sleeves, anchor bolts, and embedded items.

2. Give all trades whose work is related to the concrete ample notice and opportunity to introduce embedded items before concrete is placed.

3. Position expansion joint material, waterstops, and embedded items accurately and support them against displacement. Fill voids in sleeves temporarily with readily removable material to prevent the entry of concrete.

3-4 MIXING (READY-MIX CONCRETE): When the concrete is mixed completely in a truck mixer, 70 to 100 revolutions at the mixing speed specified by the manufacturer are required to produce uniformity of the concrete.

3-5 BATCHING CONCRETE:

A. Batch Plant Operation:

1. In batching plant, provide bins with adequate separate compartments for fine and for each size of coarse aggregate. Design and operate each bin to discharge efficiently and freely, with minimum segregation, into the weighing hopper. Provide means of control so that, as the quantity desired in the weighing hopper is approached, the material may be shut off with precision. Construct weighing hoppers to eliminate accumulations of tare materials and to discharge fully.

2. Indicating devices shall be in full view and located for accurate reading. Operator shall have convenient access to all controls.

3. Scales for batching concrete ingredients may be either beam or springless dial scales complying with NBS Handbook 44. Methods for weighing, such as electric, hydraulic, or load cells, that meet the weighing tolerances are also acceptable.

4. Adequate standard test weights shall be available for checking accuracy. Keep all exposed fulcrums, clevises, and similar working parts of scales clean.

5. Device for measurement of added water shall be capable of delivering to the batch the quantity required within the accuracy required. Arrange device so measurements will not be affected by variable pressures in the water line.

B. Mixing Equipment: Mixers may be stationary mixers or truck mixers. Agitators may be truck mixers or truck agitators.

1. Equip stationary mixers with metal plates plainly marked with the mixing speed of the drum or paddles and the maximum capacity in terms of the volume of mixed concrete. Equip stationary mixers used for the complete mixing of concrete with an acceptable timing device that will not permit the batch to be discharged until specified mixing time has elapsed.

2. Attach to each truck mixer or agitator metal rating plates plainly marked with the maximum capacities of the drum or container in terms of the volume both for mixed concrete and for agitated concrete. Rating plates shall also be marked with the minimum and maximum speeds of rotation of the drum, blades, or paddles, both for mixing and agitating the concrete. Equip truck mixers and agitators with means by which the number of revolutions of the drum, blades, or paddles may be readily verified.

C. All stationary and truck mixers shall be capable of combining the ingredients of the concrete within the specified time into a thoroughly mixed and uniform mass and of discharging the concrete with an acceptable degree of uniformity.

D. All agitators shall be capable of maintaining the mixed concrete in a thoroughly mixed and uniform mass and of discharging the concrete with an acceptable degree of uniformity.

E. Mixing and Transporting:

1. Operate mixers and agitators within limits of capacity and speed of rotation specified by manufacturer.

2. When a stationary mixer is used for the complete mixing of the concrete, mixing time shall be measured from the time all the solid materials are in the drum. The batch shall be charged into the mixer so that some water will enter in advance of the cement and aggregate, and all water shall be in the drum by the end of the first one-fourth of the specified mixing time.

3. When the concrete is mixed in a truck mixer only, 70 to 100 revolutions at the mixing speed specified by the manufacturer are required to produce uniformity of the concrete.

3-6 PREPARATION OF FORM SURFACES:

A. Ensure that forms are clean and free of ice or water.

B. Seal plywood with coating material to minimize absorption of moisture from the concrete.

3-7 DEPOSITING:

A. Discharge concrete into forms within 1-1/2 hours after introduction of water to cement. When temperature of concrete is 85 degrees F or above, the time between introduction of water to cement and complete discharge of concrete into forms shall not exceed 45 minutes.

B. Concrete delivered shall have the following maximum and minimum temperatures.

Outside Air Temperature	Minimum Concrete Temperature	Maximum Concrete Temperature
45 degrees F and above	45 degrees F	90 degrees F
30 to 45 degrees F	60 degrees F	90 degrees F
0 to 30 degrees F	65 degrees F	90 degrees F
Below 0 degrees F	70 degrees F	90 degrees F

C. When either water or aggregates are heated to above 100 degrees F, they shall be combined first in the mixer before the cement is added to obtain a temperature not to exceed 80 degrees F for the aggregate and water mixture.

D. Ice may be used as a part or all of the mixing water. Crush or shave ice to assure complete melting by the time mixing is complete.

3-8 CONVEYING: Convey concrete from mixer to place of deposit by methods which will prevent separation or loss of materials. Equipment for chuting, pumping, and pneumatically conveying concrete shall be of such size and design as to insure a practically continuous flow of concrete at the delivery end without separation, segregation, contamination, or other degradation of the concrete. Remove any hardened concrete or foreign material from inner surfaces of conveying equipment before use.

3-9 PLACING OF CONCRETE:

A. Preparation Before Placing:

1. Remove hardened concrete and foreign materials from inner surfaces of conveying equipment.

2. Check formwork for completion, check position and securement of reinforcement, expansion joint material, anchors, and other embedded items, and obtain approval on entire preparation.

3. Remove ice and excess water and sprinkle semiporous subgrades sufficiently to eliminate suction.

4. Do not place concrete on frozen ground.

5. Do not place concrete during rain, sleet, or snow unless protection is provided.

B. Depositing:

1. Place concrete in final position to avoid segregation due to rehandling or flowing. Spread concrete in horizontal layers and do not drop more than 5 feet without using drop chutes. Place concrete at such a rate that the concrete remains plastic and flows readily into spaces between bars. Place concrete before it has taken its initial set and, except for ready-mixed concrete or concrete being agitated, deposit within 30 minutes after mixing. Do not deposit concrete that has partially hardened or become contaminated by foreign material. Lifts shall be kept between 6 inches and 20 inches high and shall be of a height to minimize surface defects and eliminate rock pockets and cold joints.

2. Deposit concrete continuously and rapidly enough so that the layer supporting the one being placed is still plastic. If continuous placement is impossible, locate construction joints where shown or as approved. Do not use partially hardened or contaminated concrete.

3. Remove temporary form spreaders when concrete reaches them.

4. Do not begin placing concrete in supported elements until the concrete previously placed in walls is no longer plastic.

5. Deposit concrete as near to its final position as possible to avoid segregation due to rehandling or flowing. Do not subject concrete to any procedure that will cause segregation.

C. Compacting:

1. Use high frequency vibrators in the placement of concrete forms. When concrete is being placed on hardened concrete or in bottom of forms, exercise care to assure complete consolidation. After the initial lift, vibrator shall penetrate through and into top of previous lift of concrete.

2. Internal vibrators shall have a minimum frequency of 8,000 rpm. Overvibrating and use of vibrators to transport concrete within forms shall not be allowed. Insert and withdraw vibrators at many points, from 18 to 30 inches apart, for 5 to 15 seconds duration. Keep a spare vibrator on the job site during all concrete placing operations.

3. Compact concrete in slabs thoroughly by means of screeds.

4. Once concreting is started, it shall be carried on as a continuous operation until the placing of the panel or section is completed, preventing fresh concrete from being deposited on concrete which has hardened sufficiently to cause formation of seams and planes of weakness within the section.

5. Remove splashes or accumulations of hardened or partially hardened concrete or mortar on forms or reinforcement above general level of the concrete already in place before the work proceeds.

6. All reinforcement, forms, fillers, and ground with which the concrete is to come in contact shall be free from frost, oil, grease, or any other contaminating substances.

D. Bonding: Where fresh concrete is to be placed against and bonded to hardened concrete, dampen (but do not saturate) the hardened concrete.

3-10 FORM REMOVAL: Carefully remove forms to insure the complete safety of the structure. Where the structure is supported by shoring, vertical forms may be removed after 72 hours, providing the concrete will not be injured. All supporting forms shall remain in place for a minimum of 10 days. Do not remove supporting forms or shoring until members have acquired sufficient strength to support their weight and imposed loads safely.

3-11 REPAIRING AND PATCHING: Patch all the tie holes and all repairable defective areas immediately after form removal.

A. All honeycombed and other defective concrete shall be removed to sound concrete with edges perpendicular to the surface. Dampen the area to be patched and an area at least 6 inches wide surrounding it to prevent absorption of water from the patching mortar. Mix patching grout to the consistency of thick cream and brush it well into the surface.

B. Make the patching mortar of the same material and approximately the same portions as used for the concrete, omitting the coarse aggregate. The resultant mortar shall consist of not more than 1 part cement to 2-1/2 parts sand by damp loose volume.

C. On exposed concrete, in order to produce a color matching that of the surrounding concrete, substitute white portland cement (as determined by a trial patch) for a part of the grey portland cement.

D. Do not use more mixing water than necessary for handling and placing. Mix the patching mortar in advance and allow to stand with frequent manipulation with a trowel, without adding water, until it has reached the stiffest consistency that will permit placing.

E. After surface water has evaporated from the area to be patched, brush the patching grout well into the surface. When the patching grout begins to lose the water sheen, apply the premixed patching mortar. The mortar shall be thoroughly consolidated into place and struck off to leave the patch slightly higher than the surrounding surface. To permit initial shrinkage, leave the patch undisturbed for at least 1 hour before finishing it. Keep the patched area damp for 7 days. Do not use metal tools in finishing a patch in a formed wall that will be exposed.

F. Tie Holes: Clean and thoroughly dampen, then fill solid with patching mortar.

3-12 FINISHES FOR FORMED SURFACES:

A. Rough Form Finish: Leave surface with texture imparted by the forms on foundation walls below finished grade.

B. Smooth Form Finish: On concrete above finished grade and interior concrete exposed to view, completely remove all fins projecting 1/8 inch or more by chipping. No grinding on walls will be permitted.

3-13 SLABS:

A. Screeding: After concrete has been thoroughly consolidated, screed slabs to the desired elevation and contours by means of accurately placed edge forms and intermediate screed strips.

B. Floated Finish for Fuel Tank Slab and Valve Pit Roof:

1. Place, consolidate, strike off, and level concrete, but do not work it further until ready for floating. Begin floating when water sheen has disappeared and when the surface has stiffened sufficiently.

2. During or after the first floating, check planeness of surface with a 10-foot straightedge applied at not less than two different angles, and then cut down all high spots and fill all low spots to achieve a true plane within 1/4 inch in 10 feet.

3. Refloat slab immediately to a uniform sandy texture.

C. Troweled Finish for Valve Pit Floor and Garage: Float finish slab as described above, then steel trowel by machine or by hand. Additional trowelings shall be done by hand after the surface has hardened sufficiently. Final troweling shall produce a ringing sound from the trowel and then finish surface shall be free of trowel marks, uniform in texture, and appearance shall be planed to the tolerance specified under Floated Finish.

3-14 CURING AND PROTECTION:

A. General: Beginning immediately after placement, protect concrete from drying, excessively hot or cold temperatures, and mechanical injury. Keep moisture loss to a minimum until cement has hydrated and concrete is hard.

B. Curing:

1. Formed Surfaces: Keep forms wet. Cool metal forms exposed to the sun with water. Forms shall remain in place for 7 days unless material specified for curing materials in Part 2 is applied. If curing compound is used, apply in accordance with manufacturer's instructions. Curing compound shall not be used on any wall scheduled to be painted.

2. Slabs: Immediately after finishing, apply one of the materials specified in article entitled Curing Materials for Slabs, but use membrane forming liquid only with Contracting Officer's approval.

3. Duration of Curing: 7 days minimum; except when temperature of surrounding air is below 40 degrees F, maintain concrete at a temperature of not less than 55 degrees F for at least 5 days and above freezing for an additional 12-day period.

C. Protection:

1. In cold weather, maintain the moisture conditions but also, by heating or covering, maintain temperature of the concrete between 50 degrees F and 70 degrees F for entire curing period.

2. In hot weather, take immediate steps to protect newly finished concrete from the drying effects of wind and sun, and maintain temperature of the air surrounding the concrete uniform within 5 degrees F in any one hour or 50 degrees F in any 24 hour period.

3. During curing period, protect concrete from mechanical damage, loading, shock, and vibration.

3-15 GENERAL WATERTIGHTNESS: Watertightness is required for all concrete and concrete joints in the valve pit. Leakage at joints shall be corrected.

3-16 CONSTRUCTION LOADS ON STRUCTURAL ROOF SLAB: If shoring is removed, no construction materials and equipment shall be allowed on the structural floor slab until the concrete has reached the 28-day compressive strength. All superimposed construction loads will then be limited to the design load of the floor slab.

3-17 TESTING:

A. Three compressive test specimens shall be taken for every 20 cubic yards of concrete placed or for each major placement during the day. The Contracting Officer has the option to direct the Contractor to take the required test specimens as he deems necessary to insure the concrete meets the specification.

B. Specimens shall be taken, cured, and tested for compressive strength in accordance with ASTM C31-83, ASTM C39-81, and ASTM C172-82, respectively.

C. Standard age of compressive test shall be 28 days; however, 7-day tests may be used provided that the relation between the 7-day and 28-day strengths of the concrete is established by test for the materials and proportions used.

D. Air content and slump test are to be taken in accordance with Paragraph 1-3C.

3-18 DAMAGED OR DEFECTIVE CONCRETE: Remove damaged or defective concrete before completion and acceptance of the work and replace with acceptable concrete.

3-19 EPOXY GROUT: Use epoxy grout to secure reinforcement to existing concrete as shown. Epoxy grout shall be mixed and used in accordance with manufacturer's recommendations. Use a non-rotary machine for drilling holes. Drilled holes shall be flushed with water, then blown out using oil-free compressed air and allowed to dry. Reinforcement shall be temporarily wedged and centered in the hole opening until the grout has set.

3-20 SPLASH BLOCKS: Install splash blocks where indicated on drawings. Install with proper pitch to positively channel downspout discharge away from building.

END

PART 1: GENERAL

1-1 DESCRIPTION: The work of this section consists of furnishing and installing brick chimney.

1-2 RELATED WORK SPECIFIED ELSEWHERE: Miscellaneous metals - Section 05120.

1-3 COORDINATION: Coordinate work of this section with work of other sections for building in required items.

1-4 QUALITY ASSURANCE: Construct a sample wall panel of approved materials for each type of masonry work, 2 feet long by 2 feet high, showing color, range of masonry, texture, bond, reinforcement, color and tooling of mortar joints, and workmanship. Do no other masonry work until the sample panel is approved. Approved panel shall become the standard of comparison for all masonry work. Do not alter, move, or destroy panel until the work is completed.

1-5 SUBMITTALS: In accordance with Section 01300.

A. Submit samples and product literature of each type of masonry unit showing color range and markings, flashings, dry samples of each mortar material and materials mixed.

B. If requested, furnish an affidavit from manufacturer certifying materials and products delivered meet requirements specified.

1-6 PRODUCT HANDLING: Store materials in a dry place, where directed, off the ground, under cover which permits air circulation, to prevent damage and intrusion of water or foreign matter. Handle and store masonry units on pallets.

1-7 JOB CONDITIONS: Do not lay masonry when the temperature of the outside air is below 40 degrees F, unless approved means are provided to heat materials, protect work from cold and frost, and insure that mortar will harden without freezing.

PART 2: MATERIALS

2-1 BRICK: ASTM C216, Grade MW, Type FBX, modular size. Brick samples are available at park headquarters. Color, red-orange, and texture shall be approved by Contracting Officer. Do not exceed variations in color and texture of approved samples. Contractor shall include in his bid an allowance of $250.00 per thousand for all face brick, FOB job site. Allowance shall include state sales tax.

2-2 MORTAR: Shall conform to the property requirements for Type S mortar in accordance with ASTM C270, using masonry cement. Mortar shall develop a minimum 1,800 psi compressive strength in 28 days.

2-3 REINFORCING BARS: ASTM A615-82, Grade 40.

2-4 CLEANING MATERIALS:

A. Water, potable, hot (120 degrees F).

B. Solution Y2, containing muriatic acid, by Dunn Chemical Company, Pennsauken, New Jersey 08110, or approved equal.

C. Muriatic Acid: Clean, stain free, commercial grade of hydrochloric acid.

D. Stiff fiber brush.

PART 3: EXECUTION

3-1 PRECAUTIONS AND GENERAL REQUIREMENTS:

A. Protect facing material against staining, and keep tops of walls covered with nonstaining waterproof coverings when work is not in progress. When work is resumed, top surface of work shall be cleaned of all loose mortar and, in drying weather, thoroughly wet.

B. Brick having absorption rates more than 0.025 ounces per square inch per minute shall be wetted sufficiently so the rate of absorption when laid does not exceed this amount. For a field check, deposit a quantity of water to the flat side of the brick to wet the area approximately 1 inch diameter. If the water disappears in less than 1-1/2 minutes, wet the brick. Thoroughly wet (do not immersion soak) absorptive brick in the pile each afternoon prior to the day they are to be used and cover with tarpulin or heavy paper to prevent evaporation. In wetting brick, spray, using a heavy coarse sprinkle, until water runs

from all sides of the pile. Units shall be free from water adhering to their surfaces when they are laid in the wall.

C. Before closing up any pipe, duct, or similar inaccessible spaces or shafts with masonry, remove all rubbish and sweep out the area to be enclosed.

D. Where fresh masonry joins masonry that is partially set or totally set, clean the exposed surface of the set masonry and wet lightly to obtain the best possible bond with the new work. Remove all loose brick and mortar. Stopping off of a horizontal run of masonry shall be done by stepping back one half of masonry unit length in each course.

E. Build in work of other sections as the work progresses.

3-2 MORTAR PREPARATION:

A. In general, and unless otherwise specified by the Contracting Officer, mortar shall be mechanically mixed in an approved paddle type mixer.

B. Materials that have partially set shall not be retempered or used. Frozen, caked, or lumpy material shall not be used. Mixers and boxes shall be thoroughly cleaned of all set or hardened mortar before the materials for a new batch are loaded.

C. All sand and water for mixing shall be heated to at least 80 degrees F when daily temperatures are below 50 degrees F. All masonry shall be protected and maintained at 50 degrees F while curing, for 72 hours in freezing weather.

3-3 PCINTING: Apply mortar into the joint under sufficient pressure to assure a solid joint. When mortar is thumbprint hard, tool same as existing adjacent joints.

3-4 LAYING BRICK:

A. Lay brick, plumb, level, and true to line in full beds of mortar. Except where other pattern is indicated, lay brick in running bond. Fill with mortar brickwork joints and joints between brick and other required materials as each course is laid. Butter and shove head joints to insure full mortar joints.

B. Make joints in brickwork uniform and approximately 3/8-inch-wide, or as shown. When mortar is thumbprint hard, exposed joints shall be tooled concave. Close all cracks and crevices. Cut off flush all other joints. Rake joints as necessary to receive caulking or sealant.

3-5 POINTING: Point and fill all holes and cracks in exposed joints with additional fresh mortar. If mortar has hardened, defects shall be chiseled out, wetted, and refilled solidly with fresh mortar and tooled as specified above.

3-6 CLEANING:

A. Clean all exposed masonry from top down to remove stains and mortar. If stiff brushes and water do not suffice, use soap powder, a mild detergent, a weak solution of not more than 1 part hydrochloric or muriatic acid to 9 parts water or other approved solution. Do not attempt to clean with soap powder or other mild solutions less than 48 hours after construction of wall. Restrict use of acid solutions to hardened mortar cured a minimum of 7 days as approved.

B. Wet walls prior to applying cleaning solution and protect all other work from the corrosive action of cleaning solution.

C. Before cleaning finished masonry, apply the approved cleaning agents to wall sections of approximately 4 square feet, at inconspicuous approved places, to insure no adverse effect on either mortar joint or masonry units. Results shall not be judged for 7 days. After results have been judged satisfactory, use same cleaning materials and methods on remaining wall areas. Scrub masonry with stiff fiber brushes cleaning only a small area at a time; rinse surfaces thoroughly with clean water immediately after cleaning to avoid etching or staining of masonry.

D. Remove efflorescence in accordance with unit masonry product manufacturer's recommendation.

E. Do not use metal cleaning tools, wire brushes, or abrasive powders.

3-7 FLASHING: See Section 07600.

END

PART 1: GENERAL

1-1 DESCRIPTION: The work of this section consists of providing structural steel, including miscellaneous loose items, bolts and fastenings 1/4-inch diameter and greater, plates and hangers 1/4 inch thick and over.

1-2 RELATED WORK: Bolts and fastenings less than 1/4-inch diameter, plates and hangers less than 1/4 inch thick - Section 06100; concrete - Section 03310.

1-3 COORDINATION: Coordinate the work of this section with the work of other trades.

1-4 QUALITY ASSURANCE: Standards, American Institute of Steel Construction (AISC), American Society for Testing and Materials (ASTM), American Welding Society (AWS), and manufacturer's printed recommendations.

1-5 SUBMITTALS: In accordance with Section 01300.

PART 2: MATERIALS

2-1 STRUCTURAL STEEL:

A. Steel for Shapes, Bars, Threaded Rods, Anchor Bolts: ANSI/ASTM A36.

2-2 STANDARD FASTENERS: Lag screws, standard bolts and nuts, anchor bolts, ASTM A307, washers, standard flat washers. All exterior standard fasteners and those located in the crawl space shall be hot dipped galvanized.

2-3 CONCRETE EXPANSION ANCHORS: Galvanized steel, Red Head Phillips anchors, size as shown, manufactured by ITT Phillips Drill Division, Michigan City, Indiana 46460, or approved equal.

2-4 MALLEABLE IRON ROUND WASHERS: Shall be hot dipped galvanized.

2-5 TURNBUCKLES: Shall have a safe working load of 3.5 kips minimum. Shall be compatible with threaded rod as shown on drawings.

2-6 GALVANIZING:

A. Steel Shapes: ANSI/ASTM A123.

B. Hardware Items: ANSI/ASTM A153.

2-7 FABRICATION:

A. Structural steel, AISC Specification for the Design, Fabrication and Erection of Structural Steel for Buildings. For exposed members, AISC Specification for Architecturally Exposed Structural Steel.

B. Do not paint galvanized steel, steelwork to be encased in concrete, or concealed steelwork. Other structural steel, one coat shop paint. Preparation and application, Section 1.24, Shop Painting, of AISC Specification for the Design, Fabrication and Erection of Structural Steel for Buildings.

C. Welding: Weld shall conform to AWS D1.1, Structural Welding Code, and Section 1.17, Welds, of the AISC Specification for the Design, Fabrication and Erection of Structural Steel for Buildings, and with the following provisions:

1. Welding Procedures: Structural components shall be welded with shielded metal arc or other approved welding process. Preheating for welding is permissible, provided the temperature does not exceed 300 degrees F for a total time of 30 minutes.

2. Rewelding Defects: Portions of joints that are defective shall be repaired only by rewelding. The defective weld shall be removed by grinding, chipping, machining or air carbon arc cutting and gouging. Flame cutting shall not be used. Before rewelding, the joint shall have all of the defective weld metal removed. The joint shall be accessible so the welder can obtain full penetration through the joint.

2-8 FILLER METAL FOR WELDING: E7018 low hydrogen electrodes for shielded metal arc welding.

2-9 INSTALLATION HARDWARE: Provide bolts, nuts, washers, and other hardware for joining steel to wood, wood to wood, or embedded into concrete as shown.

PART 3: EXECUTION

3-1 INSTALLATION:

A. All field welds shall be in accordance with the requirements of AWS D1.1, Structural Welding Code.

B. Straightening Bent Material: Straightening of plates, angles, and shapes, when permitted by the Contracting Officer, shall be done by methods that will not produce fractures or other injury. Distorted member shall only be straightened by mechanical means; application of heat is not allowed.

C. Do all necessary touch-up painting.

D. Embed anchor bolts in concrete as shown, giving special attention to projections, elevations, and plumbness.

END

PART 1: GENERAL

1-1 DESCRIPTION: The work of this section consists of rough carpentry work, including installation of plates and hangers.

1-2 RELATED WORK: Finish carpentry - Section 06200.

1-3 QUALITY ASSURANCE:

A. Standards: American Plywood Association (APA), American Wood Preservers Association (AWPA), American Wood Preservers Bureau (AWPB), Western Wood Products Association (WWPA), Uniform Building Code (UBC 82), and manufacturer's printed recommendations.

B. Lumber: Grade stamp to contain symbol of grading agency, mill number or name, grade of lumber, species, or species grouping or combination designation, rules under which graded, where applicable, and condition of seasoning at time of manufacture.

C. Plywood: Appropriate grade trademark of the APA, including type, grade, class, identification or span index, and inspection and testing agency mark.

1-4 SUBMITTALS: In accordance with Section 01300.

A. Certifications: Submit certification by treating plant stating chemicals and process used, net amount of salts retained, and conformance with applicable standards. For waterborne preservative, certify that moisture content was reduced to 19 percent maximum after treatment.

1-5 PRODUCT DELIVERY, STORAGE, AND HANDLING:

A. Immediately upon delivery to job site, place materials in area protected from weather. Store materials a minimum of 6 inches above ground on framework or blocking and protect with waterproof covering allowing for adequate air circulation and ventilation. Do not store seasoned materials in wet or damp portions of building.

PART 2: MATERIALS

2-1 FRAMING LUMBER:

A. Moisture Content: 19 percent maximum (dry) at time of manufacture.

B. Surfacing: S4S, unless specified elsewhere.

C. Dimensions: All dimensions are nominal unless indicated.

D. Species and Grade: Douglas Fir-Larch graded and marked according to WWPA Western Lumber Grading Rules.

1. Studs: No. 2 grade.

2. Joists and Rafters: No. 2 grade.

3. Beams, Posts, and Timbers: No. 1 grade.

4. All Other Lumber: No. 2 grade.

2-2 PLYWOOD: Each sheathing panel shall be 4-foot by 8-foot and identified with the appropriate trademark of the American Plywood Association, and shall meet the requirements of the latest edition of U.S. Product Standard PS-1.

A. Roof Sheathing: 3/4-inch APA Sturd-I-Floor, 48/24, Exp. 1.

B. Wall Sheathing: 1/2-inch rated sheathing, 32/16, Exp. 1.

C. Subflooring:

1. First Floor: 3/4-inch APA Sturd-I-Floor, 48/24, Exp. 1.

2. Second Floor: 1/2-inch APA rated sheathing, 32/16, Exp. 1.

2-3 BUILDING PAPER:

A. Asphalt-Saturated Felt: ASTM D226, 15-pound, nonperforated.

2-4 PRESSURE TREATMENT: Pressure treat all lumber in contact with concrete, soil, or exposed to weather with ammoniacal copper arsenate (ACA) waterborne salt to a minimum retention of 0.4 pound per cubic foot, conforming to AWPA Standard C-2 for soil contact. Treated wood shall bear the AWPB Quality Mark LP-22, which shall be accepted as evidence of conformance with this specification.

2-5 FIELD PRESERVATIVE: Shall be ammoniacal copper arsenate (ACA).

2-6 ROUGH HARDWARE: Use nails, spikes, screws, bolts, nuts, washers, anchors, and similar items of proper size to rigidly secure members in place. All exterior fastenings, galvanized.

2-7 CONNECTORS: Simpson Strong-Tie, size and type as shown, Simpson Company, San Leandro, California 94577, or approved equal. All connectors exposed to weather shall be hot dipped galvanized after fabrication with a minimum of 2.0 ounces of zinc coating per square foot of actual surface area.

2-8 SILL SEALER: 1 inch by width of sill plate, compressible insulation, as manufactured by Manville Products Corporation, Denver, Colorado, or approved equal.

2-9 TRUSS PLATES: Teco Nail-On Truss Plates, size as shown; Teco, 5530 Wisconsin Avenue, Washington, D. C. 20015.

2-10 FOUNDATION VENTS: Vents shall be sized to fit and installed in existing foundation openings. Vents shall be steel or extruded aluminum with insect screens mechanically secured to the inside face of the louver, as manufactured by Construction Specialties, 725 Twin Oaks Valley Road, San Marcos, California 92069, or approved equal.

A. Approved units shall have equal or greater free area when compared to the above manufacturer's units of the same size.

B. Units shall be finished with a light bronze anodization.

C. Units shall have a gasketed closure which is operated from the exterior by a key.

D. Units shall be available with a flanged exterior frame.

2-11 ATTIC VENTS: Roof and attic vent design shall be approved by Contracting Officer. Vent free area shall be equal to or greater than minimum allowable free area indicated in vent schedule, drawing sheet A-8.

PART 3: EXECUTION

3-1 CONDITIONS OF SURFACES: Verify that surfaces to receive rough carpentry materials are prepared to exact grade and dimensions.

3-2 PRESERVATIVE TREATED WOOD PRODUCTS: Provide treated wood for all framing and blocking, wood in contact with masonry, wood in contact with concrete, and wood exposed to weather.

A. Apply two brush coats of same preservative used in original treatment to all sawn or cut surfaces of treated lumber in accordance with AWPA M4.

B. For field treating, either soak wood for 3 minutes, or apply two brush coats, applying second coat between 15 and 30 minutes after application of first coat.

3-3 NAILING: UBC Table 25-Q, unless otherwise specified.

3-4 SILLS: Set level, 1/16 inch in 6 feet, on sill sealer.

3-5 POSTS AND COLUMNS: Provide two surfaces on posts at right angles to each other for installation of interior finish material.

3-6 STUD FRAMING:

A. Plates and Stud Members: Use single bottom plate and double top plates for loadbearing partitions; single top and bottom plates for non-loadbearing partitions. Provide studs in continuous lengths without splices. Overlap double top plates at corners and intersections. Triple studs at corners and partition intersections. Locate joists directly below studs where partitions are parallel with joists. Double studs at openings less than 4 feet; triple at openings 5 feet and greater.

B. Blocking: Install in continuous horizontal row at mid-height of single story partitions over 8 feet high and multi-story partitions. Wedge, align, and anchor blocking with countersunk bolts, washers and nuts, or nails. Locate blocking to facilitate installation of finishing materials, fixtures, specialty items, and trim.

C. Cutting and notching shall not exceed 25 percent of its width for exterior or bearing walls, 40 percent of its width for interior non-bearing walls.

3-7 JOIST FRAMING:

A. Set with crown edge up. Double joists to form headers and trimmers longer than 4 feet; support with metal joist hangers.

B. Each member shall have not less than 1-1/2 inches of bearing on wood or metal.

C. Notches on ends of members shall not exceed one-fourth the joist depth. Holes bored in members shall not be within 2 inches of the top or bottom of the member, and the diameter of any such hole shall not exceed on-third the depth of the member. Notches in the top or bottom of the member shall not exceed one-sixth the depth and shall not be located in the middle third of the span.

3-8 RAFTERS:

A. Notch to fit exterior wall plates. Double rafters at openings in roof framing to provide headers and trimmers, and support with metal hangers. At ridge, place rafters directly opposite each other and nail to ridge member or support with metal hangers as shown.

B. Notches on ends of members shall not exceed one-fourth the rafter depth. Holes bored in members shall not be within 2 inches of the top or bottom of the member, and the diameter of any such hole shall not exceed one-third the depth of the member. Notches in the top or bottom of the member shall not exceed one-sixth the depth and shall not be located in the middle third of the span.

3-9 BEAMS: Install with crown edge up.

3-10 MISCELLANEOUS FRAMING:

A. Firestops: Provide 2-inch-thick by depth of member blocking at each floor level and top story ceiling level in stud walls. Provide 2-inch-thick by depth of wood member blocking fitted to fill openings in floor and ceiling framing.

B. Framing for Mechanical Work: Frame members for passage of pipes and ducts. Do not cut, notch, or bore framing members for passage of pipes or conduits without approval of Contracting Officer. Reinforce framing members where damaged by cutting.

C. Blocking: Install blocking for anchoring at required locations to support ceiling fixtures and other wall mounted materials. Nail to wood twice at each joint. Install to insure true lines in applied finishes.

3-11 ROOF SHEATHING: Install plywood with face grain perpendicular to supports, continuously over 2 or more supports, and with end joints staggered between panels and located over

supports. Allow a minimum space of 1/8 inch between end joints and 1/4 inch between edge joints.

3-12 WALL SHEATHING: Install plywood with face grain horizontal or vertical. Allow minimum 1/16 inch space at end joints and 1/8 inch at edge joints. 2-inch nominal blocking required at all plywood panel edges.

3-13 SUBFLOORING: Install plywood with face grain perpendicular to joists; end joints occuring over the joists. Allow 1/16 inch space at end joints and 1/8 inch at edge joints. Stagger panel end joints.

3-14 FOUNDATION VENTS: Anchor securely with mounting system as recommended by manufacturer.

3-15 ATTIC VENTS: Locate vents where indicated on drawings; securely fasten in place as per manufacturer's recommendations.

END

PART 1: GENERAL

1-1 DESCRIPTION: The work of this section consists of finish carpentry work.

1-2 RELATED WORK SPECIFIED ELSEWHERE: Rough carpentry - Section 06100; finish hardware - Section 08710.

1-3 QUALITY ASSURANCE: Identify lumber and plywood by official grade mark. A certificate will be required for material left unmarked for reasons of appearance.

A. Lumber: Grade stamp to contain, where applicable, symbol of grading agency, mill number or name, grade of lumber, species, rules under which graded, and condition of seasoning at time of manufacture.

B. Plywood: Appropriate grade trademark of the APA, including type, grade, class, identification or span index, and inspection and testing agency mark.

1-4 SUBMITTALS: In accordance with Section 01300.

A. Shop drawings for prefabricated millwork. Include species, erection data, arrangements, profiles of moldings, thicknesses, sizes of parts, construction, fastenings, and clearances.

B. One linear foot of each kind of trim and moldings.

C. Shop drawings or catalog cuts for bath lavatory cabinets showing design and materials.

D. Certifications:

1. Submit certification by treating plant stating chemicals and process used, net amount of salts retained, and conformance with applicable standards.

2. Certificates on graded but unmarked lumber or plywood attesting that materials meet the grade requirements.

1-5 DELIVERY, STORAGE, AND HANDLING:

A. Immediately upon delivery to job site, place materials in area protected from weather. Store materials a minimum of 6 inches above ground on framework or blocking and protect with waterproof covering allowing for adequate air circulation and ventilation. Do not store materials in wet or damp portions of building.

B. Store interior finish lumber indoors in a heated and ventilated area for a minimum of 30 days before installation to acclimatize the material to the operating temperature and humidity of the building. Stack well supported to prevent warpage and with spacers for maximum air circulation.

PART 2: MATERIALS

2-1 SIZES AND PATTERNS OF WOOD PRODUCTS: Yard and board lumber sizes shall meet PS-20. Provide shaped lumber and millwork in patterns shown. Sizes referenced, unless otherwise shown or specified, are nominal sizes; actual sizes shall be within manufacturing tolerances allowed by the standard under which the product is produced. No finger jointed material permitted.

2-2 MOISTURE CONTENT OF WOOD PRODUCTS: Kiln-dry lumber. Boardwalk timbers and decking material may be air-dried, as approved. The maximum moisture content of wood products at time of delivery shall be as follows:

A. Interior Finish Lumber, Trim, and Millwork: 9 percent.

B. Exterior Treated or Untreated Finish Lumber, and Trim and Millwork: 12 percent.

C. Moisture content of other material shall be in accordance with the standards under which the products are produced.

2-3 PRESERVATIVE TREATMENT OF WOOD PRODUCTS:

A. Pressure Treatment: Pressure treat exterior stair treads and risers, boardwalk sleepers and stringers, door thresholds, and any wood material in contact with concrete or soil, including 2x4 sleepers of garage steps.

1. Material Not Exposed to View: Pressure treat with ammoniacal copper arsenate (ACA) waterborne salt to a minimum retention of 0.40 pound per cubic foot, conforming to AWPA Standards C-2 and C-9 for ground contact, incised, and bearing the AWPB Quality Mark LP22, which shall be accepted as evidence of conformance to this specification. After treatment, dry lumber to a moisture content not exceeding that specified in this section.

2. Material Exposed to View: Do not incise.

3. Pressure Treatment of Framing Materials and Exterior Plywood Sheathing: See Section 06100, Rough Carpentry.

B. Brush Treatment: All borings and field cuts shall be field treated in accordance with AWPA M-4. Use same preservative as for pressure treatment.

2-4 WCCD: Provide species and grades specified below. Species and grades listed in this section follow WWPA Standard Grading Rules. If materials supplied are graded under different rules than WWPA, materials must be equivalent to those specified in this section.

A. Garage Stair Treads, Risers, and Decking: Douglas Fir-Larch, S4S, C Select, vertical grain.

B. Garage Stair Railing: Douglas Fir-Larch, S4S, Selects, 1 and 2 Clear, B and Better.

C. Siding: Douglas Fir, S4S, C Select, vertical grain.

D. Exterior Trim and Millwork, Interior Finish Work, Trim and Millwork: White Pine, Ponderosa Pine, or Douglas Fir, S4S, Selects, 1 and 2 Clear, B and Better, vertical grain. Interior door and window trim to be 1x4 material, or match existing elsewhere.

E. Boardwalk Decking: 2x6 rough sawn, 2 Common, Douglas Fir.

F. Boardwalk Sleepers and Stringers: Timbers, No. 2, Douglas Fir.

G. Shelving: 1-inch-thick, suitable species equal to or exceeding the requirements of No. 3 shop hem-fir graded under WWPA.

H. Clothes Hanger Rods and Handrails: 1-1/2-inch diameter hardwood.

2-5 SOFTWOOD PLYWOOD: PS-1.

A. Access Hatches: Floor, 3/4-inch thick, same species and grade as first floor flooring; ceiling, 1/2-inch thick, same species and grade as second floor flooring.

B. Shelving: 3/4-inch-thick, interior type, A-B, any species group.

2-6 HARDWOOD PLYWOOD: PS-51, as approved.

2-7 HARDBOARD: PS-58, as approved.

2-8 PARTICLEBOARD: CS 236, as approved.

2-9 LAMINATED PLASTIC: Allowed in nonpublic areas only, as manufactured by Formica Corporation, 3145 Northwest Yeon, Portland, Oregon 97208, or approved equal. Backing sheet, Style ND, Type IV, 0.020 inch thick.

2-10 ADHESIVE FOR LAMINATED PLASTIC: Water resistant resin.

2-11 HARDWARE: Provide sizes and types recommended by the product manufacturer, except as specified in Section 08710. Provide hot-dipped galvanized steel nails and fastenings where used on the exterior or exposed to the weather.

2-12 BUILDING PAPER: For use under siding, must not create a moisture barrier, as approved by Contracting Officer.

PART 3: EXECUTION

3-1 GENERAL FINISH WORK: Where practicable, shop assemble and finish items of built-up millwork. Joints shall be tight and constructed in a manner that will conceal shrinkage. Miter trim and moldings at exterior angles and returns, and cope at interior angles. Material shall show no excessive warp. Provide a liberal brush coat of preservative treatment to field cuts or holes in treated material. Before installation of materials, prime surfaces as specified in Section 09901. Install millwork and trim in the longest lengths possible. Fasten finish work with finish nails. Provide blind nailing where practicable. Set face nails for putty stopping in all interior finish work and all exterior trim and molding.

A. Exterior: Machine sand exposed flat members and square edges. Machine finish semi-exposed surfaces. Construct joints to exclude water. In addition to nailing, glue joints of built-up items as necessary, for weather-resistant construction. Provide well-distributed end joints in built-up members. Shoulder joints in flat work. Hold backs of wide-faced miters together with metal rings and glue. Fascias and other flat members, unless otherwise shown, shall be 3/4-inch thick. Provide door and window trim in single lengths. Provide braced, blocked, and rigidly anchored cornices for support and protection of vertical joints.

B. Interior: Machine sand exposed surfaces at the mill. Run trim, except window stools and aprons, with channeled backs. Provide window and door trim in single lengths. After installation, sand exposed surfaces smooth.

3-2 DOOR FRAMES: Set plumb and square. Provide solid blocking for jambs spaced at not more than 16 inches on centers. Position blocking to occur behind hinges and lock strikes. Double wedge frames and fasten with finishing nails. Set nails for putty stopping.

3-3 WINDOW STOOLS AND APRONS: Provide 1-1/16-inch thick, or thickness as shown, stools and rabbet over the window sill. Provide 3/4-inch thick, or thickness as shown, aprons, and cut returns accurately to the profile of the member.

3-4 BASES: Provide a one-piece base, 1 inch by 4 inches. Fasten base to framing members. Set wood base after finish flooring is placed.

3-5 FINISH STAIRWORK: Fit, nail, screw, bolt, and glue stairwork together to form a strong rigid structure without squeaks or vibrations. Install railings with straight runs following slope of stairs. Return railing profile at ends. Support wall rails on metal brackets spaced near ends and not over 5 feet on centers.

3-6 SHELVING: Supported with end and intermediate supports and arrange to prevent buckling and sagging. Hook strips shall be 1 inch by 4 inches.

3-7 CLOTHES HANGER RODS: Set rods parallel with the front edges of the shelves and support at each end by suitable sockets and by intermediate brackets spaced at not more than 4-foot centers.

3-8 COUNTERS: Conceal fastenings where practicable. Fit the counter neatly, and scribe to adjoining surfaces. Face and edge tops with plastic laminate. Bond plastic laminate under pressure. Plastic laminating shall meet the requirements of NEMA LD3. Provide counter sections in the longest lengths practicable. Keep joints in tops to a minimum, and where joints are necessary, provide tight hairline joints drawn up with concealed-type heavy pull-up bolts. Glue joints and, in addition, make rigid with screws, bolts, or other approved fastenings.

3-9 ACCESS HATCHES:

A. Flcor: Construct hatch of 2x4's and 3/4-inch plywood as indicated on drawings. See Section 08710 for hardware.

B. Wall: Hatch in wall between Room 102 and below Stair 103 and between garage and attic above Room 106 shall be constructed of 1/2-inch plywood as indicated on drawings. See Section 08710 for hardware.

C. Ceiling: Construct hatch of 1/2-inch plywood as indicated on drawings. Attach 2 inches of rigid insulation to attic surface of hatch.

D. All hatch panels shall be suitable to finish to match surrounding materials.

3-10 SIDING: Install building paper on sheathing, horizontally, lap sheets 2 inches minimum, end laps 6 inches minimum. Secure with staples. Install siding level, with end joints made at 45 degrees only at bearing. Stagger joints with no end joint occurring in same space in adjacent boards. Minimum board length shall be three stud spaces. Blind nail tongue and groove siding, 10d finish, at each bearing. For shiplap siding, nail twice at each bearing, one blind, one face, 10d finish. Drive nails flush without marring wood. Install no siding until face, sides, ends, and tongues and grooves have been primed.

3-11 FIRST FLOOR TREATMENT:

A. Contractor shall make every effort possible to complete structural work without removing any flooring materials beyond that noted to be removed.

B. If Contractor and Contracting Officer determine that structural work cannot be completed as indicated above, the Contractor may, as approved, remove small areas of flooring and subflooring to facilitate structural work.

C. If previous method described in Paragraph B above does not permit required structural work to be accomplished, Contractor may, with Contracting Officer's approval, remove any or all floor and subfloor materials. This approach is referred to as the worst case situation in the drawings, and requires floor and subfloor materials to be installed as per the Room Finish Schedule and drawing details.

END

PART 1: GENERAL

1-1 DESCRIPTION: The work of this section consists of furnishing and applying bituminous dampproofing on exterior below grade surfaces of the valve pit.

1-2 SUBMITTALS: In accordance with Section 01300. Submit manufacturer's literature and recommendations for applying.

1-3 PRODUCT HANDLING: Deliver in original containers, marked with manufacturer's name, brand name, and type of material. Follow manufacturer's recommendations for protection and storage.

1-4 PROJECT CONDITIONS: Apply dampproofing only when ambient temperature is above 40 degrees F, ground is not frozen, and no muddy or rainy condition exists. Verify that concrete has cured 7 days, minimum, and is ready to receive dampproofing, or report unsuitable surface to Contracting Officer.

PART 2: MATERIALS

2-1 PRIMER: ANSI/ASTM D41-78.

2-2 ASPHALT: ANSI/ASTM D449-79, Type I.

PART 3: EXECUTION

3-1 SURFACE PREPARATION: Point holes, joints, and cracks flush with mortar. Before dampproofing, brush surfaces clean of all foreign matter.

3-2 APPLICATION OF PRIMER: Apply primer by brush or spray, at a minimum rate of 1 gallon per 100 square feet.

3-3 APPLICATION OF ASPHALT: Apply two coats of asphalt after prime coat is dry, but before any deterioration of primed surface. Allow 24 hours drying time between coats. Apply each coat at the rate of 20 pounds per 100 square feet. Asphalt shall be not less than 300 degrees F when applied. Do not heat above 450 degrees F. Finished surface shall be fully bonded to primed surface and shall be smooth, lustrous, and impervious to moisture. Recoat dull or porous spots.

3-4 INSPECTION: Do not backfill against dampproofing until acceptance by Contracting Officer.

END

PART 1: GENERAL

1-1 DESCRIPTION: The work of this section consists of furnishing and installing vapor barriers for first floor floors, exterior walls, and second floor ceilings.

1-2 SUBMITTALS: In accordance with Section 01300, submit two copies of manufacturer's installation instructions and recommendations.

PART 2: MATERIALS

2-1 Polyethylene sheeting. 6 mil Visqueen as manufactured by Ethyl Corporation, Baton Pouge, Louisiana 70801, or approved equal.

PART 3: EXECUTION

3-1 GENERAL: Do not begin work until framing of openings is complete and wood blocking, nailers, curbs, vents, piping drains, and other projections through vapor barrier are installed.

3-2 FLOORS, EXTERIOR WALLS AND CEILINGS: Install vapor barrier over warm side of floors, walls, and ceilings. Apply film horizontally in maximum practical widths and lengths. Attach with 1/4-inch to 3/4-inch leg length staples applied with a compression staple tacker, spaced not more than 6 inches on center. No stapling is required on intermediate studs or joints except as necessary to hold film in place. At second floor ceilings, staple film to joist working film tight while stapling. Where required, lap end joints 3 inches over solid and continuous backing. Bring up film tight against electric outlets, doors, window frames, and similar openings. Use pressure sensitive tape or vapor barrier material with adhesive to seal punctures, tears, or penetrations through film.

END

PART 1: GENERAL

1-1 DESCRIPTION: The work of this section consists of furnishing and installing floor, wall, ceiling, and chase insulation.

1-2 RELATED WORK: Insulation for piping and equipment - Section 15181.

1-3 SUBMITTALS: In accordance with Section 01300. Submit samples of each material to be used, clearly identified with manufacturer's name, brand name, R or K value, and composition.

1-4 PRODUCT HANDLING: Deliver materials to project site in original packaging. Store materials off ground. Protect against weather, condensation, and damage.

PART 2: MATERIALS

2-1 FLOOR, WALL, CEILING AND CHASE INSULATION:

A. Unfaced: Friction fit type, with an installed thermal resistance of R=11 for walls and R=38 minimum for ceilings.

B. Vapor Barrier for Unfaced Insulation: Section 07190.

C. Kraft Breather Paper Faced: Flanged for stapling, with an installed thermal resistance of R=11 for chase and R=38 for first floor (floor and ceiling).

2-2 FASTENERS: Plated steel staples, plastic tape, and other fastening devices required to insure tight fitting insulation.

PART 3: EXECUTION

3-1 WALL, CEILING, AND FLOOR INSULATION: Fit insulation snugly between framing. Maintain integrity of insulation over entire area to be insulated. Insulate small areas between closely spaced framing members. Carefully cut insulation and fit around pipes, conduits, and other obstructions. Where pipes or conduits are located in stud spaces, place insulation between exterior wall and pipe.

3-2 CHASE INSULATION: Completely fill all chase cavities with batt insulation stapled to interior surface of chase walls.

END

PART 1: GENERAL

1-1 DESCRIPTION: The work of this section consists of furnishing and installing a wood shingle roof.

1-2 QUALITY ASSURANCE: Grading rules of the Red Cedar Shingle & Handsplit Shake Bureau, 5510 White Building, Seattle, Washington 98101.

1-3 SUBMITTALS: In accordance with Section 01300, submit samples of shingles, fire retardant treatment certification, and installation instructions.

1-4 GUARANTEE: Furnish a guarantee-warranty in writing against a defective roofing system for a 5-year period from date of acceptance. Such a guarantee-warranty shall include repairing that becomes necessary to maintain the roof in a watertight condition.

PART 2: MATERIALS

2-1 SHINGLES: No. 1 Grade Blue Label 18-inch long, Red Cedar shingles, UL label, Class C, 100 percent edge grain, 100 percent all clear, 100 percent heartwood, NCX treated, as produced by J. H. Baxter, 1700 S. El Camino Real, San Mateo, California 94402, Telephone: 415/349-0201, or approved equal.

2-2 PLASTIC COATED FOIL UNDERLAYMENT: By J. H. Baxter, or approved equal.

2-3 RIDGE UNITS: Prefabricated units complying with grading rules. Length, same as shingles.

2-4 NAILS: Hot-dipped zinc coated box nails. Use 3d nails in field of roof and 5d for ridges and starter course.

2-5 RCOFING FELT STRIPS: ASTM D226, Type II, 30-pound, unperforated, asphalt saturated felt.

2-6 ROSIN PAPER: Rosin sized, unsaturated paper weighing approximately 6 pounds per 100 square feet.

2-7 FLASHING AND CHIMNEY CRICKETS: Section 07600.

PART 3: EXECUTION

3-1 LAYING SHINGLES - GENERAL REQUIREMENTS: Install shingles over plastic coated foil as per manufacturer's recommendations. Do not insert wood spacers between shingles and plywood roof sheathing. Roof sheathing shall have butted joints; do not lap joint plywood. Install foil continuous over sheathing with 4-inch overlap at all foil seams; do not insert foil edge under plywood edges.

A. Spacing: Space shingles 1/4 to 3/8 inch apart.

B. Number of Nails: Use only two nails per shingle.

C. Location of Nails: Not over 3/4 inch from the edge of shingle at each side. 1-1/4 inches above the butt line of the course to follow.

D. Driving Nails: Drive nail flush but not into shingle surface.

E. Length of Nails: Verify that nail selected is just long enough to penetrate through the sheathing.

F. Exposure: 5-1/2 inches, or match existing elsewhere.

G. Lines: Lay shingle butts in straight lines. Check lines frequently.

H. Side Lap: Stagger joints between adjacent courses at least 1-1/2 inches. Avoid joint alignment between alternate courses.

3-2 TRIPLED FIRST COURSE: At eaves, project first course to overhang approximately 1-1/4 inches. Make first course a triple layer of shingles with joints in all three layers staggered.

3-3 GABLE ENDS: Project shingles about 1-1/4 inches over end rafter, barge board, or molding. Tilt edge shingles slightly away from gable edge by installing beveled siding strip (with tapered edge facing inward) along rake on top of sheathing.

3-4 VALLEY: Directly on sheathing, lay strip of roofing felt wide encugh to insulate valley metal from deck; and, before installing metal, cover felt with rosin paper slip sheet.

3-5 RIDGES:

A. Center an 8-inch-wide felt strip over sheathing at ridges.

B. Where ridges terminate in gables, start with a double course at each gable end and work toward middle. At center, splice with small saddle shingle butts.

3-6 INSTALLATION OF METAL FLASHING FOR PIPES AND CHIMNEYS: Install flashing on top of shingles on downhill side. Do not try to conceal the downhill side of flashings.

END

PART 1: GENERAL

1-1 DESCRIPTION: The work of this section consists of furnishing and installing a four-ply gravel surface built-up roofing system using felts and asphalt bitumen.

1-2 QUALITY ASSURANCE: The built-up roofing system shall be equal to Manville Building Material Corporation, Specification No. 4GNG, which has been used as a basis for this specification. Other systems will be considered for approval. Completed roof shall meet all requirements for manufacturer's 20-year bond, but no bond is required.

A. Materials: All materials shall be furnished by, or approved by, manufacturer of the roofing system.

B. Tests: Test cuts may be required by the Contracting Officer prior to application of surfacing. Such cuts shall be obtained and the cut repaired by the Contractor at no additional cost to the Government. Any cost for laboratory analyses will be borne by the Government.

1-3 SUBMITTALS: In accordance with Section 01300.

A. Manufacturer's descriptive data, including installation recommendations.

B. Certificate or other evidence satisfactory to the Contracting Officer that the applicator is approved by manufacturer of the roofing system.

1-4 PRODUCT HANDLING: Deliver materials in manufacturer's original unopened package. Store in accordance with manufacturer's recommendations, away from all moisture.

1-5 PROJECT CONDITIONS: Apply roofing only in dry weather. Do not apply at temperatures below 40 degrees F without approval of Contracting Officer.

PART 2: MATERIALS

2-1 SHEATHING PAPER: As recommended by manufacturer.

2-2 FELTS:

A. Base Felt: Glasbase.

B. Finishing Felt: Asphalt impregnated fiberglass ply felt, 15-pound, ASTM D2178-76, Type IV.

2-3 BITUMEN: ANSI/ASTM D312-78, Type III.

2-4 GRAVEL OR SLAG: ASTM D1863-80, or from local source as approved. Use medium gray color, as approved.

2-5 CANT STRIP: Asphalt impregnated fiberboard, size as indicated, as manufactured by Celotex Corporation, Tampa, Florida, or approved equal. Preservative treated wood may be used as shown.

2-6 BASE FLASHING: As recommended by manufacturer of the roofing system.

2-7 FASTENERS: Nails with annular or spiral threads, driven through tin caps if the heads are less than 1 inch in diameter, or staples power driven through tin caps.

PART 3: EXECUTION

3-1 INSPECTION: Determine that deck surfaces are in suitable condition or report unsuitable surfaces to Contracting Officer.

3-2 AMOUNT OF MATERIAL TO BE USED PER 100 SQUARE FEET OF ROOF AREA:

A. Felts:

1. Base Felt: 1 layer.

2. Finishing Felt: 3 layers.

B. Bitumen: 129 pounds (23 pounds between each layer, total 69 pounds; 60 pounds in surfacing).

C. Surfacing: Gravel, 400 pounds, or slag, 300 pounds.

3-3 SHEATHING PAPER: Apply sheathing paper under first felt next to wood deck.

3-4 FIRST FELT: Apply felt horizontally, starting at the low edge. Working up the slope, lap each felt 2 inches over the preceding one. Nail laps at 9 inches on center. Down the longitudinal center of each felt, nail two rows approximately 11 inches apart. Place nails in each row 18 inches on center and offset the second row so that each nail is centered between nails of the first row.

3-5 BITUMEN: Apply bitumen between felts at temperatures between 350 degrees and 475 degrees F. Mop uniformly over the entire surface just before placing each layer of felt. Felt shall not touch felt.

3-6 SECOND, THIRD, AND FOURTH FELTS: Starting at the low edge, apply one 12-inch-wide, then over that one 24-inch-wide, then over both a full 36-inch-wide felt. Following felts are to be applied full width overlapping the preceding felt by 14-2/3 inches in such a manner that at least three plies of felt cover the base felt at any point. Nail each felt at approximately 9-inch centers adjacent to the back edge. Broom each felt so that it is firmly and uniformly set without voids into hot bitumen.

3-7 SURFACING: Flood the surface with bitumen, and while it is hot, embed gravel or slag. Complete installation of built-up roofing system, including aggregate surface, up to line of termination of day's work.

END

PART 1: GENERAL

1-1 DESCRIPTION: The work of this section consists of furnishing and installing flashing and sheet metal.

1-2 SUBMITTALS: In accordance with Section 01300.

A. Shop Drawings: Show sheet metal items, including joints, types and locations of fasteners, and special shapes.

B. Samples: Two 12-inch by 12-inch samples of each sheet metal material. Show pattern, finish, color, and thickness.

C. Manufacturer's Literature: Sheet metal manufacturer's welding instructions, printed instructions, and recommendations for installation.

1-3 GUARANTEE: Guarantee materials and workmanship for two years.

PART 2: MATERIALS

2-1 SHEET METAL:

A. Cricket and Chimney Flashing: Copper, ANSI/ASTM B370, cold rolled temper, weighing minimum of 16 ounces per square foot.

B. Galvanized Steel: 26-gauge, ANSI/ASTM A526, commercial quality, or ANSI/ASTM A527, lock-forming quality. Coating designation, G90, ANSI/ASTM A525.

C. Lead Coated Copper: ANSI/ASTM B101, Type I, Class A, soft or hard temper. Copper sheets, cold rolled, 20 ounces per square foot, exclusive of lead coating.

2-2 FASTENERS:

A. Nails: FS FF-N-105. Material, large headed galvanized roofing nails for galvanized flashing; large headed copper roofing nails for copper and lead coated copper flashing.

B. Screws: FS FF-S-107, self-tapping sheet metal type.

2-3 EXPANSION ANCHORS: FS FF-B-588.

2-4 SOLDER: ANSI/ASTM B32, alloy grade 50A, 50 percent tin, 50 percent lead.

2-5 SEALANT: FS TT-S-230, Type II, Class A, or manufacturer's standard, silicone, or polyurethane type.

2-6 BITUMINOUS PLASTIC CEMENT: FS SS-C-153, Type I or II.

2-7 PRIMER COATING: FS-TT-P-641, Type I or II, prime coat for finished painting. FS TT-P-645, prime coat for finished painting or for terne.

2-8 ASPHALTIC COATING COMPOUND: FS TT-C-494, Type II.

2-9 UNDERLAYMENT: ANSI/ASTM D226, asphalt saturated, unperforated roofing felt, 15 pound type, or ANSI/ASTM D227, coal tar saturated roofing felt.

2-10 SLIP SHEET: Building paper, FS UU-B-790, Type I, Grade A, Style 1b.

2-11 FABRICATION:

A. Cleats: Minimum width, 2 inches. Same material and thickness as sheet metal.

B. Chimney Crickets: Form crickets of 16 ounce copper. Cricket ridge shall have an 8-inch rise at the chimney vertical face. The masonry and roof flashing shall be shaped to fit the individual chimney, then soldered to the cricket piece, with lap seams, forming a one-piece cricket unit. See Article 3-2 for lap requirements.

C. Chimney Flashing: Form of 16 ounce copper. See Article 3-2 for lap requirements.

D. Window and Door Head Flashing: Form of 26-gauge, galvanized steel as detailed on the drawings. All pieces shall be one-piece; no splicing will be allowed.

E. Parapet Cap Flashing: Form of 20 ounce lead coated copper as detailed on drawings.

PART 3: EXECUTION

3-1 INSPECTION: Determine that surfaces are smooth and clean to the extent required for sheet metal work. Correct defective surfaces or report them to the Contracting Officer. Verify that nails, cants, and blocking to receive sheet metal are installed and free of concrete and soil. Before commencing work, verify shapes and dimensions of surface to be covered.

3-2 INSTALLATION:

A. General: Install work watertight, without waves, warps, buckles, fastening stresses, or distortion. Allow for expansion and contraction. Angle bottom edges of exposed vertical surfaces to form drips. Hem exposed edges.

B. Seams:

1. Lap Seams: Finished width, 2 inches.

2. Cricket and Chimney Soldered Lap Seams: Finished width, 1 inch. Sweat full with solder.

3. Cover Plate Seams: Space abutting sheets 1/2 inch apart plus fastener thickness. Cover joint with 4-inch-wide backup with cover plate set in sealant. Match plates to flashing profile. Secure plates to substrate with screws installed through open space between flashing sheets.

C. Cleats: Space 2 feet on center. For copper, space 1 foot on center. Secure to substrate with fasteners and cover heads with cleat tabs. For continuous cleats, secure to substrate with fasteners spaced 1 foot on center.

D. Soldering: Clean and flux metals before soldering. Sweat solder completely through seam width.

E. Sealant Installation: Apply 1/4-inch diameter bead, centered on full length of joint.

F. Bituminous Plastic Cement: Trowel 1/8-inch thick.

G. Painting: See Section 09901.

H. Base Flashing: Extend flashing from 2 inches above top edge of base shingle to 1-1/2 inches above butt edge of covering edge of shingle. Extend up vertical surface 5 inches minimum and onto roofing 4 inches minimum. Install flashing under each shingle course. Secure top edge of flashing by nailing to substrate. At

chimneys and skylights, extend up vertical surface 8 inches minimum and onto roofing 4 inches minimum. Embed and cover with sealant, lap vertical seams. Miter, lap corners, embed and cover with sealant.

I. Open Valley Flashing: Minimum width, 18 inches. Fabricate with edges folded back 1/2 inch and with 1-inch-high deflector at valley center. Install over slip sheet. Overlap joints 8 inches minimum in direction of water flow. Cleat folded edges to substrate on 2-foot centers.

J. Apron Flashing Where Roof Slopes Away From Vertical Surface: Extend up vertical surface 4 inches or to first brick joint, and onto roof surface 4 inches minimum. Secure top edge to wall sheathing. Hem bottom edge 1/2 inch. Lap seam of vertical joints 3 inches minimum and apply sealant, engaging hemmed edges. Miter and seal joints, and extend around corners 3 inches. Install bottom edge tight against roofing.

K. Cricket Flashing: Form cricket to slope away from vertical surfaces. Solder lap joints. Extend up vertical surfaces 4 inches minimum, and onto roof surfaces 8 inches minimum with edges folded back over 1/2 inch. Grout top of flashing into 1-inch deep masonry joints.

L. Chimney Flashing: See base flashing, Paragraph H above, for lap requirements. Grout top of flashing into masonry joints as described in Paragraph K above.

M. Rake Flashing: Extend horizontal flange 3 inches under roofing. Nail to substrate. Extend vertical face over fascia. Lap seam joint in direction of water flow.

N. Copings: Prefabricated, as recommended by manufacturer. Space cover plate seams 8 feet apart maximum. Miter and join corners with seams to match others in coping. For parapet walls, where exposure is over 5 inches, lock exterior edges over continuous cleats secured to substrate. Slope 3/4 inch in 12 inches toward inside of parapet. Lock interior edges to substrate with cleats anchored at seams. For free standing walls, lock edges exposed to prevailing wind over continuous cleats secured to substrate. Lock edges away from prevailing winds with spaced cleats. For raised roof edges, lock exterior edges over continuous cleats secured to substrate. Install roof flange tight against roofing. Attach clips to substrate with concealed fasteners. Reinforce clips by double bending back over bottom edge of roof flange. Provide at built-up roofing, edge raised at least 5-1/2 inches above roof deck substrate.

O. Gravel Stops: Prefabricated, as recommended by manufacturer. Form gravel stops 3/4 inch minimum height. Fabricate joints with lap seams spaced 10 feet apart maximum. Fill roof flange joints with bituminous plastic cement. Extend roof flange 4 inches on top of roofing, set in plastic cement bed, and secure to substrate with nails spaced as recommended.

P. Through Wall Scuppers: Line opening and slope toward drain outlet. If roofing is gravel surfaced, install gravel stop across opening. Join liner to inside flange fabricated as one piece with flat lock seams. Extend flange 4 inches on top of roofing, and 4 inches in all other directions. Secure roof flange to substrate with nails spaced 6 inches apart. Join liner to outside flange with single corner seams. Extend flange 1 inch in all directions. Make top seam watertight by soldering. Make top edges of inside and outside flanges watertight with sealant installed between flange and wall face. Counterflash top of inside and outside flanges as specified above.

Q. Roof Penetration Flashing: For base flashing, extend flange onto roof 6 inches minimum away from penetration. At shingle roof, extend roof flange 8 inches minimum away from penetration. Extend flange upward around penetration to at least 8 inches above roofing felts. Fold back upper and side roof flange edges 1/2 inch. Solder lap joints. For counterflashing, overlap base flashing 1 inch minimum with storm collar sloped away from penetration. Secure to penetration with draw band and sealant, rivet and sealant, solder, or by welding.

3-3 REPAIRING: Repair or replace damaged work.

3-4 CLEANING: As work progresses, neutralize excess flux with 5 to 10 percent washing soda solution and thoroughly rinse. Leave work clean and free of stains and debris.

END

PART 1: GENERAL

1-1 DESCRIPTION: The work of this section consists of furnishing and installing gutters and downspouts.

1-2 SUBMITTALS: In accordance with Section 01300.

A. Shop Drawings: Show methods of forming, jointing, nailing, and securing metal to form units including joint details and waterproof connections.

B. Two copies of manufacturer's installation instructions and recommendations.

PART 2: MATERIALS

2-1 GUTTERS AND DOWNSPOUTS: ANSI/ASTM A526. Steel, sheet, zinc coated (galvanized), commercial quality. Zinc coating designation, ANSI/ASTM A525, G90.

2-2 GUTTER SPIKES: Galvanized steel. Length, up to 3 inches longer than gutter opening width, provided spike does not penetrate past solid backing.

2-3 GUTTER SPIKE FERRULES: Material same as gutter, length to match gutter opening width.

2-4 GUTTER SEALANT: One part, nondrying, gun grade, butyl rubber, silicone, or as recommended by the gutter manufacturer.

2-5 ACCESSORIES: As recommended by the gutter manufacturer.

2-6 DOWNSPOUT STRAINERS: 14-gauge copper wire mesh, 1/2 inch by 1/2 inch.

PART 3: EXECUTION

3-1 INSTALLATION:

A. Gutters: In accordance with manufacturer's instructions and recommendations and SMACNA Architectural Sheet Metal Specifications. Hangers and fasteners, space maximum of 3 feet on center. Join gutter sections using slip joint connectors.

Before installation, fill joints between connectors and end caps with sealant for waterproof connections. Gravel stops, as shown; secure to permit expansion and contraction; set in sealant and lap a minimum of 4 inches. Support and anchor each unit as shown with lines and slope of 1/16 inch per foot, accurate and true in alignment and location. Locate and shape outlet thimble to fit downspouts. Size thimble 1/8 inch less than downspout and extend 2 inches below gutter soffit.

B. Downspouts: Fabricate longitudinal joints with double corner or flat lock seams. Telescope upper sections into lower sections 1-1/2 inches minimum. Elbow downspouts away from buildings at open downspout ends. Attach to wall with 1-1/4-inch-wide straps matching downspout material and 1 gauge heavier. Locate straps at downspout tops, bottoms, horizontal joints, and at 10-foot maximum centers. Secure straps to wall with fastener heads covered with strap tabs.

C. Downspout Strainers: Fit tightly in each gutter outlet thimble.

END

PART 1: GENERAL

1-1 DESCRIPTION: The work of this section consists of furnishing and installing skylight.

1-2 RELATED WORK: Flashing and sheet metal - Section 07600.

1-3 SUBMITTALS: In accordance with Section 01300.

A. Submit 12-inch by 12-inch samples of materials proposed for use.

B. Shop drawings.

C. Manufacturer's installation instructions.

1-4 PROJECT CONDITIONS: Determine exact size of skylight by field measurements. Sizes shown are approximate and shall be used for estimate only.

1-5 PRODUCT HANDLING: Deliver skylight with protective coating or in protective container.

PART 2: MATERIALS

2-1 SKYLIGHT: Unit shall be as manufactured by Kalwall Corporation, 1111 Candia Road, Manchester, New Hampshire 03103, or approved equal. Skylight shall consist of two layers of crystal colored fiberglass panels, 0.070-inch (exterior) and 0.045-inch (interior) thick, separated by and bonded to extruded aluminum I-beams, for a total thickness of 2-3/4 inches. Space between fiberglass panels shall not contain insulation. Exposed aluminum surfaces shall have corrosion resistant vinyl cladding, bronze color No. 84.

2-2 ACCESSORIES: Provide all accessories required for complete installation.

2-3 LOWER LENS: Provide one crystal colored fiberglass lift-out panel, 0.070-inch thick, sized to fit.

2-4 All items to be of same manufacturer.

PART 3: EXECUTION

3-1 INSTALLATION:

A. Protect all items from damage during installation.

B. Install skylight and accessories in accordance with manufacturer's instructions.

C. Install lower lens as indicated on drawings.

3-2 CLEANING: Remove protective coating when installation is complete. Clean both surfaces of skylight and lower lens.

END

PART 1: GENERAL

1-1 DESCRIPTION: The work of this section consists of furnishing and installing sealant materials for all exterior joints to establish and maintain a positive barrier against air, water, or moisture; to seal all interior or exterior joints where there is a need to exclude air or dirt or to satisfy appearance requirements.

1-2 SUBMITTALS: In accordance with Section 01300.

A. Manufacturer's technical data and application instructions for any products not specified by trade name.

B. Samples of sealant colors.

1-3 PRODUCT HANDLING: Deliver materials in manufacturer's original, unopened containers and store in a protected area at temperatures recommended by manufacturer.

1-4 REFERENCED MANUFACTURERS:

A. Backer Rod Manufacturing and Supply Company, Denver, Colorado.

B. Dow Chemical Company, Midland, Michigan.

C. Dow Corning Corporation, Midland, Michigan.

D. General Electric Company (GE), Waterford, New York.

E. Pecora Corporation, Harleysville, Pennsylvania.

F. Sika Chemical Corporation, Lyndhurst, New Jersey.

G. Sonneborn-Contech, Minneapolis, Minnesota.

H. Tremco, Cleveland, Ohio.

I. Williams Products, Inc., Troy, Michigan.

J. Woodmont Products, Inc., Huntington Valley, Pennsylvania.

1-5 QUALITY ASSURANCE: Contractor shall have copies of ASTM C920-79, C962-81, and C790-74 available for reference on the job site.

1-6 ENVIRONMENTAL CONDITIONS: Install sealants only in favorable weather conditions as defined by 5.1.5.4 of ASTM C962-81. To help balance expansion and contraction of sealants in exterior working joints, install sealants in such joints at substrate temperatures as near as possible to 55 degrees F.

PART 2: MATERIALS

2-1 TYPE 1 SEALANT: For joints on vertical surfaces, including interior joints where movement is anticipated, and all exterior joints. ASTM C920-79, Type S, Grade NS, Class 25, Uses M, A, and O, as applicable. Limit sealants to neutral cure one-part silicones and one-part urethanes. Acceptable products include 790 by Dow Corning, Silpruf by GE, Dynatrol I by Pecora, Sikaflex-1a by Sika, Sonolastic NP1 by Sonneborn, DYmonic by Tremco, and Chem-Calk 900 by Woodmont, or approved equal.

2-2 TYPE 3 SEALANT: Mildew resistant, for interior use on joints in high humidity or possibly wet areas such as toilet rooms and shower stalls. Use on ceramic tile, on plastic laminate, and around plumbing fixtures and pipes. Do not use on surfaces in contact with food. ASTM C920-79, Type S, Grade NS, Class 12-1/2, Use O. Single component acid-curing silicone incorporating mildew resistant ingredient. Acceptable products include Silicone Rubber Bathtub Caulk by Dow Corning, Silicone Sanitary Sealant by GE, Silicone Rubber Bathroom Caulk by Woodmont, or approved equal.

2-3 JOINT FILLERS: ASTM C962-81, Type A, rod stock closed cell polyethylene foam, closed cell neoprene foam, or open cell urethane foam, as recommended by sealant manufacturer as being compatible both with the sealant used and the primer.

2-4 BOND BREAKER TAPE: Colored polyethylene pressure sensitive tape, minimum thickness 0.012 inch. Acceptable product is Bond Breaker Tape by Woodmont, or approved equal.

2-5 PRIMER: Follow sealant manufacturer's recommendations regarding use or non-use of a primer for the substrates in question and the environmental conditions anticipated. If a primer is required, use only the primer recommended by sealant manufacturer. If manufacturer or Contracting Officer determines that adhesion tests are necessary to resolve question of primer use, send substrate samples to sealant manufacturer with copy of

transmittal to Contracting Officer. Contractor will not have to bear the expense of making tests.

PART 3: EXECUTION

3-1 INSTALLATION OF SEALANTS: Follow manufacturer's instructions.

A. Install Type 1 and 3 sealants per ASTM C962-81, and the following instructions which refer to paragraphs or figures in the standard.

1. 5.1.5.6 and 5.1.5.7. Thoroughly fill joint and tool with sufficient pressure. Tool joints concave.

2. 8.5.1. Do not use solvents to clean concrete or other porous materials.

END

PART 1: GENERAL

1-1 DESCRIPTION: The work of this section consists of furnishing and installing new wood doors, and restoring and installing existing wood doors.

1-2 RELATED WORK: Finish carpentry - Section 06200.

1-3 QUALITY ASSURANCE: Wood door No. 107 shall bear the proper UL label. Hardware scheduled for application on fire doors shall be UL listed for such purpose.

1-4 SUBMITTALS: In accordance with Section 01300.

A. Shop Drawings: Show elevations, door and frame locations, door swings, dimensions, fire rating, and construction details, glazing, hardware, installation details, and garage door air leakage test data.

B. Manufacturer's Data: Submit five copies of manufacturer's installation instructions and recommendations.

1-5 PRODUCT HANDLING:

A. Deliver doors in labeled, protective packaging.

B. Store doors, where directed, on raised supports to prevent damage.

C. Store doors in a heated and ventilated area for a minimum of 30 days before installation to acclimatize the material to the operating temperature and humidity of the building. Stack to prevent warpage and to provide maximum air circulation.

1-6 CLOSEOUT SUBMITTALS: In accordance with Section 01700, furnish a written guarantee-warranty from the manufacturer covering all doors provided. Guarantees shall include costs of transportation, handling, refinishing, rehanging, and other incidental charges. Guarantee period shall begin from date of project acceptance of the completed door installations and shall extend for life for solid core flush interior doors, two years for all other doors, except that no guarantee-warranty required for existing historic doors.

PART 2: MATERIALS

2-1 NEW WOOD DOORS: Meet requirements of NWMA I.S. 1, Sound Grade, or WWPA No. 1 Door Cuttings. Species, Douglas Fir, Western Hemlock, Sitka Spruce, or Ponderosa Pine. Factory premachined and prefit. All similar doors shall be fabricated by one manufacturer.

A. Solid Core Fire Door No. 107: Door leaf shall have a mineral core with medium density overlay faces for paint finish. Door shall meet UL, 1-1/2 hour, B label requirements.

B. Panel Doors:

1. Rails, stiles, and panels shall be solid wood. Use mortise and tenon, pegged and glued joints. Extend tenons through stiles and peg with two 5/8-inch diameter hardwood dowels. Glue all meeting surfaces for all joints. Profiles as detailed. Muntins and bars shall be continuous pieces. Notch and glue for a tight joint where horizontal and vertical pieces meet. Notch and glue for tight joints into rails and stiles. Panels shall be solid wood, 9/16-inch thick, minimum. Plywood will not be acceptable. Panel grain shall be vertical. Panel stops may be fixed or removable; however, only one removable stop will be allowed and it shall be on the interior side of the leaf. Removable stops shall have mitered corners and be nailed in place with finish nails. Staples will not be acceptable. Use same profile on both sides of door.

2. Glass shall be double strength with waves or other distortions running in same direction as in other glazing in the building. See Section 08810 for glazing.

C. Garage Door:

1. Overhead garage door shall be 16-foot by 8-foot by 1-3/4-inch thick flush urethane core, U-factor of 0.147, by Barcol Overdoor Company, Inc., 2042 E. 3rd Avenue, Anchorage, Alaska 99501, Telephone: 907/277-7686, or approved equal.

2. Door shall provide perimeter sealing by use of perimeter gasket and cam action of door to limit air leakage to a maximum of 0.8 cfm per foot of door jamb at wind velocity of 40 mph when door is closed. Door shall provide free-running clearance without friction or contact between door and jamb gasket throughout the opening and closing operation.

3. Jamb gasket shall be compressible, resilient rubber, and conform to ASTM R615BCFPZ, mounted to door casing.

4. Head and threshold gaskets shall be compressible rubber, mounted to door.

5. Track shall be Model 100, 3-inch, 11-gauge steel, cam action.

6. All above items shall be of same manufacturer.

2-2 MANUFACTURE:

A. Hardware Preparation: Section 08710. Carefully mortise, drill, and machine each door as required for finish hardware. Obtain hardware manufacturers' templates for use during machining. Before machining, verify hardware locations and hand of door. Predrill holes for screws.

B. Fitting: Fit doors to provide a uniform clearance at jambs and head of between 1/16 inch and 1/8 inch. Except at undercut doors, bottom clearance shall be 3/8 inch maximum above finish flooring.

C. Factory seal and prime door faces and all edges, ready for field finish.

PART 3: EXECUTION

3-1 INSTALLATION: Install doors plumb to provide free swinging operation with easy closing and secure latching. Remove all hardware while painting doors. All doors shall be finished all four edges and two faces. Reapply and fit hardware carefully and attach securely.

3-2 RESTORATION OF EXISTING DOORS AND TRANSOMS: Secure Contracting Officer's approval of materials and methods. Remove existing paint or other finishes to reveal condition of wood and joints. Replace damaged or deteriorated members with material matching sizes and profiles of original. Match joints to original. Repair other members as required with well fitted pieces securely dowelled, glued, or nailed. Treat weathered, dry wood with a mixture of 50 percent linseed oil and 50 percent turpentine, well brushed in, two coats minimum. Dry thoroughly between coats. Putty, sand, and seal new and original wood, ready for painting. Replace broken lights with glass of same thickness and color as existing, oriented with distortion waves in same direction as existing. Remove, clean, repair (or replace

if required), and reinstall transom hardware to make transoms operable.

3-3 GARAGE DOOR:

A. Install overhead garage door according to manufacturer's instructions, complete with track and perimeter sealing.

B. After door is installed, attach siding matching garage south wall siding to exterior full width face of door. Carefully align door siding joints with wall siding joints when door is in closed position. Attach siding to door with continuous beads of silicone sealant located on back side of siding near the top and bottom edge of each piece of siding. In addition, nail siding to door with two 6d finish nails at each bearing point; tongue and groove siding, blind nail; shiplap siding, one blind nail, one face nail. See Section 06200 for additional siding attachment requirements (use no building paper). At horizontal joints between door panels, carefully bevel cut siding so that door will function properly and siding will have weathertight surface when door is closed.

C. When door and siding installation is complete, door must operate smoothly. When door is closed, door siding must have same alignment and appearance as wall siding; garage door existence must not be apparent except for door trim.

END

PART 1: GENERAL

1-1 DESCRIPTION: The work of this section consists of furnishing and installing double hung, awning, and casement window units, and restoring existing windows.

1-2 QUALITY ASSURANCE: Windows shall be constructed in accordance with ANSI/NWMA 1.S.2 and shall be preservative treated, weatherstripped, and factory glazed.

1-3 SUBMITTALS: In accordance with Section 01300, submit shop drawings showing window types, sizes, and locations.

1-4 MANUFACTURER: Liberated Window Company, 2024 Broadway East, Seattle, Washington 98102 or approved equal.

1-5 PRODUCT HANDLING: Deliver windows in labeled, protective packaging. Store in a heated and ventilated area for a minimum of 30 days before installation to acclimatize the material to the operating temperature and humidity of the building. Stack well supported to prevent warpage and with spacers for maximum air circulation.

PART 2: MATERIALS

2-1 WINDOW UNITS: Ponderosa Pine, No. 1 sash cuttings, or other approved species, kiln-dried to moisture content of 6 to 12 percent at time of fabrication.

2-2 HARDWARE: Hinges, latches, and operating devices, including screws, shall be made of noncorroding material, or steel protected by a corrosion-resistant finish.

2-3 SCREEN PANELS: Wood frames with steel or copper screen cloth, flat black finish, 18x16 mesh, with attaching hardware.

2-4 FABRICATION: Fabricate new window units with double strength glass.

A. Provide operable windows with screen panels as approved by Contracting Officer.

B. Provide all windows, except store front windows, with single pane storm panels. Provide insulated panel or blanket system for store front windows for winter shutdown of building. System shall be mounted at inside of windows and secured in a manner to prevent damage to sash or frames. Secure approval of design.

C. New window units shall be factory primed. Restored window units shall be field primed.

PART 3: EXECUTION

3-1 INSTALLATION: Install units in accordance with manufacturer's recommendations. Lubricate hardware and movable parts and adjust to proper tension.

3-2 RESTORATION OF EXISTING SASH: Secure Contracting Officer's approval of materials and methods. Remove existing paint or other finishes to reveal condition of wood and joints. Replace damaged or deteriorated members with material matching sizes and profiles of original. Match joints to original. Repair other members as required with well fitted pieces securely dowelled, glued, or nailed. Treat weathered, dry wood with a mixture of 50 percent linseed oil and 50 percent turpentine, well brushed in, two coats minimum. Dry thoroughly between coats. Putty, sand, and seal new and original wood, ready for painting. Replace broken lights with glass of same thickness and color as existing, oriented with distortion waves in same direction as existing.

3-3 INSPECTION AND CLEANING:

A. Clean wood surfaces without using abrasive cleaners or solutions containing corrosive solvents.

B. Replace scratched, chipped or defective units. After inspection, remove labels and clean surfaces.

C. Glass shall be washed on both sides before final inspection and again on label side after label is removed.

D. Glass labels shall be removed only after final inspection and approval.

END

PART 1: GENERAL

1-1 DESCRIPTION: The work of this section consists of furnishing and installing finish hardware.

1-2 SUBMITTALS: In accordance with Section 01300. Hardware submittal must be organized by door and window number and shall not be organized by quantity of like items.

A. Hardware Schedule: Show item number, manufacturer, symbols and finish, kind, size, and hand of door, frame dimensions, and mounting heights for all items.

B. Templates: To avoid delays in fabrication of work, furnish for approved hardware.

1-3 PRODUCT HANDLING: Deliver hardware packaged and marked for specific openings in accordance with approved schedule. Include with the package all screws, special wrenches, instructions, and installation templates for accurately locating, setting, adjusting, and attaching.

1-4 CLOSEOUT SUBMITTALS: In accordance with Section 01700.

A. Maintenance Data and Operating Instructions: After hardware has been installed, furnish adjusting tools and maintenance instructions.

B. Keys: After stamping for identification, deliver to Park Superintendent. Furnish two keys for each lock. The use of final keys will not be permitted during construction.

PART 2: MATERIALS

2-1 HARDWARE: See Schedule. Provide all accessories required for proper functioning. No substitutions will be permitted without prior approval. Sizes, locations, dimensions, types, and other pertinent information, as shown.

2-2 HINGES: As indicated for each door in hardware schedule.

2-3 FASTENINGS: For wood, wood screws. For exposed surfaces match finish of adjacent metal parts of hardware.

2-4 STRIKES: On frame, box type strike plates.

2-5 KEY SYSTEM: Provide same type in use at park as approved.

2-6 HARDWARE MANUFACTURERS:

A. Door Hardware:

1. Modern Hinges and Pulls:

a. Stanley Hardware, 195 Lake Street, New Britain, Connecticut 06050. (Ball tip, Contractor's option.)

b. H. Soss and Company, 5716 W. 96th Street, Los Angeles, California 90045.

c. (Alternate Manufacturer.) Hager Hinge Company, 139 Victor Street, St. Louis, Missouri 63104.

2. Reproduction Hinges:

a. Ball and Ball, 463 West Lincoln Highway, Exton, Pennsylvania 19341.

b. (Alternate manufacturer.) Cirecast, Inc., 380 7th Street, San Francisco, California 94103.

3. Locksets, Latchsets, Dead Bolts, and Cylinders: Best Lock Corporation, P. O. Box 103, Indianapolis, Indiana 46206.

4. Door Stops: Builders Brass Works Corporation, 3447 Union Pacific Avenue, Los Angeles, California 90023 (No. F-8063 or No. F-8065).

5. Weatherstripping and Door Shoes: Pemko, Ralph M. Dulin and Son, Inc., P. O. Box 520, Bothwell, Washington 98011.

B. Window Hardware:

1. Hinges: H. Soss and Company, 5716 W. 96th Street, Los Angeles, California 90045.

2. Sash Fasteners, Hangers, Lifts, and Adjusters:

a. McMaster-Carr, P. O. Box 54960, Los Angeles, California 90054.

b. Hager Hinge Company, 139 Victor Street, St. Louis, Missouri 63104.

3. Weatherstripping: Pemko, Ralph M. Dulin and Son, Inc., P. O. Box 520, Bothwell, Washington 98011.

C. Access Panel Hardware:

1. Hinges:

a. McMaster-Carr, P. O. Box 54960, Los Angeles, California 90054.

b. Stanley Hardware, 195 Lake Street, New Britain, Connecticut 06050.

2. Pulls and Latches: McMaster-Carr, P. O. Box 54960, Los Angeles, California 90054.

2-7 DOOR HARDWARE SCHEDULE:

A. Door 101, from exterior to Room 101, multi-use. Door 109 from exterior to Room 106, multi-use. Door 124, from exterior to Room 119, multi-use, except no spring bolts or astragal.

1. Hinges: If existing are historic (Victorian) style, remove, clean, reinstall. If existing are modern style, remove and replace with 1-1/2 pair (each leaf), 4-1/2-inch by 4-1/2 inch, V51, US10, Ball and Ball.

2. Latchset: Restore existing.

3. Lock: Remove and salvage existing. Install new mortise lockset 29H6K1C, US10, Best.

4. Spring Bolts: Door 101, repair or replace upper spring bolt strike; install new lower spring bolt and strike to match upper existing bolt, Ball and Ball or Cirecast. Door 109, replace missing upper and lower spring bolts, Ball and Ball or Cirecast.

5. Astragal: Remove existing, replace with new wood astragal to match existing profile, sized to close opening.

6. Door Stops: Builders.

7. Weatherstrip: Head and jambs, S88 Siliconseal, dark bronze; sill, 313AN with cold weather vinyl; rain shield, 345B, Pemko.

8. Threshold: Remove existing, replace with new 4-inch wide Oak threshold.

B. Door 102, from Room 101, multi-use, to Room 102, storage. Door 103, from Room 101, multi-use, to Room 103, stair. Door 105, from Room 101, multi-use, to Room 105, corridor. Door 108, from Rocm 105, corridor, to Room 106, multi-use. Door 115, from Room 110, multi-use, to Room 111, storage. Door 116, from Room 111, storage, to Room 112, closet. Door 117, from Room 111, storage, to Room 114, bathroom. Door 120, from Room 101, multi-use, to Room 116, corridor. Door 121, from Room 116, corridor, to Room 117, men's restroom. Door 122, from Room 116, corridor, to Room 118, women's restroom. Door 123, from Room 110, multi-use, to Room 119, multi-use. Door 201 through Door 213, all of second floor, except Doors 204, 207, 209, 210, and 211.

1. Hinges: Remove, clean and reinstall, or replace with new, 1-1/2 pair, 4-inch by 4-inch, US10, FBB191, Stanley.

2. Latchsets and Locksets: Remove, clean, and reinstall, or replace with new mortise lockset 22HOL, CD, US10, Best.

3. Door Stops: Builders.

C. Door 104, from exterior to Room 103, stair. Door 112, from exterior, to Room 109, stair. Door 114, from exterior, to Room 110, multi-use.

1. Hinges: Reproduction, 1-1/2 pair, 4-1/2-inch by 4-1/2-inch, V51, US10, Ball and Ball.

2. Locksets: New, mortise lockset, 22H6F, CD, US10, Best.

3. Door Stops: Builders.

4. Weatherstrip: Head and jambs, S88 Siliconseal, dark bronze; sill, 313AN with cold weather vinyl; rain shield, 345B, Pemko.

5. Threshold: Remove existing, replace with new 4-inch wide Oak threshold.

D. Door 106, from exterior to Room 105, corridor. Door 118, from exterior to Room 113, mechanical. Door 125, from exterior to Room 119, multi-use.

1. Hinges: New, 1-1/2 pair, 4-1/2-inch by 4-1/2-inch, US10, FBB191, Stanley. Use nonremovable pin for Door 106.

2. Lockset: New, mortise lockset, 22H6F, CD, US10, Best.

3. Door Stops: Builders.

4. Weatherstrip: Head and jambs, S88 Siliconseal, dark bronze; sill, 313AN with cold weather vinyl; rain shield, 345B, Pemko.

5. Threshold: Remove existing, replace with new 4-inch wide Oak threshold.

E. Door 107, from Room 105, corridor, to Room 107, vehicle storage. Same treatment as Door 106, except no rain shield.

F. Door 110, from exterior to Room 107, vehicle storage. All required hardware as indicated on drawings and as recommended by overhead door manufacturer.

G. Door 111, from Room 101, multi-use, to Room 109, stair. Door 113, from Room 109, stair, to Room 110, multi-use.

1. Hinges: If existing are historic (Victorian) style, remove, clean, reinstall. If existing are modern style, remove and replace with 1-1/2 pair, 4-1/2-inch by 4-1/2-inch, V51, US10, Ball and Ball.

2. Latchsets: Restore existing.

3. Locksets: Remove and salvage existing. Install new mortise lockset, 22H6T, US10, Best.

4. Door Stops: Builders.

H. Door 119, from Room 116, corridor, to Room 115, storage. Door 210, from Room 214 to Room 109, stair.

1. Hinges: New, 1-1/2 pair, 4-1/2-inch by 4-1/2-inch, US10, heavy weight, FBB191, Stanley.

2. Lockset: New, mortise lockset, 22H6E, CD, US10, Best.

3. Door Stops: Builders.

I. Door 204, from Room 211 to Room 206.

1. Hinges: Remove, clean and reinstall, or replace with new 1-1/2 pair, 4-inch by 4-inch, US10, standard weight, FBB191, Stanley.

2. Latchset: Remove, clean, and reinstall, or replace with new mortise latchset, 22HON, CD, US10, Best.

3. Surface Bolts: New, top and bottom, solid brass, 6-inch long with 1-inch throw, 1438A3, McMaster-Carr.

4. Door Stops: Builders.

J. Door 207, from Room 208-B, hall, to Room 209, closet. Door 209, from Room 211 to Room 214. Door 211, from Room 214 to Room 213-A.

1. Hinges: Remove, clean and reinstall, or replace with new 1-1/2 pair, 4-inch by 4-inch, US10, standard weight, FBB191, Stanley.

2. Latchsets: Remove, clean, and reinstall, or replace with new mortise latchset, 22HON, CD, US10, Best.

3. Door Stops: Builders.

2-8 WINDOW HARDWARE SCHEDULE:

A. Windows 101, 102, 103, 116, 117, 118, 119, and 120: Fixed sash, no hardware required.

B. Windows 105, 107, 108, and 115: Removed; no hardware required.

C. Windows 104 and 121: Sliding showcase; no hardware required.

D. Windows 106, 109, 110, 111, 112, 206, 207, and 208: Awning type. Windows 113 and 114, casement type, same as below, except only one adjuster required per sash.

1. Hinges: 1 pair, butts, full mortise, 3-inch by 3-inch, brass or bronze, 5055.

2. Latch: One per sash, cast brass, 1073AS, McMaster-Carr.

3. Adjuster: Two per sash, bronze finish, 1058D11, McMaster-Carr.

4. Weatherstrip: S88 Siliconseal, dark bronze, Pemko.

E. Windows 201, 202, 203, 204, 205, 209, 210, 211, 212, 213, 214, 215, 216, and 217: Double-hung type.

1. Latch: One per sash, cast brass, 1069A4, McMaster-Carr.

2. Sash Lifts: Steel, brass plated, 1-1/8-inch wide by 1-1/4-inch high, 1486, Hager.

3. Spring Bolts: Wrought steel, zinc plated, 3-1/4 inches long, 1075A2, McMaster-Carr.

4. Weatherstrip: Spring bronze, 7/8-inch by full window opening dimension, 74B, Pemko.

2-9 STORM WINDOW HARDWARE SCHEDULE:

A. Windows 101, 102, 103, 116, 117, 118, 119, and 120: Fixed sash.

B. Windows 105, 107, 108, and 115: Removed; no hardware required.

C. Windows 104 and 121: Sliding showcase; no hardware required.

D. Windows (All Remaining) 106, 109, 110, 111, 112, 113, 114, 201, 202, 203, 204, 205, 206, 207, 208, 209, 210, 211, 212, 213, 214, 215, 216, 217: Awning, casement, double-hung type.

1. Spring Bolts: Wrought steel, zinc plated, 3-1/4 inches long, 1075A2, McMaster-Carr. Quantity per window type: awning and casement, two; double-hung, four.

2. Weatherstrip: S88 Siliconseal, dark bronze, Pemko.

2-10 ACCESS PANEL HARDWARE:

A. Crawl Space Access Panel:

1. Hinges: Two required, plain bearing, standard weight, brass, 4-inch by 4-inch, F191, Stanley.

2. Pull: Two required, flush ring, cast brass, 1-1/2-inch by 1-7/8-inch, polished finish, 1649A4, McMaster-Carr.

B. Access panels from Room 102 to beneath stair 103, and from vehicle storage attic to attic above Room 106, multi-use.

1. Hinges: Recessed cabinet hinge, satin chrome finish, 1 pair, 2-1/8-inch by 1-1/2-inch, 1801A12, McMaster-Carr.

2. Pull: Hardwood, 1-1/4-inch diameter knob, one required, 1652A13, McMaster-Carr.

3. Latch: Magnetic, one required, 1672A11, McMaster-Carr.

PART 3: EXECUTION

3-1 INSTALLATION: As shown or as recommended by hardware manufacturer. Fit accurately, apply securely, and adjust carefully all items of finish hardware. Exercise care to avoid marring or injuring adjacent work or hardware. Set thresholds in oil base caulking compound. Use proper boring jigs, strike gauges, routers, and templates. Install all locksets using a system of jigs and dado equipment capable of accurately cutting openings. Defaced screw heads, marred, or imperfect hardware will not be acceptable. Properly tag all keys received for locks and deliver to the Contracting Officer upon completion of work. Install items uniformly with like items in same position and location. Install weatherstripping in accordance with manufacturer's recommendations. No weatherstripping shall be exposed when units are in closed position.

3-2 CLEANING EXISTING HARDWARE: Soak hardware in approved cleaning solution to remove paint, dirt, and grease. Do not scrape finish surfaces.

3-3 Replace missing iron bars, exterior and interior, on Door No. 109, with new iron bars of shape, style, and dimension to match existing.

END

PART 1: GENERAL

1-1 DESCRIPTION: The work of this section consists of furnishing and installing glass.

1-2 RELATED WORK: Wood windows - Section 08610; toilet and bath accessories - Section 10800.

1-3 QUALITY ASSURANCE:

A. Each pane of glass shall be factory labeled as to quality, type, thickness, and manufacturer.

B. Contractor shall have a copy of the Glazing Manual, 1980 edition, published by the Flat Glass Marketing Association (FGMA), Topeka, Kansas, available for reference on the jobsite.

1-4 SUBMITTALS: In accordance with Section 01300.

A. Samples: Identify each sample as to brand and type.

1. 12-inch by 12-inch samples of each glass product except clear single pane units.

2. Each type and color of glazing sealant.

B. Manufacturer's installation instructions.

1-5 PROJECT CONDITIONS: Determine exact size of glass by field measurements. Sizes shown are approximate and shall be used for estimate only.

PART 2: MATERIALS

2-1 ANNEALED GLASS: FS DD-G-451D, thickness as shown, or to match existing, clear, Type I float, Class 1.

2-2 SEALANTS:

A. Putty: FS TT-P-00791B(2).

B. Primers for Putty: Follow putty manufacturer's recommendations.

2-3 ACCESSORIES: Follow FGMA recommendations for width and thickness of blocks and spacers.

A. Setting Blocks: ANSI/ASTM C864-79, hardness 80 to 90 Shore A durometer. Length per block, 0.1 inch per square foot glass area, minimum 4 inches.

B. Edge Blocks: ANSI/ASTM C864-79, hardness 60 to 70 Shore A durometer, length 4 inches minimum.

C. Spacers (Lateral Shims): ANSI/ASTM C864-79, hardness 40 to 60 Shore A durometer, continuous extrusions full width and height of openings. Size spacers to provide 1/8-inch bite on glass.

D. Glazing Points: Standard galvanized.

PART 3: EXECUTION

3-1 COMPLIANCE REQUIREMENTS: Comply with manufacturer's instructions. For details of work not covered, comply either with the FGMA Glazing Manual or with Recommended Practices for Vertical Field Glazing of Organically Sealed Insulating Units, Document A-3000-82(76), published by SIGMA, Chicago, Illinois, as appropriate.

3-2 PREPARATION FOR GLAZING:

A. General:

1. Before glazing, check openings to assure they are square, plumb, and in true plane.

2. Protect glass from edge damage. Discard units with significant edge damage or other imperfections.

B. Wood Sash: Verify that sash have been prime painted, including rabetts. Prime and back prime wood glazing stops.

3-3 GLAZING:

A. General:

1. Install setting blocks in channel or sill rabbet, one-fourth of glass width from each corner. Set blocks in thin layer of putty.

2. If desired by Contractor, provide spacers inside and out wherever glass sizes exceed 50 united inches.

3. Install edge blocking as described in glazing manual.

B. Wood Sash: Install setting blocks. Back-putty rabbet, set glass with glazing points, and face-putty.

3-4 CURING, PROTECTING, AND CLEANING:

A. Protect glass from breakage immediately upon installation, by use of crossed streamers attached to framing and held away from glass. Do not apply markers to surfaces of glass.

B. Protect putty from abrasion until cured.

C. Wash and polish all glass inside and out.

END

PART 1: GENERAL

1-1 DESCRIPTION: The work of this section consists of installing gypsum wallboard.

1-2 SUBMITTALS: In accordance with Section 01300, submit certification from manufacturer attesting that all gypsum drywall material used is abestos free.

1-3 METHOD OF ATTACHMENT: Contractor shall have the option of using either one of two alternative methods of securing gypsum board to wood framing. The methods shall be similiar and equal to those described in U.S. Gypsum Company's Drywall Construction Handbook and shall be either nail-on method or screw attachment method.

1-4 PROJECT CONDITIONS:

A. Minimum temperature in space shall be 55 degrees F. Preferable minimum is 70 degrees F. Provide ventilation and heat as required to remove excess moisture.

B. Surfaces to which gypsum board is to be applied shall be straight, even, smooth, all in the same plane, thoroughly clean and dry, and free from all defects that might affect proper application. Shim face of framing as required to create flat plane suitable for gypsum board application. Report unsatisfactory surfaces to the Contracting Officer before correcting defective surfaces.

1-5 QUALITY ASSURANCE:

A. A copy of Gypsum Association's Recommended Specifications GA-216 shall be available for reference on the job site.

B. All material used under this section shall be asbestos free.

C. The products named in this section are made by the U.S. Gypsum Company (USG). Equivalent products of other manufacturers may be sustituted if approved as equal by the Contracting Officer.

D. For all conditions not covered by this section follow the recommendations in U.S. Gypsum Company's technical literature.

1-6 PRODUCT HANDLING: Stockpile gypsum board flat on raised supports in piles taking care not to exceed load limits of floor. Leave in original wrappings or containers until ready for actual use. Protect gypsum board from wetting.

PART 2: MATERIALS

2-1 GYPSUM WALLBOARD: Use 5/8-inch-thick material. Exposed finish material shall have long edges tapered and the taper shall culminate in a rounded profile characteristic of USG Smooth Wall system.

A. Fire Rated Board: ANSI/ASTM C36, Type X.

B. Water Resistant Board: ANSI/ASTM C630.

2-2 FASTENERS:

A. Nails: Parkerhead, as manufactured by CF&I Steel Corporation, Pueblo, Colorado, or approved equal. Use nails of sufficient length to penetrate framing, 1-inch minimum.

B. Screws: USG Hi-Lo, bugle head, Type W for attaching to wood. Size as recommended by USG.

2-3 JOINT TREATMENT MATERIALS:

A. Tape: USG Perf-a-Tape Reinforcement.

B. Joint Compound: USG Durabond 90.

C. Tape Bedding Compound: USG Durabond Joint Compound-Taping.

D. Topping Compound: USG Crater Free Ready-to-Use Joint Compound-All Purpose.

2-4 METAL ACCESSORIES: USG Dura-Bead for all exterior corners and USG No. 200 and No. 701 Series for metal trim. Accessories shall be hot dipped galvanized steel.

2-5 SEALANTS: Use W/R Sealant.

2-6 SHIMS: 1/16-inch thick cardboard shim strip.

PART 3: EXECUTION

3-1 INSTALLATION: Check face of wall and ceiling framing for eveness of plane with 8-foot minimum long straightedge. Fill low areas of framing with cardboard shim strips, stapled, until face of framing is smooth, even plane. Apply gypsum boards to ceilings first, then to walls.

A. Install in maximum practical lengths to span ceilings and walls without end joints. Apply horizontally for walls less than 8 feet 2 inches high, vertically for walls greater than 8 feet 2 inches high. Attach upper gypsum board first on horizontal applications. Butt joints loosely together.

B. If butt joints occur, stagger joints and locate as far as possible from center of ceilings or walls. Maximum allowable gap at butt joints shall be 1/4 inch.

C. No vertical joints shall occur within 8 inches of external corners of windows, doors, or other such openings.

3-2 WATER RESISTANT WALLBOARD INSTALLATION: Install in locations indicated in finish schedule. Pre-cut panels to required size and make necessary cut-outs. Apply sealant to all cut or exposed panel edges before installation. Apply sealant over all fastener heads. Apply joint treatment only to joints and fasteners not to be tiled.

3-3 GENERAL REQUIREMENTS FOR FASTENER APPLICATION:

A. Install fasteners no closer than 3/8 inch to end or edge. Space fasteners opposite each other on adjacent ends or edges. Begin fastening from center of gypsum board and proceed toward outer ends or edges. Apply pressure on gypsum board adjacent to fasteners being driven to insure that gypsum board will be secured tightly to framing member. Check for looseness at fasteners. Drive fastener with shank perpendicular to face of board.

B. Drive nails with crown-head hammer. Being careful not to break paper, seat nail so that head is in slight, uniform dimple formed by last blow of hammer.

C. Drive screws with a positive clutch electric power tool. Surface of head shall be below surface of paper without cutting paper.

3-4 DETAIL FASTENER REQUIREMENTS:

A. Method Using Screws But No Adhesive: Follow Gypsum Association's recommendations for fastener spacing.

3-5 METAL ACCESSORIES: Install in maximum practicable lengths.

A. Corner Bead: Reinforce all vertical and horizontal exterior corners.

B. Metal Trim: Apply over gypsum panels where partitions or ceilings terminate against dissimilar materials.

3-6 PRE-FILL APPLICATION: Pre-fill the "V" groove between Smooth Wall gypsum board with joint compound. Apply compound directly over "V" groove. Allow compound to harden.

3-7 JCINT TREATMENT:

A. Embedding Tape: Center tape reinforcement and press it down into fresh tape bedding compound. Immediately after embedding apply a skim coat of compound.

B. Spotting Fastener Heads: Apply coat of tape bedding compound or joint compound over all fastener heads.

C. Second Coat Application: After embedding and covering coat has hardened, apply second coat, using topping compound, feathered approximately 2 inches beyond edges of first coat. Spot fastener heads with similar coat. Allow to dry.

D. Third Coat Application: After second coat is dry, sand lightly. Apply a thin finishing coat of topping compound to joints and fastener heads. Feather joint edges at least 2 inches beyond second coat. Sand lightly when dry.

E. Apply joint treatment to butt and end joints, feathering approximately 18 inches.

F. Finishing Inside Corners: Fold tape along center crease. Butter both sides of corner with joint compound and apply tape. Apply second and third coats.

3-8 FINISHING BEADS AND TRIMS:

A. Apply joint compound to all bead and trim and properly feather out from high point to plane of surface. Allow to harden.

B. Apply second coat in same manner as first coat, extending topping compound slightly beyond onto face of panel.

C. Apply finish coat to all bead and trim, extending topping compound slightly beyond the second coat and properly feathering from high point to plane of surface. Sand finish coat as necessary when dry to provide a flat, smooth surface ready for decoration.

3-9 PATCHING: Correct all surface damage and defects, leaving work smcoth, uniform, without observable blemishes which will show through the surface finish, and ready for painting or wall covering.

END

PART 1: GENERAL

1-1 DESCRIPTION: The work of this section consists of furnishing, installing, and finishing wood strip flooring.

1-2 SUBMITTALS: In accordance with Section 01300.

A. Samples: Two 36-inch strips of wood flooring.

B. Manufacturer's Literature: Material description and installation instructions and recommendations.

1-3 PRODUCT HANDLING: Store in manufacturer's packaging with grade marks, seals, and labels intact and legible. Store where flooring will be installed, a minimum of 72 hours before installing. Protect flooring from dampness and damage.

1-4 PROJECT CONDITIONS:

A. Determine that subfloor surfaces are in suitable condition, including floor joists, nailing, and membrane covering. Correct defective surfaces or notify Contracting Officer.

B. Do not begin work until subfloor construction and framing of openings are complete.

C. Maintain ambient temperatures between 50 degrees F and 70 degrees F for 72 hours prior to installation and minimum of 48 hours after completion of work.

D. Maintain minimum temperature of 50 degrees F within installation area until final acceptance of building.

PART 2: MATERIALS

2-1 FLOORING:

A. For repairing existing wood strip flooring, match species, thickness, and width of new flooring to existing.

B. When installing new flooring to match flooring existing in another room, match as indicated in Paragraph A above.

C. If flooring is to be completely replaced as indicated in worst case situation, Section 06200, use unfinished, plain-sawn, White or Red Oak, No. 1 Common Grade, 25/32 inch thick by 2-1/4 inches wide.

2-2 UNDERLAYMENT: Felt, ANSI/ASTM D226, Type I, asphalt saturated, organic, unperforated, 15-pound, or rosin paper, unsaturated, weighing approximately 6 pounds per 100 square feet.

2-3 NAILS: 7d or 8d, cut steel flooring, screw type, and finish.

2-4 SEALER: FS TT-S-176, Class 2, penetrating.

2-5 VARNISH: Clear, as approved, Section 09901.

2-6 WAX: FS P-W-158, Type I, solvent type, containing no water. Self-polishing type is not acceptable.

PART 3: EXECUTION

3-1 PREPARATION: Sweep subfloor removing all foreign matter.

3-2 INSTALLATION:

A. Underlayment: Lap seams 4 inches. Tack lightly to hold in place.

B. New Flooring: Lay out strips prior to starting work, minimizing clustering. Lay same direction as existing. Leave expansion spaces, minimum 3/4-inch, at edges of room. Force flooring into position using driving blocks of scrap flooring. Nail as recommended. When feasible, stagger end joints where new flooring meets existing flooring to remain. Secure approval of layout.

C. Existing Flooring to Remain: Remove exposed nails and other nonfunctional fasteners. Re-secure loose boards with finish nails, blind nailed where possible. Countersink all face nails, fill with wood filler.

3-3 SANDING: Sand to smooth finish using minimum of three grades of sandpaper. For final sanding, use disk sander. Blend junctions of old and new flooring to same level with gradual transitions of one foot of run for every 1/16 inch of vertical difference. Do not over-sand existing flooring--it will not be necessary to remove all imperfections. Sanding of existing and new flooring, including transitions and repairs, shall be as directed and approved by Contracting Officer.

3-4 SEALING: After sanding, thoroughly clean all surfaces in the room. Floor shall be completely free of fine dust. Apply first coat of sealer following manufacturer's directions. When first coat is dry, apply second sealer coat.

3-5 WAXING: After varnishing, apply two coats of wax. Buff each coat. After final buffing, protect floor until final inspection. If necessary, rewax and buff immediately before final inspection.

END

PART 1: GENERAL

1-1 DESCRIPTION: The work of this section consists of furnishing and installing resilient flooring.

1-2 SUBMITTALS: In accordance with Section 01300. Submit samples of floor covering material in quantity sufficient to show pattern and color range, and a 4-foot length of base material.

1-3 PRODUCT HANDLING:

A. Delivery: Deliver in manufacturer's original, unopened protective packaging with labels intact and legible showing brand name, colors, and patterns.

B. Storage: In accordance with manufacturer's recommendations.

1-4 PROJECT CONDITIONS: Maintain a minimum temperature of 70 degrees F in space to receive flooring for 24 hours before and 48 hours after installation. Relative humidity shall be within limits recommended by flooring manufacturer.

1-5 CLOSEOUT SUBMITTALS: In accordance with Section 01700.

A. Maintenance Manuals: Submit two copies of manufacturer's recommendations for maintenance of flooring and accessories.

B. Maintenance Materials: Furnish in unopened cartons one box of each type and color of tile of same run as installed for future replacements.

PART 2: MATERIALS

2-1 TILE FLOORING: FS SS-T-312, vinyl asbestos, Type IV, 12 inches by 12 inches by 1/8-inch.

2-2 SHEET FLOORING:

A. FS L-F-475, vinyl sheet, Type II, Grade A, 72-inch wide rolls. Thickness, minimum 0.085 inch.

B. Synthetic rubber by Nora Flooring, 4201 Wilson Avenue, Madison, Indiana 47250, Telephone: 812/273-1852, or approved equal.

2-3 COLORS AND PATTERNS: Shall be selected from manufacturer's standards.

2-4 ACCESSORIES:

A. Resilient Base: FS SS-W-40, rubber or vinyl plastic, Type II, with matching end stops and preformed or molded corner units, top set cove, 4 inches high. Thickness, minimum 0.125 inch.

B. Adhesives: Waterproof, stabilized type, as recommended by flooring manufacturer.

C. Underlayment: Latex or 15-pound asphalt saturated felt, as recommended by flooring manufacturer.

PART 3: EXECUTION

3-1 PREPARATION:

A. Determine that surfaces to which flooring is to be applied are even, smooth, sound, thoroughly clean and dry, and free from defects that might affect proper installation. Report unsatisfactory surfaces to Contracting Officer. Commencing installation shall signify acceptance and responsibility for prior work by others.

B. Before installation of flooring, broom clean or vacuum surfaces to be covered.

C. Provide felt underlayment for all wood subfloors. Install felt over entire area, tightly butting all seams. Cement felt without voids or air pockets.

D. Install flooring after finishing operations, including painting, have been completed and heating system is operating.

3-2 GENERAL

A. Place flooring with adhesive cement complying with manufacturer's recommendations. Butt tightly to vertical surfaces, thresholds, nosings, and edgings. Scribe flooring around obstructions to produce neat joints; lay with joints tight, even, and straight. Extend flooring into toe spaces, door reveals, closets, and similar openings.

B. Tightly cement flooring to subbase without open cracks, voids, raising and puckering at joints, or other surface imperfections.

3-3 TILE FLOORING: Lay tile from center marks established with principal walls, adjusting as necessary to avoid cut widths less than 3 inches at perimeters, assuring equal widths at opposite edges of room. Lay tile square to room axis. Match color and pattern of tiles, using tile from cartons in same sequence as manufactured and packaged, with an alternating grain. Cut tile neatly to and around all fixtures. Broken, cracked, chipped, or deformed tile are not acceptable.

3-4 SHEET FLOORING: Lay flooring with as few seams as possible, matching edges for color shading and pattern. Weld seams to provide smooth installation.

3-5 ACCESSORIES: Apply resilient base to walls, columns, pilasters, casework, and other permanent fixtures as required. Install base in as long lengths as practicable, with mitered or coped intersections. Tightly bond to backing with continuous contact at all surfaces. On irregular surfaces, fill voids along top edge of resilient wall base with manufacturer's recommended adhesive filler material.

3-6 CLEANING: Remove excessive adhesive using neutral type cleaners as recommended by flooring manufacturer. Protect installed flooring by covering.

3-7 FINISHING: Before final inspection, clean floors and accessories. Wax and buff, following manufacturer's instructions.

END

PART 1: GENERAL

1-1 DESCRIPTION: The work of this section consists of furnishing and installing carpet and pad.

1-2 SUBMITTALS: In accordance with Section 01300, submit samples of carpeting with full range of colors.

1-3 CLOSEOUT SUBMITTALS: In accordance with Section 01700.

A. Maintenance Data: Furnish two copies of manufacturer's maintenance manual.

B. Maintenance Materials: Furnish all usable remnants for future replacements.

PART 2: MATERIALS

2-1 CARPET: Carpet shall be of new materials, free from blemishes, streaks, poorly dyed areas, and other physical manufacturing defects. In addition to meeting the requirements of FS DDD-C-95, carpet shall also meet the following requirements:

A. Pitch or Gauge: 216 (double heddle).

B. Wires Per Inch: 8.

C. Pile Height: 0.225.

D. Face Yarn: 4-ply Antron II plus Antron III added for static protection.

E. Face Weight Per Square Yard: 34.7 ounces.

F. Backing Material: Montrel.

G. Finished Weight Per Square Yard: 61.3 ounces.

2-2 PADDING: FS ZZ-C-00811, Type I.

2-3 ANCHORS: 1-1/8-inch-wide plywood strips same thickness as carpet cushion, having two staggered rows of 16-gauge steel tacks at 60-degree angles.

PART 3: EXECUTION

3-1 PREPARATION: Determine surfaces on which carpet is to be laid are clean, thoroughly dry, and free from defects that might affect proper installation. Notify Contracting Officer of defects. Commencing installation shall signify acceptance of surfaces and responsibility for all prior work by others.

3-2 INSTALLATION:

A. Padding: Lay smooth and even, joints butted. Use continuous lengths in widths as broad as possible. Secure in place as recommended by pad manufacturer.

B. Carpet: Install in accordance with manufacturer's printed recommendations, using continuous lengths in widths as broad as possible to minimize placement of seams in traffic lanes. Match carpet pattern at seams. No seams shall occur perpendicular to doors or entries. Center parallel seams directly under doors. Lay carpet with pile inclination in same direction. Fit neatly into breaks and recesses, against bases, around pipes and penetrations, under saddles and thresholds, and around permanent equipment. Where edges are exposed, cut to form invisible, nonraveling joints.

C. Anchors: Install where carpeting abuts vertical surfaces.

3-3 CLEANING: Remove spots and stains from carpet with solvent or cleaning solution recommended by carpet manufacturer and vacuum.

3-4 PROTECTION: Cover carpeted areas until final acceptance.

END

PART 1: GENERAL

1-1 DESCRIPTION: The work of this section consists of painting and finishing work, including touch-up of factory or shop applied prime coats prior to applying additional coats, priming of exterior millwork, and back priming of millwork. It includes painting of mechanical and electrical work, and application of piping identification symbols and colors.

1-2 SUBMITTALS: In accordance with Section 01300.

A. Submit complete list of materials proposed to be provided for the work.

B. Prepare at the job site 12-inch by 12-inch samples of paint and stain colors proposed for use. Samples shall have paint or stain applied on same type surface material as will be used in the work.

1-3 PRODUCT HANDLING: Deliver sealed containers with labels legible and intact. Store where directed and protect materials from damage.

1-4 PROJECT CONDITIONS:

A. Do not apply finish material when temperature is below 50 degrees F. Do not apply exterior oil based materials in damp, rainy weather. Do not apply paint on surfaces in direct sunlight. Do not apply finishes in spaces where dust is being generated that would speck the finish.

B. Take necessary precautions to keep fire hazard to a minimum; remove from the area daily all oily rags, waste, and other combustibles not in covered metal containers.

PART 2: MATERIALS

2-1 PAINT AND FINISH PRODUCTS: Highest quality standard brand, as distributed by a nationally known manufacturer. Paint products shall be fresh and well ground; shall not settle readily, cake, or thicken in the container; shall be broken up readily with paddle to a smooth consistency; and shall have easy application properties. Other painting materials such as linseed oil, turpentine, mineral spirits, miscellaneous thinners,

varnish and shellac shall be the highest quality of an approved manufacturer.

2-2 FILLING COMPOUNDS: Use only high quality, nonshrink materials which have been approved. Use putty for wood and joint compound for gypsum drywall.

2-3 COLORS: Match color samples submitted and approved.

2-4 MATERIALS LIST:

A. Preparation and Paint Materials:

1. Linseed oil, raw and boiled.

2. Turpentine, pure spirits.

3. Putty, pure linseed oil.

4. Filler, wood paste.

5. Sealer.

6. Shellac.

7. Paint, exterior, oil-alkyd, semi-gloss, Benjamin-Moore, or as approved.

8. Paint, interior, oil-alkyd, semi-gloss, Benjamin-Moore, or as approved.

9. Paint, interior, acrylic or vinyl base latex, Kwal, may be used when approved.

10. Paint primers, suitable for coating system used, as approved.

11. Varnish, clear.

12. Zinc dust-zinc oxide primer.

B. Building Exterior Colors (Benjamin-Moore Numbers):

1. North and West Elevations:

a. 4 (E) ST 37: Siding; door rails and stiles; first floor panel frames; second floor panels.

b. Brown E ST 1: Trim; door panels, first floor panels.

c. Black: Window sash; "The Mascot" sign background.

d. Sign Painters White: "The Mascot" sign lettering and borders.

2. East and South Elevations: Weathering stain as approved by Contracting Officer.

C. Building Interior Colors: Color scheme to be compatible with exterior of building when visible from the exterior, as approved.

D. Buried Tank Coating Materials: A two-component coal tar-epoxy resin combination coating shall be used. The coating system shall be 2-HD polyamide cured coal tar-epoxy resin over polyamide cured inhibitive primer as manufactured by Pittsburgh Paints, PPG Industries, Inc., Pittsburgh, Pennsylvania 15222, or an approved equal. The coating system consists of three coats, minimum 12 mils dry film. First coat, Aquapon Green Primer 97-49/97-98 at 2 mils minimum dry film thickness. Second and third coats, Polyamide Coal Cat Epoxy 97-640/97/641, at 6 mils minimum dry film thickness each coat.

E. Valve Pit Piping Coating: For all ferrous piping inside valve pit, including water, sprinkler piping, valves, and appurtenances, drain, and sump pump discharge, an epoxy coating shall be used. The painting system shall consist of one coat Koppers 654 Epoxy Primer at 1.5 mils minimum dry film thickness, followed by two coats Koppers 200 Epoxy at 2 mils minimum dry film thickness each coat. Color of finish coats to be Light Gray No. 306. This coating system by Koppers Company, Inc., Pittsburgh, Pennsylvania 15219, or an approved equal.

PART 3: EXECUTION

3-1 PREPARATION:

A. Cover and protect finished work of other trades and surfaces not to be painted. Use drop cloths of adequate size to protect adjacent areas.

B. Determine that surfaces to which paint and other finishes are to be applied are even, smooth, sound, clean, dry, and free from defects affecting proper application. Correct defective surfaces or notify Contracting Officer.

3-2 GENERAL REQUIREMENTS:

A. Lightly sand woodwork to receive a clear finish before applying finish. Finish access panels, grilles, registers, and similar items in the same color as their surroundings. Finish closets in the same colors as adjoining rooms.

B. Remove and protect hardware, accessories, device plates, lighting fixtures, factory finished work, and similar items or provide ample in-place protection. Upon completion of each space, carefully replace all removed items. Use only skilled mechanics for removal, replacement, and protection.

C. Remove doors to finish tops and bottoms.

3-3 SURFACE PREPARATION:

A. Wood: Sandpaper to a smooth and even surface, then dust off. Apply shellac to all knots, pitch, and resinous sapwood after scraping and burning; putty all nail holes, cracks, open joints, and other defects. Prime after all surface preparation has been completed. For stained wood, putty shall be colored to match stain. Verify that treated wood is paintable and dry. Brush or sand off preservative residue.

B. Gypsum Drywall: Fill minor irregularities with joint compound and sand to a smooth, level surface.

C. Ferrous Surfaces: Remove dirt and grease with mineral spirits. Remove rust, mill scale, and defective paint down to sound surface, using scraper, sandpaper, or wire brush as necessary. Touch up all spots and damaged shop coats with rust inhibitive primer.

D. Galvanized Sheet Metal:

1. Thoroughly clean all galvanized metal to be painted, including exposed flashing, gutters, and downspouts, with a solution consisting of four ounces of copper sulphate in one gallon of water. Permit coating to remain on surface at least 12 hours, dust off with stiff brush.

2. Apply one coat of zinc dust-zinc oxide primer to all galvanized metal surfaces.

3. Apply two coats of exterior paint.

E. Buried Tanks: Commercial blast, SSPC-SP 6-63.

F. Valve Pit Piping: Solvent cleaning: SSPC-SP 1-63.

3-4 APPLICATION: Secure approval of each coat before proceeding with the next.

A. Apply material evenly without runs, sags, or other defects. Work each coat onto the material being coated at an average rate of coverage recommended. Cover surfaces completely to provide uniform color and appearance. Leave moldings, trim, ornaments, edges, and millwork clean and true to details without excess paint in corners or depressions. Make edges of paint adjoining other materials or colors sharp and clean, and without overlaps.

B. Number of Coats: One coat minimum finish paint over existing painted wood. One prime coat and minimum of two finish coats over bare wood and gypsum board.

C. Painted Work: Back prime exterior millwork and finish material if untreated. Prior to or on same day of installation, prime wood siding, faces, edges, tongues and grooves, and exterior work. Touch up scarred and abraded places on shop or factory applied prime coats.

D. Natural Stained Finish: Adjust natural finishes as necessary to obtain a like appearance on veneers and solid stock. Finish interior stained work to a furniture smooth surface.

E. Drying Time: Minimum time, as recommended. Do not apply succeeding coats until the undercoat is thoroughly dry.

F. Sanding: Lightly sand between coats to insure that surface finish is smooth to the touch. Exterior stained siding, soffits, fascia, and rough-sawn material need not be sanded.

3-5 BURIED TANKS: Shop apply in accordance with manufacturer's instructions. Tanks are to be inspected at the site. Touch up tanks prior to backfilling to insure a holiday free surface.

3-6 CLEANUP: Remove all paint, stain, or other finish material where it has spilled or spattered.

END

SECTION 10162 METAL TOILET PARTITIONS AND URINAL SCREENS

PART 1: GENERAL

1-1 DESCRIPTION: The work of this section consists of furnishing and installing metal toilet partitions and urinal screens.

1-2 QUALITY ASSURANCE: This section is based on FS RR-P-1352A. For any part not covered, follow manufacturer's recommendations.

1-3 SUBMITTALS: In accordance with Section 01300.

A. Shop Drawings: Show dimensioned plan layout, elevations of partitions, details of fabrication, erection, anchoring, leveling, jointing, reinforcing, metal thickness, core construction, hardware, fittings and fastenings, and finishes, for approval. Show specific reinforcing for each toilet accessory specified in Section 10800 which mounts on a core panel.

B. Colors: Submit manufacturer's standard color chart for color selection. Contracting Officer will select a maximum of two colors.

C. Certificate: Furnish certificate from compartment manufacturer, stating materials, construction, and finish meet the requirements of the drawings and specifications.

1-4 PRODUCT HANDLING:

A. Delivery:

1. Deliver material in manufacturer's original unopened and undamaged packages.

2. Clearly identify manufacturer, brand name, and color on each package.

B. Storage:

1. Store in original packaging under protective cover and protect from damage.

2. Stack containers in accordance with manufacturer's recommendations.

PART 2: MATERIALS:

2-1 TYPES:

A. Toilet Compartment: FS RP-P-1352A, Type I, Style A.

B. Urinal Screen: FS PR-P-1352A, Type III, Style D.

2-2 FABRICATION AND MANUFACTURE: Finish shall be baked enamel in colors as selected by Contracting Officer.

2-3 ACCESSORIES:

A. Provide coat hooks in accordance with manufacturer's standards.

B. All Other Accessories: Section 10800.

PART 3: EXECUTION

3-1 INSTALLATION: In accordance with FS RR-P-1352A. Follow manufacturer's recommendations for any part of the installation not specifically covered under FS RR-P-1352A. Conceal evidence of drilling, cutting, and fitting.

3-2 ADJUST AND CLEAN: Adjust pilaster shoes to fit flush with finish. Clearance at vertical edges of doors shall be uniform from top to bottom and not exceed 3/16 inch. Adjust hardware for proper operation. After completion of installation, clean and polish exposed compartment and screen surfaces and touch-up minor scratches.

END

PART 1: GENERAL

1-1 DESCRIPTION: The work of this section consists of providing and installing toilet and bath accessories.

1-2 RELATED WORK SPECIFIED ELSEWHERE: Metal toilet partitions and urinal screens - Section 10162.

1-3 QUALITY ASSURANCE:

A. Model numbers shown in the accessory schedule are items manufactured by Bobrick Washroom Equipment, Inc., Northway 10 Industrial Park, Clifton Park, New York 12065, and are listed to represent design selection and a standard of quality.

B. The equivalent model numbers of the following manufacturers have been determined to meet the requirements of this specification. Products from other manufacturers will be considered, provided they are approved as equal.

1. Accessory Specialties, Inc., 1335 East Bay Avenue, New York, New York 10474.

2. Bradley Corporation, Box 321, Moorestown, New Jersey 08057.

3. The Charles Parker Co., 290 Pratt Street, Meriden, Connecticut 06450.

4. Watrous Incorporated, 106 Gateway Road, Bensenville, Illinois 60106.

C. Provide products of a single manufacturer unless specified otherwise in the accessory schedule.

1-4 SUBMITTALS: In accordance with Section 01300. Manufacturer's catalog cuts and data sheets, complete parts list, installation requirements, maintenance data, and operating instructions as applicable for each accessory item specified.

1-5 PRODUCT HANDLING:

A. Deliver items in manufacturer's original unopened protective packaging.

B. Store materials in original protective packaging to prevent soiling, physical damage, or wetting.

C. Handle so as to prevent damage to finished surfaces.

D. Protection:

1. Maintain protective covers on all units until installation is complete.

2. Remove protective covers at final clean-up of installation.

1-6 CLOSEOUT SUBMITTALS: In accordance with Section 01700. Deliver two keys for each type of lock to the Contracting Officer.

PART 2: MATERIALS

2-1 METALS AND FINISHES:

A. Stainless Steel: Type 302/304, ANSI/ASTM A167. No. 4 satin finish, exposed surfaces.

B. Concealed Anchor Plates: Galvanized steel, ANSI/ASTM A386. Minimum 12 gauge, tapped to receive stainless steel machine screws.

2-2 ACCESSORY SCHEDULE:

A. Mirrors: Model B-294-1624.

B. Paper Towel Dispenser: Model B-263.

C. Soap Dispensers: Model B-2014.

D. Feminine Napkin Dispenser: Model B-2802.

E. Feminine Napkin Disposal and Purse Shelf: Model B-271.

F. Toilet Paper Holders: Model B-6857.

G. Toilet Seat Cover Dispenser: Model B-221.

H. Grab Bars: Model B-620 x 36 and B-6293 x 52.

I. Medicine Cabinet: Model B-397.

J. Towel Bar: Model B-6747, 24-inch.

K. Robe Hooks: Model B-6727.

2-3 FABRICATION:

A. Fabricate recessed units with seamless one piece flange on exposed face or full one piece face panel as per design selection.

B. Key all locked dispensing units alike. Key coin boxes separately from coin operated dispensing units.

C. Weld corners, leaving no open miters.

PART 3: EXECUTION

3-1 INSPECTION:

A. Check openings scheduled to receive recessed units for correct dimensions and plumbness of blocking or frames.

B. Check walls or partitions to receive surface mounted units for conditions that would affect quality and execution of work.

C. Verify spacing of plumbing fixtures and toilet partitions that may affect installation of partition mounted accessories.

D. Do not begin installation of toilet and bath accessories until openings and surfaces are acceptable. Report defective conditions to the Contracting Officer.

3-2 INSTALLATION:

A. Install in accordance with manufacturer's instructions and recommendations.

B. Drill holes to correct size and location to assure they are concealed by the item.

C. Mount recessed accessories into wall openings with wood screws through cabinet sides into wood blocking, or sheet metal screws into metal frames.

D. Install surface mounted accessories to walls or partitions with recommended fasteners, plumb and true to line.

E. Attach grab bars to recommended anchor plates using stainless steel machine screws; or attach them to toilet partitions using through bolts and sleeves.

3-3 ADJUST AND CLEAN:

A. Adjust accessories for proper operation.

B. After completion of installation, clean and polish all exposed surfaces.

END

PART 1: GENERAL

1-1 DESCRIPTION: This section is an extension of the General Requirements (Division 1) and contains items of a common or administrative nature that pertain to all mechanical work.

1-2 QUALITY ASSURANCE:

A. Standards: Comply with referenced standards listed in the individual sections. All work shall meet requirements of the Uniform Mechanical and Plumbing Codes.

B. All pressure vessels, including safety devices and appurtenances, shall comply with standards of and bear stamp of ASME.

C. All electrical devices and wiring shall be UL listed and labeled.

1-3 DRAWINGS: Drawings are diagrammatic and show the general design, arrangement, and extent of the systems. Do not scale drawings for roughing-in measurement, nor use as shop drawings. Make field measurements and prepare shop drawings as required. Coordinate work with shop drawings of other divisions. Investigate capacity and space requirements of proposed equipment before submitting shop drawings.

1-4 COORDINATION:

A. Interruption of Services: Coordinate shutdown of water, waste, or heating systems with Contracting Officer.

B. Schedule of Work: Coordinate work with other trades. In scheduling, anticipate such items as installing equipment through available openings in structure.

C. Make minor changes in piping, ductwork, and equipment locations to suit actual conditions.

1-5 PROTECTION: Completely cover motors and other machinery to protect from dirt and water. Cap all openings in pipe and ductwork to protect against entry of foreign matter.

1-6 CLOSEOUT SUBMITTALS: In accordance with Section 01700. Provide four complete sets of the following data in loose leaf, 1-1/2-inch ring binders with permanent covers, separators with index tabs, and transparent loose leaf sheet protectors. Data shall be on 8-1/2-inch by 11-inch sheets or manufacturers' standard catalogs, suitable for side binding.

A. Manufacturers' Literature: Instructions for operation and maintenance of all mechanical equipment and specialties, including replacement parts lists, wiring diagrams, and temperature control diagrams. For each piece of equipment, list system number, unit number, manufacturer's model number, manufacturer's drawing number, and name, address, and telephone number of local service representative.

B. Brief description of each system and basic operational features.

C. Maintenance Instructions: Typewritten instructions for maintenance of each system, in itemized form and with time schedule for maintenance work. List each item of mechanical equipment requiring inspection, lubrication and service, and describe performance of maintenance. List all types of bearings for each piece of equipment, the type of lubricant for each of the systems, emergency procedures, normal starting, operating and shutdown procedures, and when applicable, seasonal shutdown procedures.

D. Special Tools: One set of special tools required to operate, adjust, dismantle, or repair equipment. Special tools are those not normally found in possession of maintenance personnel.

PART 2: MATERIALS

2-1 See individual sections.

PART 3: EXECUTION

3-1 INSTALLATION: Install equipment in accordance with manufacturer's recommendations unless directed otherwise.

END

PART 1: GENERAL

1-1 DESCRIPTION: The work of this section consists of providing the necessary testing apparatus and instruments and performing all procedures to test, adjust, and balance the circulating hot water heating system to optimum performance as required.

1-2 SYSTEMS INCLUDED:

A. Heating system, including checking, adjusting, and balancing of boiler, pump, flow rates, radiation units, and appurtenances.

B. Automatic temperature controls and appurtenances.

1-3 QUALITY ASSURANCE: Standards, codes, rules, and regulations listed in Section 15010.

1-4 SUBMITTALS: In accordance with Section 01300.

A. Drawings and Data: Furnish to the agency a complete set of approved plans and specifications, certified pump curves, shop drawings of distribution system,temperature control system, and performance data on all other applicable pieces of equipment.

B. Balancing and Testing Plan: Submit, not less than two weeks before balancing and testing is scheduled to begin, a balancing and testing plan which shall include the procedures, instructions, and reports to be used.

1-5 TESTING AGENCY:

A. Contractor shall obtain the services of an approved independent balancing and testing agency, which specializes in and whose business is limited to the balancing and testing of heating, ventilating, and air conditioning systems, to balance, adjust, and test the systems installed under this Contract. The balancing and testing agency shall meet the requirements for membership in the Associated Air Balance Council.

B. Contractor shall furnish for approval, within 30 days after award cf Contract, the name of the balancing and testing agency with a resume of the agency, including the qualifications of personnel to be used, and the authority and responsibilities of the personnel.

C. All work by this agency shall be done under the direct supervision of a qualified heating, ventilating, and air conditioning engineer employed by the agency. The balancing and testing agency and the engineer shall have successfully completed at least five projects of similar size and scope. The balancing and testing engineer shall be a registered professional engineer.

1-6 REPORT:

A. Balancing and Testing Agency Report: Obtain from the balancing and testing agency a report which shall include all test data required to show compliance with the contract specifications and drawings, as well as a list of all items that are installed incorrectly or require correction. Deficiencies shall be corrected by the Contractor and retests shall be made as required. Before the installation is accepted, the Contractor shall deliver a certified report from the balancing and testing agency, certifying that the systems have been balanced and tested and are functioning satisfactorily. Number of copies shall be as directed.

B. Test Data: Report shall include the following test data as a minimum, in typwritten schedules, of readings taken during the balancing and testing operations indicating the required or specified reading. The first reading taken, and final balanced reading for the following items:

1. Water Balance:

a. Boilers: Water temperature entering and leaving boiler, degrees F., water flow, gpm, pressure entering and leaving.

b. Radiation, Series Loop: Water flow, gpm, water temperature entering and leaving loop, degrees F.

c. Radiation, Reverse Return: Water flow in loop, gpm, water temperature entering and leaving loop, degrees F, water flow to each fin coil, gpm.

2. Pumps: Manufacturer, model, size, type, rpm, total dynamic head, gpm, motor load amperes, and voltage.

PART 2: MATERIALS

2-1 TEST INSTRUMENTS AND EQUIPMENT: Provide all test instruments, meters, gauges, thermometers, power measuring instruments, pumping equipment, temporary piping, fittings,

wiring, wiring devices, and miscellaneous items necessary to perform the required testing procedures. All instruments shall be calibrated and certified accurate.

2-2 ACCESSORY DEVICES: Provide thermometer wells, gauge cocks, balancing valves, and other appurtenances as required. Coordinate with agency as to the locations of these items as construction progresses, to avoid disturbance to finished complete systems.

PART 3: EXECUTION

3-1 GENERAL:

A. Study the drawings and specifications to insure that all valves and instrumentation necessary for proper balancing and testing are shown or specified.

B. Before commencing adjustment and balancing work, test and clean all systems; remove air from water system; conduct trial runs on equipment.

3-2 CLEANING AND ADJUSTING:

A. Clean pipes free of scale and thoroughly flush of all foreign matter. Provide temporary bypass for all water coils to prevent flushing water from passing through coils. Thoroughly clean strainers and valves.

B. Lubricate bearings with oil or grease as recommended by manufacturer. Adjust miscellaneous equipment to setting indicated or directed.

C. Coordinate with the manufacturer's representative to adjust the automatically operated valves for required operation and to check all controls for proper calibration, operation, and function.

3-3 TESTING:

A. General: Conduct tests in the presence of the Contracting Officer who shall be given 48 hours notice before any test is to be conducted. Provide water, electricity, and fuel oil required for the tests.

B. Piping: After cleaning, all water piping shall be hydrostatically tested at a pressure equal to 150 percent of the

total system operating pressure for a period of time sufficient to inspect every joint in the system and in no case less than two hours. No loss of pressure will be allowed. Repair leaks found during tests by rejoining or replacing pipe or fittings. Caulking of joints will not be permitted. Test concealed and insulated piping in place before covering or concealing.

3-4 BALANCING: Balance water piping systems to produce water quantities as required with all manual and automatic control valves open.

3-5 PERFORMANCE TESTS: After cleaning, pressure and other tests, and adjusting and balance are complete, each system shall be performance tested as a whole to verify all items perform as integral parts of the system, and temperatures and conditions are evenly controlled throughout the building. Make corrections and adjustments as required to produce the conditions indicated.

END

PART 1: GENERAL

1-1 DESCRIPTION: The work of this section describes the materials and methods common to all sections of Division 15. Mechanical materials specified under other sections of Division 15 shall meet the requirements of this section, unless part of larger factory assembled equipment.

1-2 QUALITY ASSURANCE: Section 15010.

Perform welding in accordance with provisions of latest issue of all applicable codes, including ASME Boiler Construction Code and ANSI Code for Pressure Piping. Welding of pressure piping shall be done by welders who have been qualified by a recognized agency within six months prior to date of the Contract.

1-3 JCB CONDITIONS:

A. Electrical Requirements:

1. Disconnects: Motor disconnects are specified in Division 16.

2. Power Wiring: Power wiring is specified in Division 16. Equipment devices and wiring shall comply with Article 440 NEC.

PART 2: MATERIALS Not used.

PART 3: EXECUTION

3-1 EQUIPMENT INSTALLATION: Install equipment so nameplates are visible.

3-2 IDENTIFICATION: The work of applying identification symbols and colors to piping, valves, and similar items shall be in accordance with ANSI A13.1-1981, and with requirements which follow.

A. Piping:

1. Coiled plastic markers designed to hold in place without bands or tape shall be used.

2. Identify all piping at approximately 25-foot centers, but not less than once in each room, whether or not concealed.

B. Valves:

1. Identify valves in mechanical equipment areas with 1-1/4-inch by 3-inch identification tags installed on handwheels or stem with brass beaded chain. Identification tags shall be engraved, indicating the service abbreviation, stating whether normally open (engraved on green) or normally closed (engraved on red).

2. Provide suitably sized identification charts, framed with glass or plastic front. Pipe identification chart shall list piping systems with symbol, and color coding where applicable. Valve identification chart shall list valve model numbers and symbol for service corresponding to piping symbol. Mount identification charts in each mechanical area.

C. Equipment:

1. Provide manufacturers' nameplates on all equipment, identifying manufacturer's name, model number, size, capacity, and electrical characteristics.

2. Leave all manufacturers' nameplates clean and legible. Install all equipment so view of nameplates is not obstructed.

D. Controls: Provide engraved identification of function on switches and manually operable controls, white letters on black background.

3-3 TESTING BUILDING PIPING SYSTEMS: Section 01665.

3-4 TEMPERATURE CONTROL: See Section 15620.

3-5 CLEANING:

A. During progress of work, keep premises reasonably free of debris, cuttings, and waste material. Upon completion of work, and at other times as directed, remove all such debris from premises.

B. Clean equipment and materials. Remove foreign materials including dirt, grease, splashed paint, and plaster. Restore to original condition any finish damaged.

C. Clean, by flushing, interior of water piping. Upon completion of flushing, completely drain systems at all low

points; remove, clean, and replace all strainer baskets and refill systems.

D. Domestic Water Systems: Sterilize domestic water systems in accordance with requirements of Section 01656.

E. Closed Water Circulating Systems:

1. After flushing, draining, refilling, and venting, circulate for a period of 6 hours a solution of 1 pound of trisodium phosphate for each 50 gallons of water in system. Upon completion, completely drain systems at all low points; remove, clean, and replace strainer baskets.

2. After cleaning, flush system thoroughly and refill with 60 percent fresh water, 40 percent Dowtherm SR-1, Dow Chemical Company, Midland, Michigan 48640, or an approved equal.

3-6 PRELIMINARY OPERATION: Operate any portion of installation if requested. Such operation does not constitute acceptance of the work as complete.

3-7 START UP SERVICE:

A. Prior to start up, check auxiliary connections, lubrication, venting, controls, wiring, equipment for proper rotation, and install and properly set relief and safety valves to insure readiness of systems.

B. Start and operate all systems. Provide services of factory trained technicians for start up of major equipment and systems, including temperature controls.

END

PART 1: GENERAL

1-1 DESCRIPTION: The work of this section consists of furnishing and installing insulation for mechanical piping and related equipment.

1-2 RELATED WOPK: General mechanical - Section 15010.

1-3 SUBMITTALS: In accordance with Section 01300.

A. Complete list of proposed materials, including manufacturers' names, catalog numbers, and descriptive literature.

B. Manufacturer's instructions for installing insulation.

1-4 QUALITY ASSURANCE:

A. Fire/Smoke Ratings: Composite insulation, including jackets, coverings, sealers, mastics, and wet or dry adhesives, shall have a flame-spread rating of 25 or less and smoke-developed rating of 50 or less, as tested by ANSI/ASTM E84-81a. Tubing insulation with a smoke-developed rating of 150 or less may be used, except in ducts, plenums, and concealed spaces that are part of the air distribution system. PVC fitting covers shall have a maximum flame spread of 25 or less and are excepted from the smoke spread criteria.

PART 2: MATERIALS

2-1 PIPE INSULATION:

A. Factory molded fibrous glass with factory applied jackets, FS HH-I-558B, Form D, Type III, Class 12. Maximum thermal conductivity (k), 0.26 at 75 degrees F mean, manufactured by Manville Products Corporation, Denver, Colorado, or approved equal. The Contractor has the option of providing either Micro-Lok 650 AP or 650 AP-T, except that insulation exposed to the weather, physical damage, or in crawl spaces shall be metal jacketed, 650 ML.

A closed cell elastomeric insulation of equal thermal and vapor characteristics may be substituted where there is insufficient clearance. Aerotube or equal, as manufactured by Manville Products Corporation, Denver, Colorado.

B. Insulation Thickness:

1. Hot Water Heating Piping: 1-1/2-inch pipe and smaller, 1 inch thick; 2 to 6-inch pipe, 1-1/2 inches thick.

2. Domestic Hot and Cold Piping: All pipe sizes, 1/2 inch thick.

3. Waste Piping Where Subject to Freezing Ambient Temperatures: All pipe sizes, concealed and exposed, 1/2 inch thick.

4. Domestic Water and Hydronic Piping Subject to Freezing Ambient Temperatures: All pipe sizes, 1-1/2 inches thick.

2-2 PIPE FITTING AND VALVE COVERS: One-piece compressed fibrous glass blanket and premolded pvc cover; thickness equal to adjoining pipe insulation.

2-3 ACCESSORIES:

A. Rigid Insulation Inserts for Pipe: Calcium silicate, or approved substitute, for installation between pipe and hanger. Insulation inserts shall be not less than 6 inches long for 1/2 to 2-1/2-inch pipe, and 9 inches long for 3 to 6-inch pipe; thickness equal to adjoining insulation.

B. Rigid Insulation Inserts for Tube: J. M. Aerotube rigid insulation, as manufactured by Manville Products Corporation, Denver, Colorado, or approved equal.

C. Galvanized Metal Shields: 16-gauge for 3-inch and smaller pipe, and 14-gauge for 4-inch and larger; formed to fit the diameter of the insulation, extending up to the centerline of the pipe. Length equal to insulation hanger inserts.

2-4 ADHESIVES, SEALANTS, AND VAPOR BARRIER MASTICS: Foster 30-36 or 85-75 adhesive, 35-00 vapor barrier mastic, and 30-36 sealant, manufactured by H. B. Fuller Company, Foster Products Division, Houston, Texas, or approved equal. For tubing insulation, use products recommended by manufacturer.

PART 3: EXECUTION

3-1 GENERAL: Apply insulation, adhesives, sealants, and mastics in accordance with recommendations of the manufacturer. Apply insulation on clean, dry surfaces after the items to be insulated have been tested and approved. All pipe insulation shall be continuous through wall and ceiling openings and sleeves. Cover

concealed piping, fittings, valves, and flanges same as exposed work.

3-2 PIPE INSULATION:

A. Seal longitudinal joints and butt joints neatly and securely to provide a continuous, unbroken vapor barrier.

B. Install rigid insulation inserts, protected by galvanized metal shields, between pipe and hanger.

C. Apply insulation on all cold surfaces with a continuous unbroken vapor seal. Extend sealants to protect all surfaces, ends, and raw edges of insulation. Insulate and vapor seal hangers, supports, and anchors that are secured directly to cold surfaces to prevent condensation, extending insulation at least 6 inches from cold surface where possible.

D. Cover temporary domestic cold water piping same as domestic cold water piping.

3-3 FITTING INSULATION FOR USE ON ALL PIPE FITTINGS:

A. General:

1. Omit insulation for bodies of strainers, control valves, flanges, unions, and safety valves in hot lines, domestic hot water, and heating hot water piping. Finish insulation neatly at flanges on hot water piping, leaving adequate space for access to bolts. Cover all fittings, flanges, unions, and valve bodies in cold lines.

2. Wrap one layer of fiberglass insulation around the fitting and tuck it in as necessary. Pop on the fitting cover and smooth it into position. Secure cover with tape.

B. Cold: Follow general procedure and seal edges of the cover with vapor barrier adhesive. Wrap the edges of the cover with vapor barrier pressure sensitive color matching tape. Extend the tape over the adjacent pipe insulation and overlap the tape on itself at least 2 inches on the downward side.

3-4 TUBING INSULATION: Slip insulation on pipe before erection when possible. When slip-on technique is not possible, slit insulation and apply to pipe. Insulate line fittings with miter-cut pieces of insulation the same size as adjacent insulation. Insulate all valves with elastomeric pipe and sheet insulation. Seal all joints, seams, and miter-cut pieces with adhesive. At

pipe hanger locations, provide inserts consisting of rigid insulation and metal shield.

END

PART 1: GENERAL

1-1 DESCRIPTION: The work of this section consists of providing the waste, vent, and sanitary sewer system; domestic cold and hot water supply system; and setting minimum standard for all fixtures, equipment, accessories, and appurtenances.

1-2 RELATED WORK: Basic methods - Section 15050.

1-3 QUALITY ASSURANCE: Comply with the applicable requirements of the Uniform Plumbing Code (UPC) and all local codes.

1-4 SUBMITTALS: In accordance with Section 01300, submit complete data required to identify the materials to be furnished under this section. Submittals shall include fixtures, trim, fittings, valves, specialties, supplies, hangers, and sleeves.

1-5 JOB CONDITIONS: Determine surfaces are suitable before beginning. Correct or report defective surfaces to the Contracting Officer.

PART 2: MATERIALS

2-1 WASTE AND VENT PIPE AND FITTINGS, ABOVEGROUND:

A. Pipe, 1-1/4 Inches to 2-1/2 Inches: ASTM B306, copper tubing, Type DWV.

B. Fittings, 1-1/4 Inches to 2-1/2 Inches: ANSI B16.23. Cast bronze solder drainage fittings.

C. Pipe, 3 Inches and Larger: ASTM A74. Cast iron, standard weight, no hub, with neoprene rings and stainless steel clamps and screws, in accordance with Cast Iron Soil Pipe Institute Standard 301.

D. Fittings, 3 Inches and Larger: ASTM A74. Cast iron, long sweep bends.

E. Exposed Pipe and Fittings: Polished chrome over nickel plated brass.

2-2 WASTE AND DRAINAGE PIPE AND FITTINGS, BELOWGROUND: ASTM A74. Cast iron, standard weight, no hub, with neoprene rings and

stainless steel clamps and screws, in accordance with Cast Iron Soil Pipe Institute Standard 301.

2-3 CLEANOUTS: Same size as piping up to 4 inches. Minimum of 4 inches for larger piping.

A. Exposed Piping: Josam Series 58480, or approved equal.

B. Partitions: Josam Series 58790, with access cover.

2-4 DOMESTIC WATER PIPING, FITTINGS, VALVES, AND ACCESSORIES, UNDERGROUND:

A. Piping: ASTM B88. Copper tubing, soft drawn, Type K.

B. Fittings: ANSI B16.26. Cast bronze solder joints.

2-5 DOMESTIC WATER PIPING AND FITTINGS, ABOVEGROUND:

A. Piping: ASTM B88. Copper tubing, hard drawn, Type L.

B. Fittings: ANSI B16.22. Wrought copper solder joint.

C. Unions: 2 inches and smaller, ANSI B16.22. Wrought copper solder joint, ground seat.

D. Dielectric Connections: EPCO Sales, Inc., Cleveland, Chio 44109, or approved equal.

1. Unions: 2 inches and smaller, 175 psi minimum working pressure, ends to match connections.

2. Flanges: 2-1/2 inches and larger, cast bronze, 125 pound, ASME Standard, with bolt insulators, dielectric gasket, bolts, and nuts.

E. Water Meter: Magnetic modular disc meter, bronze base, reinforced hard rubber measuring disc piston, maximum operating pressure not less than 150 psi, meter to comply with AWWA and NEWWA performance and material standards. Water meters to be one each Model 442 and Model 452, as manufactured by Hersey Products, Inc., Dedham, Massachusetts, or approved equal. Size as shown. Meter shall read in gallons.

2-6 DOMESTIC WATER VALVES, ABOVEGROUND: All bronze. Solder ends, line size.

A. Gate: 150 pound SWP saturated, 300 pound W.O.G., integral seat, solid wedge, rising stem, screw in bonnet. FS WW-V-54, Class B, Type II, Nibco/Scott S-131 by Nibco, Inc., Ross and Martin Streets, Elkhart, Indiana 46514, or approved equal.

B. Globe: 150 pound SWP saturated, 300 pound W.O.G., renewable composition disk for water service, rising stem, union bonnet. FS WW-V-51, Class B, Type I, Nibco/Scott S-235.

C. Stop and Waste Valves: Gate valves with capped male hose nipples.

D. Hose Bibbs: Interior, globe valve with hose nipple and vacuum breaker. 3/4-inch H.P.T.

2-7 DOMESTIC WATER ACCESSORIES:

A. Back Flow Preventer: Reduced pressure principle, bronze body and working parts, stainless steel springs, minimum 125 psi working pressure. Furnish with gate valves fitted with test cock and fittings. Beeco Model 12 by Hersey.

B. Shock Absorber: Hot and cold water lines, number and sizes as indicated, Josam Absorbotron.

C. Drain Valves: 1/2-inch globe valves at low points in cold water and hot water systems.

D. Exposed Piping: Exposed hot and cold water lines at plumbing fixtures, chrome plated brass pipe.

E. Pipe Sleeves and Plates:

1. Sleeves made from steel pipe or tubing shall be provided for all pipes passing through concrete floors or walls. Sleeves for partitions shall be a minimum of 24 U.S.S. gauge galvanized iron. Size for outside diameter of insulation.

2. Uninsulated pipe passing through, or entering from floors, finished walls, or ceilings, shall be fitted with heavy cast brass, chrome plated escutcheons firmly secured to pipes with set screws.

2-8 HANGERS, ANCHORS, GUIDES:

A. Insulated Pipe: Auto-Grip Insul-Speed hangers, Figure 800, by Fee and Mason Division, A-T-O, Inc., 2201 Atlantic Avenue,

Manasquan, New Jersey 08736, or approved equal. Sized to fit outside diameter of insulation.

B. Uninsulated Pipe: Adjustable band, copper plated and plastic coated hanger, Figure 381, Fee and Mason.

C. Anchors and Rods: Support by approved rods and anchors from building members. Perforated metal tape is prohibited.

2-9 INSULATION: Section 15181.

2-10 JOINT MATERIALS:

A. Solder: 95-5, tin-antimony.

B. Sealing Paste or Tape: Teflon.

2-11 PLUMBING FIXTURES:

A. General: Fixture color shall be white and shall be complete with all specialties, trim, supports, and related items required by the specified fixtures. Provide screwdriver operated stops and escutcheons on all piping connections to fixtures. Furnish chrome plated adjustable cast brass P-trap with tubing drain to wall. Size to match tail piece with chrome plated escutcheon. Plumbing fixtures shall be of one manufacturer as far as possible.

B. Toilet: Tank type, floor mounted, vitreous china, siphon jet. American-Standard No. 2122.448 Cadet toilet with church seat 5330.022. For public area, substitute elongated bowl No. 2109.180 with tank cover locking device and No. 5330.112 seat.

C. Urinal: Vitreous china, top spud, wall hung, extended sides, open trap way with visible water surface. American-Standard No. 6560.015 Trimbrook, and Sloan Royal flush valve No. 186-11. Carrier No. 17830 by Josam Manufacturing Company, Michigan City, Indiana 46360, or approved equal.

D. Lavatory, Cabinet Mounted: Front overflow. Bowl, 16 inches wide, 11-3/4 inches front to back, 6-3/8 inches deep. Overall size, 20 inches by 18 inches. 4-inch fixture centers. American-Standard No. 3001.013 Highlyn, Aquarian single control faucet, No. 2379.018.

E. Lavatory, Wall Mounted: Vitreous china, front overflow. American-Standard No. 0361.022 Scotian, 20 inches by 18 inches, complete with No. 2379.018 Aquarian single control faucet. Smith

No. 770 support by J. R. Smith Manufacturing Company, Piscataway, New Jersey 08855, or approved equal.

F. Lavatory Fittings and Drains: For public area, American-Standard lavatory grid drain No. 2411.015, with No. 2379.071 fitting. For others, use standard pop-up drain.

G. Shower: Fiberglass-reinforced polyester integral shower and wall surround, slip resistant bottom, American-Standard No. 2151.108, No. 1800.087 Cadet shower fittings, and No. 4362.026 drain.

2-12 MECHANICAL SEALS: Modular mechanical interlocking synthetic rubber links shaped to continuously fill the annular space between the pipe and sleeve. The seal shall consist of EPDM synthetic rubber sealing elements, stainless steel nuts and bolts, and injection molded Delrin plastic pressure plates. Size of sealing elements shall be as recommended by the manufacturer for the pipe and sleeve sizes involved. Mechanical seals shall be equal to Link-Seal Modular Wall and Casing Seal as manufactured by Thunderline Corporation, Wayne, Michigan 48184.

2-13 WATER HEATERS:

A. Instantaneous Water Heaters: IWH. Water heaters shall be point of use type. Heaters shall be activated by flow of water only. Units shall be capable of 54 degrees F temperature rise at a flow of one gallon per minute, and be UL listed. Water heaters shall be Chronomite Instant-Flow Model No. S-80C, as manufactured by Chronomite Laboratories, Inc., Carson, California 90745, or an approved equal. Unit shall be 8,000 watts, 208 volts, 31 amperes.

B. Under Counter Tank Type: EWH-1. 1,500 watts, 120 volts, single element, single phase, 60 hertz, 15 gallon, vertical glass lined tank. Unit shall be complete with temperature controls, high temperature cutoff, and safety valve. Tank rated at 150 psi maximum working pressure, 5-year guarantee, UL listed. A. O. Smith Model No. ELS-15 single element by A. O. Smith Corporation, Kankakee, Illinois 60901, or an approved equal.

C. Under Counter Tank Type: EWH-2. Water heater shall be A. O. Smith EDLJ-40, or an approved equal. Capacity shall be 40 U. S. gallons. Unit shall have two nonsimultaneous 4,500 watt, 240 volt, single phase elements. Supply with temperature and pressure relief valve.

D. Tank Type Vertical: EWH-3. Electric water heater shall be Model PEC-40 as manufactured by A. O. Smith, Kankakee, Illinois 60901, or an approved equal. Unit shall have two nonsimultaneous 4,500 watt, 240 volt, single phase elements. Supply with temperature and pressure relief valve.

2-14 HEAT TAPE: Heat tape shall be UL listed, with automatic thermostat. Material shall be pvc plastic to withstand 105 degrees F. Unit shall operate on 120 volt, 72 watt, single phase. Catalog No. TBTV-12S, as manufactured by Emerson-Chromalox, St. Louis, Missouri 63042, or an approved equal.

2-15 CORRUGATED METAL PIPE: Corlix aluminum by Kaiser Aluminum and Chemical Sales, Oakland, California 94643, or an approved equal.

PART 3: EXECUTION

3-1 GENERAL:

A. Install materials and equipment as shown and specified in accordance with governing codes and standards.

B. Rough in work as construction progresses to minimize cutting, eliminating interferences.

C. Locate equipment requiring service and maintenance in fully accessible positions. Furnish access doors for this purpose if required.

D. Runs and arrangement of piping shall be as shown, subject only to such changes and modifications as may be necessary to suit actual conditions at the building, to avoid interference or conflict with work of other sections. Install piping concealed in floor or in wall construction or excavations to prevent delay to other work and to allow ample time for necessary tests and approvals.

E. Carefully check installations against structural, architectural, and mechanical drawings and note where walls, ceilings, beams, and pipe shafts are furred or enclosed. Piping shall not be furred in or covered before approval by the Contracting Officer.

F. Hang horizontal piping runs from ceilings or construction above, locate as closely as possible to structural members or bottom of slabs or beams, to obtain maximum head room. If a

condition should arise where clearance below such piping would interfere with finished ceiling or wall surfaces, the Contracting Officer shall be notified, and no work shall be installed until approved.

G. Connections as shown are intended that waste, soil, water, and other services be fully connected to each individual piece of apparatus with required piping, unions, flanges, valves, check valves, and other needed appurtenances.

H. Each branch pipe shall be controlled by a gate valve where it connects to the supply main or riser. Each toilet room, group of fixtures, or isolated fixture shall be separately controlled by valves in an accessible location and provided with access doors where necessary.

I. Install swing joints or expansion loops to allow for pipe expansion. Securely anchor pipes so expansion can occur at these joints.

J. Make joints between dissimilar piping by dielectric unions or flanges.

K. Use reducing fittings wherever a change in pipe size occurs. The use of bushings will not be permitted.

L. Provide piping with unions to permit alterations and repairs.

M. Entire domestic water system shall be drainable. Install to slope to valves as shown or back to metering location. Provide additional drains and access as required.

3-2 INSTALLATION OF SANITARY SYSTEM:

A. Make connection to the public sewer system as required by local codes. Do not backfill trench until the complete sewer line has been installed, tested, and approved.

B. All underground cast iron pipe within the building shall be pitched a minimum of 1/8 inch per foot in the direction of flow. Make changes in direction of drainage lines with 45 degree wyes, long turn wyes, or sweep bends. Use long turn fittings wherever space conditions permit. Provide waterproofing around all lines penetrating through foundation walls and floor slabs.

C. Check and verify all inverts of lines within and outside the building.

D. Install traps on fixtures and equipment requiring connection to the sanitary system. Traps shall be of same size as the pipe on which they occur. Provide cleanouts for all traps. Vent traps as shown and as required by local codes.

E. Cleanouts: Provide at the base of each stack, each change in direction, and on a minimum of 50-foot centers at horizontal runs. Cleaning screws, deckplates, and other plugs shall be made up with graphite and oil only, use no grease or cement.

F. Pitch vent lines to allow for condensation drainage.

G. Where vent piping is run concealed in partitions, obtain exact dimensions and locations of partitions and use special care to assure that lines are maintained in their proper locations.

H. Joints:

1. Copper Tubing and Fittings: Assembled with 95-5 tin-antimony solder. Cut copper tubing square; ream, burr, and size; clean tube ends and fittings thoroughly; apply heat, solder, and remove excess solder.

I. Flashing: Flash vents penetrating the roof structure with 6 pound sheet lead. Extend flashing riser beyond top of vent and turn over and roll down inside of pipe vent a minimum of 1/2 inch with skirt extending on all sides of the vent a minimum of 8 inches.

3-3 INSTALLATION OF COLD WATER SYSTEM: Install cold water system as shown. Piping shall traverse the building at the locations shown, or as required to service fixtures requiring cold water, and with the pipe sizes shown or specified. The service shall be valved at the point shown. Locate underground service a minimum of 6 feet below grade. Fit pipe connections to meters and mechanical equipment with unions for ease of dismantling. Conceal cold water piping in finished areas.

3-4 INSTALLATION OF HOT WATER SYSTEM: Begin the installation of the hot water piping system at the water heater and traverse the building at the locations shown, or as required to service fixtures requiring hot water, and with the pipe sizes indicated. Fit piping to the heater and equipment with unions to assure easy dismantling for maintenance. Conceal hot water piping in finished areas.

3-5 HANGERS, ANCHORS, GUIDES:

A. Support piping to maintain required grading and pitching of lines, to prevent vibration, and to secure piping in place. Arrange to provide for expansion and contraction.

B. The spacing of hangers shall be not greater than 10 feet on center for pipe larger than 1 inch; 8 feet for 1-inch pipe; 6 feet for pipe 3/4 inch and smaller.

C. Support vertical lines at bases by an approved hanger placed in the horizontal line near the riser.

D. Do not hang piping from the ductwork or piping of other trades. A common trapeze, properly supported and pitched, may be used.

E. Make watertight seals at all concrete penetrations as shown. For 2-inch and larger, size of sealing links shall be as recommended by the manufacturer for the pipe outside diameter and sleeve inside diameter. Links shall be loosely assembled with bolts to form a continuous rubber belt around the pipe, with a pressure plate under each bolt head and nut. After the seal assembly is positioned in the sleeve, tightening of the bolts shall cause the rubber sealing elements to expand and provide an absolutely watertight seal between the pipe and wall opening. For pipes smaller than 2 inches, seal penetration with nonshrink grout.

3-6 INSULATION: Section 15181.

3-7 INSTALLATION OF PLUMBING FIXTURES:

A. Protect fixtures and equipment during construction. Replace if damaged.

B. Set fixtures level and square with relation to interior finish, floor, and wall lines. Space toilet room fixtures equidistant and at the same height from floor as shown.

C. When installed, cover metal fixture trimmings with noncorrosive grease or approved protective tape and maintain until construction work is complete. Upon completion, remove labels, clean and polish fixtures and trimmings.

3-8 TESTS AND ADJUSTMENTS: Section 01665.

3-9 DISINFECTION OF WATER SYSTEM: Section 01656. Disinfect all water piping and equipment upon completion of piping installation. Following disinfection, flush water from the

system through its extremities. Continue flushing until samples show the quality is comparable with the public water supply and complies with requirements of the public health authority having jurisdiction.

3-10 Paint all exposed ferrous pipe in the valve pit in accordance with Section 09901.

END

PART 1: GENERAL

1-1 DESCRIPTION: The work of this section consists of providing and installing a complete, automatic, dry type fire sprinkler system to service the entire building, including attics, crawl spaces, and concealed spaces. System shall include dry-pipe valve, air compressor, piping distribution system, and sprinkler heads as required.

1-2 RELATED WORK SPECIFIED ELSEWHERE: Painting - Section 09901; general mechanical - Section 15010; basic materials and methods - Section 15050; plumbing - Section 15400.

1-3 QUALITY ASSURANCE: All work performed under this section shall meet all requirements of NFPA Standard No. 13, and other codes and standards listed in Section 15010.

1-4 SYSTEM: Dry-pipe system is required throughout, spacing for ordinary hazard occupancy. If the system is hydraulically designed, the minimum design density shall be 0.158 gpm per square foot, and design area of 3,000 square feet.

1-5 SUBMITTALS: In accordance with Section 01300.

A. Provide catalog cuts for each item proposed for use.

B. Provide working plans, as defined by Paragraph 1-9 of NFPA Standard No. 13.

C. All submittals required by this section shall be submitted at one time.

PART 2: MATERIALS

2-1 PIPE AND FITTINGS: Use Schedule 40, standard weight steel pipe, ASTM A120. Fittings, ANSI B16.4, cast iron, standard weight sprinkler fittings. Bolted clamp-on fittings, utilizing a recessed annular ring on the pipe, will be allowed. All underground pipe and pipe exposed in the attic and crawl space to be hot dipped galvanized in accordance with ASTM A153.

2-2 HANGERS: Conform to requirements of NFPA Standard No. 13, except that only rod hangers shall be used on exposed piping; wire U-hook and similar hangers will not be permitted.

2-3 FLEXIBLE JOINTS: Gustin Bacon Gruvagrip or Victaulic equal; type in which ends of pipe are grooved to suit the couplings.

2-4 SPRINKLER SPECIALTIES: Provide UL approved devices throughout. Head shall be general ordinary temperature classification (135 to 170 degrees F). Pendant heads shall be dry-pipe type, and shall be minimal projection type wherein the fusible device and the spray deflector only project below the ceiling. Heads in all areas shall be bronze finished. Intermediate and high temperature heads shall be provided in all locations defined by NFPA Standard No. 13. Heads shall be of the same manufacture. Provide spare heads evenly proportioned to the type and ratings installed, in accordance with NFPA Standard No. 13, and special sprinkler head tools as required in suitable wall cabinet. Provide sprinkler head guards where required.

2-5 Air compressor shall be sized to bring the combined systems to pressure in 30 minutes maximum.

2-6 Supply one wrench sized for dry-pipe valve face plate for each valve installed.

2-7 AIR LINES: Copper; ASTM B251.

PART 3: EXECUTION

3-1 PIPING: In all cases, piping shall be installed to avoid visual intrusion. Exposed piping is prohibited, except in mechanical areas, dry-pipe valve rooms, attics, crawl spaces, and storage spaces. Areas which have attic spaces above shall have dry pendant sprinklers and piping accessible in the attic.

3-2 OFFSETTING AROUND INTERFERENCES: See that there are no conflicts between sprinkler piping and the work of other trades. Locations indicated and required for sheetmetal work, plumbing, electrical work, and lighting fixtures shall take precedence over space required for installation of sprinkler piping and heads.

3-3 MAINTENANCE OF HEADROOM: All piping and heads shall be installed to maintain maximum possible headroom.

3-4 Label entire system as shown with laminated plastic labels.

3-5 SWAY BRACING AND FLEXIBLE JOINTS: Provide in accordance with NFPA Standard No. 13.

3-6 REAMING: Ream cut pipe ends to the full pipe diameter.

3-7 SCREWED CONNECTIONS: Use true taper full V-threads, with dimensions to ANSI Code B-2.

3-8 PIPE JOINT LUBRICANT: Use on the outside threads of all screwed pipe.

3-9 LEAKS IN PIPING: Correct immediately. On threaded piping, the joints shall be tightened, and if necessary, sections shall be dismantled and replaced. Caulking or peening will not be permitted. Do not use stop-leak compound.

3-10 Special care shall be taken to insure that entire sprinkler system is drainable in accordance with NFPA Standard No. 13, Chapter 3. Any work without proper slope to drain will be rejected.

3-11 System shall be arranged to require a minimum number of low point drains.

3-12 Contractor shall be responsible for providing one set of as-built drawings showing exact locations of all valves, heads, pipes, and miscellaneous sprinkler accessories.

3-13 Contractor shall provide permanently mounted, plastic covered instruction charts in the vicinity of the dry-pipe valve. Charts shall describe operation and proper maintenance of entire system, including recommended frequency of such maintenance, and required periodic testing.

3-14 Contractor shall provide all tests required in NFPA Standard No. 13, Chapter 1. Contracting Officer shall be notified at least five days before proposed testing.

3-15 After system is complete and operable, Contractor shall provide 8 hours of instruction to Government personnel. The Contractor shall notify Contracting Officer at least 48 hours before proposed instruction, and the time shall be mutually agreeable. The instruction shall be given by Contractor's personnel who are considered qualified in the opinion of the Contracting Officer. Instruction shall include location of all valves, drains, and pipe routing, as well as proper maintenance and testing procedures.

3-16 After sprinkler system has been tested for leaks, paint entire sprinkler piping and equipment in valve pit, including main water supply and risers, in accordance with Section 09901.

END

PART 1: GENERAL

1-1 DESCRIPTION: The work of this section consists of complete installation of oil storage tank, day tank, controls, and all required piping and connections to the oil burner units. This task completion must result in a complete, operable, and safe system of fuel supply to the boiler.

1-2 RELATED WORK SPECIFIED ELSEWHERE: Excavation, trenching and backfilling - Section 02221; general mechanical - Section 15010; general plumbing - Section 15400; boilers - Section 15620; painting - Section 09901.

1-3 QUALITY ASSURANCE: Standards, codes, rules, and regulations as established and listed in Section 01070, as amended, latest editions, govern the work of this section. Installation shall meet requirements of NFPA Nos. 30 and 31.

1-4 SUBMITTALS:

A. Applicable submittals as required by Section 15010.

B. Shop Drawings: Submit detailed shop drawings for oil storage tank to include all controls, piping, and vent lines.

C. Submit manufacturer's literature, installation instructions, parts list, operating and maintenance instructions for oil storage system, including tank, level indicators, piping, valves, vents, meters, pipe and accessories inside tank, fuel handling fittings, flexible couplings, day tank, and manholes.

PART 2: MATERIALS

2-1 MATERIALS AND FABRICATIONS:

A. Fuel oil tank shall be built of steel for underground service of capacity, shape, and size as indicated on the drawings.

B. Metal tanks shall be welded, riveted and calked, brazed or bolted, or constructed by use of a combination of these methods. Filler metal used in brazing shall be nonferrous metal or an alloy having a melting point above 1,000 degrees F. and below that of the metal joined.

C. Fuel oil tank shall be designed for the maximum static head which will be imposed when the vent or fill pipe is filled with oil. The maximum static head imposed on the tank shall not exceed 10 p.s.i.g. at the bottom of the tank.

2-2 Corrosion protection for the tank and its associated buried piping shall be provided by use of protective coating, in accordance with Section 09901.

2-3 Underground tank shall be equipped with an open vent arranged to discharge to the open air. Vent openings and vent pipes shall be of ample size to prevent abnormal pressure in the tank during filling but not smaller than the pipe size indicated on the drawings.

2-4 Provide and install remote reading oil gage to visually indicate the level of oil in the underground tank. Locate gage in mechanical room as directed by the Contracting Officer. Gaging devices and liquid level indicators or signals shall be designed and installed so that oil or vapor will not be discharged into the building from the fuel supply system. Fuel oil tank shall not be equipped with a glass gage or any gage which, when broken, will permit the escape of oil from the tank.

Level indicators shall be Master Model as manufactured by Hersey Products, Inc., Spartanburg, South Carolina 29303, or an approved equal. Scale shall be calibrated to read in gallons with full scale reading same as tank capacity. The system shall be manually activated using a built-in hand pump. The transmission tubing shall be protected by 1-inch rigid galvanized steel conduit using long radius turns where necessary.

2-5 Provide one full tank of fuel oil at each installation.

2-6 FUEL FITTINGS: Miscellaneous fittings and equipment shall be as indicated on the drawings or approved equals.

2-7 FLEXIBLE COUPLINGS: Minimum length, 2 feet. B. F. Goodrich No. 94, or an approved equal.

2-8 PIPE: ASTM A120. Schedule 40 black steel.

2-9 PIPE FITTINGS: FS WW-P-521. 150 psi malleable iron.

2-10 UNIONS: FS WW-U-531, Type B, Class 2, 250 psi, malleable iron, ground joint, and brass seat.

2-11 SEALING PASTE OR TAPE: Teflon.

2-12 DAY TANK: Model shall be SFT-10A as manufactured by Simplex, Inc., Springfield, Illinois 62702, or an approved equal. The day tank shall be fitted with the following options: 060 fuel strainer; 067 manual quick drain; 070, 075 check valve on pump intake; 340 pump running light; 015 auxiliary hand pump; 087 manual fuel cut-off valve; 400 5-gpm highlift pump.

2-13 FUEL METER: To be installed on line between day tank and boiler. Meter shall be Mini-Major model as manufactured by Kent Meter Sales, Inc., Ocala, Florida 32670, or an approved equal. The meter shall include 25 micron filter and shall record flows of 0.6 to 48 gallons per hour to an accuracy of plus or minus one percent.

PART 3: EXECUTION

3-1 INSTALLATION OF UNDERGROUND TANK:

A. Only a tank complying with the construction provisions of Standard For Steel Underground Tank For Flammable and Combustible Liquids, UL58-1970, shall be buried underground.

B. Excavation for underground tank shall be made with due care to avoid undermining of foundations of existing structures. The distance from any part of the tank to the nearest wall of any basement, pit, or property line shall be not less than 1 foot.

C. The underground tank shall be set on a firm foundation as shown on drawings and surrounded with at least 6 inches of noncorrosive inert materials such as clean sand, earth, or gravel, well tamped in place.

3-2 All connections to the underground tank shall be made through the top of the tank as indicated on the drawings.

3-3 If fiber glass tank is substituted, the following shall apply:

A. Fuel Oil Tank:

1. Owens-Corning fiber glass to meet requirements of drawings.

2. Tank to meet requirements of UL and NFPA standards.

B. Fuel Oil Accessories: To be same as for metal tank.

3-4 Install where shown and as detailed on the drawings. Installation of tanks shall be in accordance with Owens-Corning Publication No. 5-PE-4896, to include hold downs and anchors. Backfill shall be pea gravel as specified in the publication. Tank installation shall be in accordance with NFPA No. 30 and No. 31 requirements.

3-5 Provide one full tank of fuel oil at each installation.

3-6 Install day tank as shown, including all associated piping, vents, and meters.

3-7 All connections to tank shall be made with flexible connectors to avoid transmitting any stress to the tank.

3-8 Install all piping to provide a complete and operable system. Use unions to insure all parts of system are easily serviceable.

3-9 Coat tank and metal appurtenances in accordance with Section 09901. Provide touch up in the field to insure tank coating is holiday free at time of installation.

END

PART 1: GENERAL

1-1 DESCRIPTION: The work of this section consists of complete installation of the boiler, including equipment, piping, insulation, controls, and related appurtenances for heating purposes. This task completion must result in a complete and operable heating supply system.

1-2 RELATED WORK SPECIFIED ELSEWHERE: General mechanical - Section 15010; plumbing system - Section 15400; hydronic water piping - Section 15701.

1-3 QUALITY ASSURANCE: Standards, codes, rules, and regulations as established and listed in Section 15010, as amended, latest editions, govern the work of this section.

1-4 SUBMITTALS:

A. Applicable submittals as required by Section 01300.

B. Shop Drawings: Submit detailed shop drawing for boilers, to include stack location, piping, and control diagram.

C. Submit manufacturer's literature, installation instructions, parts list, and operating and maintenance instructions for the boiler.

PART 2: MATERIALS

2-1 HEATING BOILER: Hydrotherm Model No. OR-385-A, or approved equal, as manufactured by Hydrotherm, Inc., Rockland Avenue, Northvale, New Jersey 07647.

A. Boiler Rating: Boiler shall be IBR approved for an input of 385,000 Btuh and shall have a heating capacity of 303,000 Btuh and an IBR net output rating of 263,000 Btuh for automatic operation with No. 2 fuel oil. The boiler shall be designed to burn No. 2 fuel oil.

B. Features: The boiler shall be factory-assembled complete with high-pressure atomizing type flame retention oil burner, cadmium sulfide cell type burner primary control, one piece fiber ceramic combustion chamber, base, absorption unit, draft regulator, hi-limit aquastat, wiring, ASME pressure relief valve,

temperature/pressure indicator, and insulated jacket. Boiler shall be shipped complete, wired ready for installation.

C. Identification: The following identification data shall be clearly cast or stamped on the front of the boiler or on a manufacturer's standard nameplate that has been permanently attached to the boiler front: name and address of manufacturer, trade name, catalog number, series number and date of manufacture, and capacity.

D. The jacket encasing the boiler shall be furnished by the manufacturer and shall be designed particularly for the boiler on which it is installed. It shall be made of rust resisting sheet metal and be neatly and attractively finished in accordance with the standard practice of the manufacturer. The jacket shall be lined with an approved type of heating insulating material.

E. Oil Burner, Pump, and Piping:

1. Burner: The oil burner shall be UL approved and shall be of a design which produces rapid intimate mixing of fuel and combustion air. The burner design shall be such as to insure high efficiency.

The oil burner system shall be supplied by the boiler manufacturer and factory matched to the boiler. The burner shall be mounted on the boiler with a rigid factory supplied mounting flange designed to support the burner and match the boiler. The burner fuel shall be designed for No. 2 fuel oil.

2. Oil Pump: An oil pump with a capacity of approximately twice the maximum firing rate shall be provided.

3. Oil Piping: Fuel oil piping shall include fuel strainer and fused oil shutoff valve. Pipe in accordance with Section 15606.

2-2 EXPANSION TANK: Provide expansion tank sized properly for final water content of heating system.

2-3 CHIMNEY: The chimney shall be Metalbestos Model SS or approved equal. Chimney shall be complete with barometric damper and all accessories required for a complete chimney system. Chimney shall be UL listed, 8-inch inside diameter, double walled, 0.012-inch stainless steel thickness on inner/outer casing, heat tape wrapping, and locking band at all pipe connections. Chimney shall be complete with 8S-DK chimney cap, 8S-IT insulated tee, 8S-CSP ceiling supports, 8S-RSP roof support, and flashing and counterflashing at roof penetration.

2-4 CIRCULATING PUMP: Taco or an approved equal. Motor shall be 115 volts, 60 hertz, single phase. Size pump based on final design of heating system. Taco, Inc., Cranston, Rhode Island 02920.

2-5 ZONE THERMOSTATS: Temperature range of 40 to 90 degrees F, two wire, heating only. Model No. T87F2873 with 104456B wallplate, or approved equal, as manufactured by Honeywell, Inc., Minneapolis, Minnesota 55408. Supply additional controls, transformers, and relays as necessary to complete the temperature control system.

2-6 ZONE CONTROL VALVES: Valves shall be electrically actuated with manual opening lever. Bell and Gossett Modu-Mate zone control valve or approved equal.

PART 3: EXECUTION

3-1 INSTALLATION:

A. Install boilers on 8-inch thick concrete block base as shown on drawings.

B. Emergency Shutdown Switch: Each boiler shall be provided with a remote emergency shutdown switch located near the boiler room exit door. The switch shall be wired through the burner controls and shall be provided with a red switch plate marked "Emergency Boiler Shutdown" and the boiler number.

C. Combustion Air: Facilities for combustion air shall be provided and shall conform to requirements of the National Fire Protection Association.

D. Breeching: Boiler shall be connected from boiler smoke connection to the stack by means of a breeching made of black iron or steel sheets not less than 16 gauge. All joints shall be welded and air tight. The size of the breeching shall be not less than the size of the smoke outlet of the boiler. Breeching for cast iron boilers shall be supported either from the floor or ceiling in an approved manner so that no weight is on boiler.

Horizontal installed breeching shall have 1-1/4-inch angle iron stiffeners around breeching, spaced not more than 36 inches and supported from the floor or ceiling. Provide safety guards where supports are less than 7 feet from finished floor. All connections between the breeching and the boiler and the stack shall be made air tight in an approved manner.

Install in the breeching of boiler an adjustable automatic draft stabilizing damper to maintain automatically the recommended draft on the boiler firebox. The size and type shall be recommended by the burner manufacturer.

E. All breeching is to be insulated. The insulation material shall be equivalent to 1-1/2-inch Kaylo as manufactured by Owens-Corning Fiberglas Corporation. The insulation shall be covered with .016-inch aluminum jacketing.

F. The vertical chimney shall be installed in accordance with manufacturer's instructions.

G. Hot water leaving the boiler shall be maintained at 185 degrees F. (adjustable).

H. The Contractor shall provide at least 4 hours of operating and maintenance instructions to Government personnel responsible for operating the boiler equipment. This training shall be scheduled with the Contracting Officer.

I. Install accessory equipment in accordance with manufacturer's instructions and as shown.

J. The circulating pump shall operate if one or more zone thermostats require heat. A minimum of four heating zones shall be provided, utilizing one circulating pump.

END

PART 1: GENERAL

1-1 DESCRIPTION: The work of this section consists of providing piping systems associated with heating, complete with all appurtenances.

1-2 RELATED WORK SPECIFIED ELSEWHERE: General mechanical - Section 15010; pipe insulation - Section 15181; plumbing systems - Section 15400; fin tube radiation - Section 15760.

1-3 SUBMITTALS: In accordance with Section 01300, submit manufacturers' literature on hangers, balancing cocks, thermometers, flow meters, strainers, and pressure gauges.

PART 2: MATERIALS

2-1 PIPING, FITTINGS, AND VALVES:

A. General: Working pressure and temperature maximums, 125 psi and 300 degrees F.; water service, above grade.

B. Piping: ASTM B88. Copper tubing, hard drawn, Type K.

C. Fittings: ANSI B16.22. Wrought copper solder joint.

D. Unions: 2-1/2 inches and smaller, ANSI B16.22. Wrought copper solder joint, ground seat.

E. Dielectric Connections: EPCO Sales, Inc., 3204 Sackett, Cleveland, Ohio 44109, or approved equal.

1. Unions: 2-1/2 inches and smaller, 175 psi minimum W.P., ends to match connections.

F. Gate Valves: 3 inches and smaller, bronze body, solder ends, 150 psi SWP saturated, 300 psi W.O.G., integral seat, double disk, rising stem, union bonnet. FS WW-V-54, Class B, Type III, Nibco/Scott S-135, by Nibco, Inc., Ross and Martin Streets, Elkhart, Indiana 46514, or approved equal.

G. Check Valves: 3 inches and smaller, bronze body, solder ends, horizontal swing, regrinding type, Y pattern, renewable bronze disk. 150 psi saturated, 300 psi W.O.G. FS WW-V-51, Class B, Type IV. Nibco/Scott S-433.

H. Balancing Cocks: Calibrated bronze balance valves with connections for a portable differential pressure meter. Meter connections provided with built-in check valves; an integral pointer to indicate valve setting; constructed with adequate seals and rated at 125 psi at 250 degrees F. 1/2-inch and 3/4-inch solder connections. 1 inch to 3 inches threaded. Use with cast bronze MIPS to solder unions and adapters. Circuit Setter by Bell & Gossett, Morton Grove, Illinois 60053, or approved equal.

2-2 PIPING ACCESSORIES:

A. Pressure Gauges: Located as shown. 4-1/2-inch dial, water service, bronze bourdon tube movement, cast aluminum case, white face, black numbers, with gauge cock. Range at two times working pressure. U.S. Gauge Division, 975 Clymer Avenue, Sellersville, Pennsylvania 18960, Marshalltown Manufacturing, Inc., Box 400, Marshalltown, Iowa 50158, or approved equal.

B. Thermometers:

1. Adjust-Angle, by Weksler Instruments Corporation, Mill Road and Hanse Avenue, Freeport, Long Island, New York 11520 or thermometer by Philadelphia Scientific Glass Company, Inc., 901 Ridge Avenue, Perkasie, Pennsylvania 18944, or approved equal. Red-reading tube, cast aluminum case, and separable sockets, including cap and chain. 9-inch scales in mechanical equipment areas and on main piping; 7-inch scales in other locations.

2. Ranges as follows:

Heating Water	30 degrees to 300 degrees F.

3. For thermometers and wells through insulation, provide extensions to compensate for insulation thickness.

C. Test Taps: Combination pressure and temperature test taps consisting of a 1/4-inch MPT fitting designed to receive either a temperature or pressure probe, at inlet and outlet water connections of all heat transfer equipment and at other locations as shown. Fittings shall be Pete's Plug as manufactured by Peterson Engineering Company, Richardson, Texas 75080, or approved equal.

D. Strainers: Wye type, bronze construction, 150 psi service, complete with removable stainless steel basket with minimum perforations of 1/8-inch diameter by Sarco Company, Inc., 1951 26th Street SW, Allentown, Pennsylvania 18105, Armstrong Machine

Works, 816 Maple Street, Three Rivers, Michigan 49093, or approved equal.

E. Safety and Relief Valves:

1. Kunkle Valve Company, Inc., 121 South Clinton Street, Ft. Wayne, Indiana 46802, or approved equal. Type and size as applicable, constructed, rated, and stamped in accordance with ASME.

2. Safety relief valves for heated liquids, including water boilers and heat exchangers.

F. Coin Operated Air Vents: Bell and Gossett No. 4-V, or approved equal.

G. Flexible Piping Connections: Seamless, stainless steel, close pitch convolutions, reinforced with bronze wire bradded cover. Rated not less than 125 psi at 350 degrees F. to be furnished at inlets and outlets of all equipment. Sizes and connections to match piping and equipment.

H. Escutcheons: Heavy solid pattern steel, cast iron, or malleable iron with set screws. Provide prime coat of paint on all piping exposed to view indoors where passing through floors, roofs, partitions, walls, or ceilings. Escutcheons installed over sleeves which project above finished floors shall be deep cup type.

I. Drain Pans: Minimum 18 gauge stainless steel, suitably reinforced.

J. Specialty fittings as required, Bell and Gossett or approved equal.

2-3 BTU METERS: Supply one Btu meter for the Mascot Saloon and one Btu meter for the other building in the Mascot Saloon group. Units shall consist of rotary sensor to measure liquid flow in gallons per minute, two temperature sensors for monitoring high and low temperatures of each zone, and integrated circuitry that computes temperature difference, instantaneous Btu and total Btu's. Operating power shall be 115 volts ac. 4-digit LED panel gives instantaneous readout, electromechanical counter gives total accumulation of Btu's and total flow. Supply connecting cable in accordance with manufacturer's recommendations. Btu meter shall be Model No. 7003, as manufactured by Hersey Products, Inc., Spartanburg, South Carolina 29303, or an approved equal.

2-4 HANGERS AND SUPPORTS:

A. Superstrut or Unistrut: Fee and Mason Division, A-T-O, Inc., 2201 Atlantic Avenue, Manasquan, New Jersey 08736, or approved equal. Hangers and supports shall have a minimum safety factor of 5, based upon ultimate tensile or compressive strength, as applicable of material used. Turnbuckles shall have capacity of not less than attached rod. Provide bracing to prevent lateral motion.

B. For piping, comply with requirements of ANSI B31.1.0.

C. Do not support weight of piping from mechanical equipment, pump flanges, coil connects, and related items.

D. Horizontal Chilled and Heating Water Piping: Horizontal channel with C-721 cast iron rollers. Rollers are not required where spring hangers are indicated.

E. Individual Horizontal Piping: Series C-711 hangers.

F. Individual Grouped Piping: Horizontal channel with Series C-702 straps.

2-5 CAULKING COMPOUND: Oakum or fibrous glass blanket. For finishing, two part polysulfide, resilient type.

2-6 FLUX: Handy, by Handy & Harman, 850 Third Avenue, New York, New York 10022, or approved equal.

2-7 INSULATION: Section 15181.

PART 3: EXECUTION

3-1 PIPING INSTALLATION, GENERAL:

A. Piping has not been shown. Piping shall be designed after building interior has been designed. Install piping as required for field conditions and work of other trades.

B. Arrange piping along walls in horizontal groups, each group to be in one plane. Maintain indicated slope.

C. Sleeves through structural members shall be as shown on shop drawings and as approved.

D. Expansion, Contraction, and Bending: Install piping with provisions for expansion and contraction using expansion loops, swing or expansion joints where required. Provide for expansion and contraction in mains, risers, and runouts. Do not spring or force piping during installation. Do not bend piping without use of bending machine.

E. Sloping, Air Venting, and Draining:

1. Slope piping as indicated, true to line and grade, and free of traps and air pockets. Slope piping up in direction of flow at 1 inch per 40 feet.

2. Slope air line up 1 inch per 10 feet toward expansion tank.

3. Provide eccentric reducers for changes in horizontal heating piping, top side flat.

4. Connect branch piping to bottom of mains.

5. Provide approved manual air vents at all high points in piping. Provide 1/4-inch copper, 180 degree bend pipe to discharge vented water into can.

6. Provide drain valves and hose adapters at all low points in piping.

F. Fittings: Standard manufactured. Field fabricated fittings and bushings are prohibited on all piping.

G. Unions: Provide piping with unions to permit alterations and repairs.

H. Pipe Ends: Cut pipe and prepare ends with full inside diameter. Deburr and size.

I. Threaded Joints: Apply Teflon tape to male equipment threads.

J. Soldered Joints: Use silver solder for copper tubing. Clean surfaces to be jointed of oil, grease, rust, and oxides. Clean socket of fitting and end of pipe with emery cloth. After cleaning and before assembly or heating, apply flux to joint surface and spread evenly.

K. Keep openings in piping closed during construction to prevent entrance of foreign matter.

L. Valves:

1. Field check valves for packing and lubricant. Determine disk is for service intended. Replace leaking packing. Service valves with lubricant for smooth and proper operation before placing in service.

2. Install valves accessible from floor level. Do not install valves with stem pointing downward unless indicated. Provide operating handles for valves and cocks without integral operators.

3. Provide valves same size as line size.

4. Install swing checks and gravity closing lift checks in horizontal position.

5. Provide gate blowdown valves and hose adapters at strainers; same size as strainer blowoff connection.

M. Locate thermometers and gauges to permit observation by personnel standing on floor. Provide instrument cocks at pressure gauges.

N. Pipe sizes, as shown.

3-2 EQUIPMENT PIPING:

A. Provide combination balancing and shutoff valves to regulate water flow through piping, coils, and at other equipment and piping where indicated or required for proportioning flow. Provide one balancing valve on series loop system; provide balancing valves at each radiation unit for reverse return systems.

B. In the cold water make-up to the boiler, provide an automatic fill valve. Provide three valve bypass with globe valve around automatic fill valve. Upstream of fill valve and its bypass, provide approved reduced pressure backflow preventer, Watts or equal.

3-3 GAUGES: Locate as approved.

3-4 THERMOMETERS:

A. Provide with brass separable sockets of proper length to insure accurate reading and extension necks to suit insulation thickness.

B. Provide brass separable socket thermometer wells for intermittent use, of proper length to insure accurate reading, extension necks to suit insulation thickness, and screwed removable plug.

C. Locate thermometers as approved.

3-5 EXPANSION LOOPS, GUIDES, AND ANCHORS:

A. Calculate expansion from 0 degrees F. to maximum operation temperature of system.

B. Provide guides to properly direct pipe movement into expansion loops and offsets.

C. Provide anchors of an approved design to control movement in piping. Weld anchors to ferrous piping and braze anchors to nonferrous piping.

D. Install in accordance with standards of Expansion Joint Manufacturer's Association.

3-6 SLEEVES:

A. Fit new piping passing through new building construction with sleeves through the full thickness of construction. Finish sleeves flush with each construction surface.

B. In new poured concrete floors, minimum 22 gauge galvanized sheet steel.

C. In new poured concrete walls, bearing walls, built-up masonry walls, beams, and columns, Schedule 40, black steel pipe.

D. In floors containing floor drains, Schedule 40, black steel pipe, extending 2 inches above finished floor.

E. Size sleeves to allow 1/2-inch annular space between pipe insulation, or the bare pipe, and the pipe sleeve.

F. For piping passing through sleeves in areas containing floor drains and in waterproof construction, caulk annular space between pipe or pipe insulation and the enclosing sleeve to attain a watertight installation. Caulk and finish with sealing compound.

G. For piping passing through all mechanical room walls, floors, and ceiling, caulk annular space between pipe or pipe insulation

and the enclosing sleeve, to prevent sound transmission. Caulk and finish filling each end with sealing compound.

3-7 PIPE HANGERS AND SUPPORTS:

A. All piping within the confines of the building walls, rigidly support from the building structure by means of hangers or supports. Support hanger rods by coach screw rods, angle iron clips, or beam clamps. No drilling of structural members will be permitted without approval. Trapeze type hangers may be used for multiple parallel horizontal pipes. Do not bend pipe hanger rods to provide alignment of piping offset from overhead supports.

B. Install at locations not more than 3 feet from the end of each runout and not over 1 foot from each change in direction. Use adjustable type hangers.

C. Support piping 2 inches and smaller with adjustable pear-shaped band iron hangers having threaded rod and two locknuts.

D. Support concealed vertical piping at each floor with riser clamps. Support exposed vertical steel piping at each floor with steel flange type supports welded to the riser. Support similar nonferrous piping with brass ring brazed to the riser.

E. Support exposed vertical piping smaller than 1-1/4 inches with split ring type hangers, located midway between floor and ceiling.

F. Support piping running along walls near the floor with approved brackets or pedestals.

G. Support copper tubing at following maximum intervals:

3/8 to 3/4 inch.....	5 feet
1 to 1-1/4 inches.....	6 feet
1-1/2 to 2-1/2 inches.....	8 feet

H. Provide additional support for heavy valves, specialties, and sway bracing where required.

I. With approval, trapeze hangers may be used to support a group of pipes.

J. Remove rust from ferrous hanger equipment and rods, and apply one coat of rust inhibitive paint before or immediately after erection.

3-8 DRAIN PANS: Provide drain pans under the entire length of any piping, including valves, joints, and fittings for any liquid carrying piping system installed over any motor, motor starter, switchgear, transformer, or other electrical equipment and under all such piping located anywhere in any transformer vault, electrical switchboard room, and telephone equipment room. Drain pans shall be not less than 2 inches deep, with a 3/4-inch drain pipe to discharge where shown or to discharge at nearest convenient drain line, floor drain, or other approved drain point.

3-9 INSULATION: Section 15181.

3-10 PIPE IDENTIFICATION: In accordance with Section 15050.

A. Controls: Provide engraved Lamicoid tags identifying function on switches and manually operable controls. Provide emergency boiler shutdown switch at boiler room door.

3-11 TESTING: Section 01665.

3-12 CLEANING AND STARTUP: In accordance with Section 15050.

END

PART 1: GENERAL

1-1 DESCRIPTION: The work of this section consists of providing fin tube heaters associated with the complete and operable hydronic heating system. Size radiation to meet individual room heat loss when building internal design is complete.

1-2 RELATED WORK SPECIFIED ELSEWHERE: Hydronic hot water piping - Section 15701; boiler - Section 15620; pipe insulation - Section 15181.

1-3 SUBMITTALS: In accordance with Section 01300. Submit complete list of materials and equipment proposed to be provided, including manufacturer's name, catalog numbers, and catalog cuts and recommendations for installation.

PART 2: MATERIALS

2-1 FIN TUBE HEATERS: Vulcan Linovector fin tube radiator complete with 14-gauge zinc coated steel enclosures, 20-gauge steel back plates, 3/16-inch by 1-1/2-inch die formed steel brackets, copper-aluminum heating elements positively positioned, sliding saddles with nylon coated supports, 18-gauge steel damper blades, and the necessary accessories to make a final installation. Louvered top shall be pencil proof with threaded damper screw that provides positive operation of blade in any position. Heating elements shall have full-heat temper fins that cannot turn on tube. All ratings shall be I=B=R approved. Rating and tube sizes shall be as indicated on drawings. Supply Vulcan Linovector style DS, copper-aluminum, 3/4-inch copper pipe, 2-3/4-inch by 4-1/4-inch fin size, 60 fins per inch and 0.020-inch fin thickness. As manufactured by Vulcan Radiator Company, 755 Capital Avenue, Hartford, Connecticut 06101, or an approved equal.

PART 3: EXECUTION

3-1 Install as recommended by the manufacturer and as detailed on the drawings.

END

PART 1: GENERAL

1-1 DESCRIPTION: The work of this section consists of ductwork, combustion air intakes, discharges, and appurtenances in connection with heating and ventilating.

1-2 RELATED WORK SPECIFIED ELSEWHERE: General mechanical - Section 15010; exhaust fans - Section 15860.

1-3 QUALITY ASSURANCE: Standards, codes, rules, and regulations as established and listed in Section 15010, as amended, latest editions, govern the work of this section.

1-4 SUBMITTALS:

A. Applicable submittals as required by Section 15010.

B. Shop Drawings: Submit detailed shop drawing for all ductwork.

PART 2: MATERIALS

2-1 DUCTWORK:

A. Except as otherwise indicated or specified, all exhaust air duct systems shown on the drawings shall be constructed from United States Steel or Bethlehem galvanized sheet metal, with bracings, reinforcement, and construction details in accordance with the latest edition of the ASHRAE Guide, NFPA Pamphlet No. 90A and SMACNA Guide.

B. Duct dimensions indicated on drawings are net, inside, clear dimensions.

C. Duct metal gage thickness shall be in accordance with SMACNA requirements for low velocity systems.

D. Alter duct sizes on basis of equal friction where required to facilitate installation.

2-2 DUCT HANGERS AND SUPPORTS: Support ducts per latest SMACNA Duct Manual.

2-3 COMBUSTION AIR LOUVERS: As shown on the drawings.

PART 3: EXECUTION

3-1 Except as otherwise specified or detailed on the drawings, all ductwork shall be constructed in accordance with the Sheet Metal and Air Conditioning Contractors National Association Standards (SMACNA). Duct systems shall be complete, including all duct fittings, turning vanes, transverse reinforcing, hangers, supports, etc., as detailed on the drawings or in the standards.

3-2 Work shall be designed and fabricated to prevent buckling, breathing, vibration, and noise. Provide any additional reinforcing as may be required to meet the actual job conditions.

3-3 Work shall be designed and fabricated to keep resistance losses to a minimum. Use standard radius elbows and gradual transformations.

3-4 Ductwork shall be adequately supported by rods, band iron, or other methods approved by the Contracting Officer.

END

PART 1: GENERAL

1-1 DESCRIPTION: The work of this section consists of furnishing and installing exhaust fans.

1-2 RELATED WORK: Basic materials and methods - Section 15050.

1-3 QUALITY ASSURANCE:

A. Fans shall be tested in accordance with procedures of AMCA 210 and shall meet the requirements of AMCA standards where applicable standards exist.

B. Fans shall bear the UL label and the AMCA Certified Rating Seal when the fan is covered by the standard. When no standard is applicable, the manufacturer shall submit data to verify the fan capacity at the specified conditions. Where Sone ratings are shown, the manufacturer shall certify that the fan has been tested in accordance with AMCA 300 and that the Sone level does not exceed that shown.

1-4 SUBMITTALS: In accordance with Section 01300.

A. Detailed shop drawings showing physical dimensions, shaft sizes, drives, drive arrangement, and motor data.

B. Manufacturer's literature, including performance curves, installation instructions, parts lists, operating and maintenance instructions, and AMCA certified air delivery and sound level (Sones) at the conditions shown.

PART 2: MATERIALS

2-1 EXHAUST FANS: Model, size, type, and capacity as shown.

A. Backdraft Dampers: Built-in, delicately balanced, automatically closing when fan stops.

B. Electrical: Motors, 115 volt, 60 hertz, single phase.

2-2 ROOF AND WALL CAPS: As shown.

PART 3: EXECUTION

3-1 INSTALLATION:

A. Install all equipment in accordance with the recommendations of the manufacturer and as required by NFPA 70 and NFPA 91 or 96, as applicable.

B. Install fan units in locations shown.

C. Operate fans with restroom light switches.

END

PART 1: GENERAL

1-1 DESCRIPTION: This section is an extension of the General Requirements (Division 1) and contains items of a common or administrative nature that pertain to all electrical work.

1-2 WORK INCLUDED: In accordance with the specifications and as shown on the drawings, furnish, install, test, and place in satisfactory and successful operation all equipment, materials, devices, and necessary appurtenances to provide a complete and operable electrical system. Included are wiring and connections required for electrical equipment furnished under other sections. Fire alarm and intrusion systems, telephone, and other communications work is considered to be electrical work.

1-3 QUALITY ASSURANCE:

A. Codes and Regulations:

1. Meet requirements of NEC, NESC, other national fire codes of NFPA, and state and local laws, ordinances, codes, and regulations, as amended, latest editions.

2. Nothing in the drawings or specifications shall be construed to permit work not complying with governing codes and regulations; if any conflict occurs, so advise the Contracting Officer.

B. Standards: Unless otherwise specified, all equipment and materials shall be manufactured, tested, and installed in accordance with standards referenced in the respective sections and the applicable standards of the following organizations:

ANSI - American National Standards Institute
AWPA - American Wood Preservers Association
ICEA - Insulated Cable Engineers Association
IEEE - Institute of Electrical and Electronic Engineers
NEMA - National Electrical Manufacturers Association
NFPA - National Fire Protection Association
UL - Underwriters Laboratories

When the specifications and/or drawings are more rigorous than the codes, regulations, and/or standards, the specifications and/or drawings shall prevail.

C. Approved Products: All electrical materials and equipment shall meet requirements of the applicable standards of UL for the classification of intended use where UL lists such materials and equipment. The UL authorized listing mark for the classification of intended use is acceptable as evidence that the materials meet this requirement. In lieu of UL authorized listing mark, the Contractor may submit independent proof satisfactory to the Contracting Officer that the materials meet the published standards.

D. Standard Products: Provide materials and equipment that are products of manufacturers regularly engaged in the manufacture of the products and are the latest standard design.

E. Finished surfaces of existing facilities that are marred, scratched, or damaged shall be refinished to match original condition. Building surfaces that have been altered for the proper installation of electrical equipment shall be restored by skilled personnel of the trades involved at no additional expense to the Government.

1-4 INTENT OF CONSTRUCTION DRAWINGS:

A. Electrical drawings do not attempt to show complete details of building construction which affect installation. Refer to architectural, structural, and mechanical drawings for additional building details which affect work.

B. Conduit and ground connections are shown diagrammatically only. Layout does not necessarily show total number of conduits or conductors for circuits required, nor are locations of indicated runs intended to show actual routing of conduits. Provide additional conduits and wire wherever needed to complete installation of specific equipment furnished.

C. Locations of outlets on drawings are approximate and may be distorted for clarity in representation. Locate outlets symmetrically with architectural elements.

D. Riser and other diagrams are schematic only and do not necessarily show physical arrangement of equipment. Do not use for obtaining quantities or for linear runs of conduit or wire.

E. Changes, such as offsetting conduit runs, moving outlets, or other minor changes necessary to facilitate installation, shall be made at no additional expense to the Government.

1-5 CCORDINATION OF WOPK:

A. Coordinate work of this division with the work of the various trades on the project. Examine drawings, including mechanical, ventilating, structural, and general drawings, for construction details and necessary work coordination.

B. Special attention is required for the following items, and conflicts shall be reported before installation to the Contracting Officer for resolution.

1. Light switches shall be installed on strike side of single doors.

2. Install electrical outlets and other equipment clear of and in proper relation to radiators, ducts, grilles, pipes, and other mechanical equipment, and items such as cabinets and counters.

1-6 SUBMITTALS: In accordance with Section 01300.

A. Shop drawings and certifications.

B. Manufacturers' catalog cuts, data sheets, and parts lists; installation and operating instructions, wiring diagrams and service manuals, clearly identified as to equipment and location.

1-7 CIOSEOUT SUBMITTALS: In accordance with Section 01700.

A. Keys: Submit all keys including duplicates. Wire all keys for each lock securely together. Tag and plainly mark with lock number or equipment identification, and indicate physical location, such as building and room name or number, or panel or switch number.

B. Operating Handles and Special Tools: Clearly identify as to related equipment.

C. Schematic Diagrams and As-Built Construction Drawings: Control wiring on each piece of equipment and interconnecting wiring shall have all terminals numbered, and conductors connected to these terminals shall be numbered to match with wire markers. Show all numbers on schematic diagrams and revised as-built construction drawings.

PART 2: MATERIALS

2-1 MISCELLANEOUS METAL: Provide channels, angles, and metal supports where shown and as required for proper support of equipment. Unless otherwise shown, supports shall be galvanized steel. For interior dry locations, use galvanized or cadmium plated fittings, bolts, and nuts. For exterior or wet locations, use only galvanized fittings and stainless steel bolts, washers, and nuts. Where welding is necessary, the welds shall be cleaned, given a prime coat of zinc chromate, and finished to match the existing paint in type and color.

2-2 EQUIPMENT ENCLOSURES: In dry locations, enclosures shall meet NEMA Type 1 requirements, and in wet locations, NEMA Type 3R requirements, unless otherwise shown or specified.

PART 3: EXECUTION

3-1 INSTALLATION: Generally, install materials and equipment in accordance with the recommendations of the manufacturer. Specific installation instructions are given in the individual sections or are shown on drawings.

3-2 INSPECTION: Make all specified tests in the presence of the Contracting Officer. All electrical work shall be demonstrated to operate satisfactorily and in accordance with the requirements of the drawings and specifications. Furnish all instruments and provide qualified personnel to perform all tests in accordance with the drawings and specifications. Prior to final inspection, remove the front covers on all panelboards and gutters. Replace covers on the respective panelboards and gutters immediately after the final inspection is completed.

3-3 TESTING:

A. General: Perform such tests as can be done on equipment installed to indicate equipment and materials have been installed correctly. Correct any defect revealed by the test at no additional expense to the Government.

3-4 EXISTING EQUIPMENT AND WIRING:

A. All existing wiring systems to be removed throughout the building. Any damage done to the part of the building that is to be preserved shall be repaired or replaced at no expense to the Government.

B. All existing materials and equipment to be removed upon specific approval of Contracting Officer becomes the property of the Contractor and shall be removed from the site.

END

PART 1: GENERAL

1-1 DESCRIPTION: The work of this section consists of general electrical materials and methods. Electrical materials that are a part of equipment specified under other sections shall meet the requirements of this section, unless part of larger factory-assembled equipment.

1-2 RELATED WORK: Wire and cable - Section 16306.

1-3 QUALITY ASSURANCE: Section 16010.

1-4 SUBMITTALS: In accordance with Section 01300. Submit manufacturer's literature for raceways and fittings, boxes, wires and cables, wiring devices, nameplates, legend plates, labels, panelboards, and safety switches.

PART 2: MATERIALS:

2-1 RACEWAYS AND FITTINGS: Unless otherwise shown, all interior wiring shall be in a raceway system and shall meet the requirements of the UL standards below.

A. Rigid galvanized steel conduit, UL 6-1981.

B. Galvanized electrical metallic tubing (EMT), UL 797-1977.

C. Flexible steel conduit, UL 1-1979, listed for grounding.

D. Liquidtight flexible metallic conduit, UL 360-1980.

E. Pvc conduit and couplings, UL 651-1981.

2-2 WIRE AND CABLE: Color coded, consistent throughout. Color coding shall be by factory insulation pigmentation or colored plastic tape at all terminations and at every point where wire is accessible. All wires on the same leg or phase shall have the same color code, each leg or phase being a different color. Black, red, and blue shall be used for three-phase, except that for delta secondary voltages where the midpoint of one phase is grounded, the conductor having the higher voltage to ground shall be orange; black and red for single-phase; white for neutral; and green for ground. Neutral and grounding conductors sized No. 6 AWG and larger may be marked with colored plastic marking tape at each end and at every point where wire is accessible; conductors

sized smaller than No. 6 AWG shall be by color coded factory insulation pigmentation.

A. Feeder and Branch Circuits: Unless otherwise shown, the conductor insulation shall be Type THHN, and shall be rated 600 volts. Conductor size shall meet requirements of NEC, or the sizes shown on the drawings if larger, and shall be No. 12 AWG minimum. Unless otherwise shown, wire sizes are for copper. Copper clad conductors are not acceptable.

1. Feeder Circuits: All feeder circuits shall be copper. Aluminum conductors are not acceptable.

2. Branch Circuits: All branch circuits shall be copper.

B. Control Wire: No. 14 AWG unless otherwise shown, 600 volt rated, copper conductor.

1. Interior control wire shall be in conduit and shall be Type THHN, insulation.

2. Direct buried wire shall have Type USE insulation.

3. Underground control wire in conduit shall be as recommended by security panel manufacturer.

4. Control wire within enclosures shall be stranded Type THHN.

2-3 BOXES: Boxes include outlet, pull, and junction boxes. Install one for each outlet, switch, receptacle, or combination, and each junction point, sized as shown. Unless otherwise shown, boxes shall be as follows:

A. Metal Raceway Systems in Interior Dry Locations: Galvanized sheet metal.

B. Outdoor and Wet Locations: Weatherproof, cast metal, threaded hub.

2-4 WIRING DEVICES:

A. Receptacles: UL 498-1981 and NEMA WD-1. Terminals shall be suitable for both copper and aluminum conductors and shall have CO/ALR rating.

1. Duplex Receptacles: Thermosetting plastic, color to match wall, NEMA heavy duty 5-15R and 5-20R configurations, Specification grade with U-shaped grounding pole and a green-

colored terminal for connection of a bonding jumper, color blended to wall decor and to be approved by Contracting Officer.

2. Special Purpose Receptacles: Ratings, number of poles, and configuration as shown.

B. Snap Switches: Specification grade, 15-ampere, 120/277 volt, ac rated, general use quiet type, NEMA heavy duty, with color blended handles. Screw terminals sized for No. 10 AWG copper or aluminum conductors, CO/ALR rated.

C. Device Plates and Covers: One-piece device plates and covers, with matching, countersunk screws, and unless otherwise shown, as follows:

1. Indoor Finished Areas: Color to match wall decor and to be approved by Contracting Officer.

2. Wet Locations: Gasketed and weatherproof with spring covers for receptacles, lever operators for switches, and cast aluminum cover plates for junction boxes.

2-5 PANELBOARDS:

A. As shown on the panelboard schedule. Complete with protective devices and enclosures, buses, ground and neutral bars as required, front covers with door and built-in lock. Protective devices shall be removable without disturbing adjacent units. Flush mounted panelboards shall have adjustable fronts with indicating trim clamps. Where panelboards are used as service entrance, they shall be listed as suitable for use as service entrance equipment by UL. Subpanel neutrals shall be insulated from their enclosures and grounds.

B. Panelboard Circuit Breakers: Unless otherwise shown, all protective devices in all panelboards shall be thermal-magnetic circuit breakers. All multi-pole breakers shall automatically open all poles when an overload occurs in any pole. No external tie-handle construction wherein adjacent poles are on the same phase or leg will be accepted. Tandem breakers are not acceptable. Where branch circuit breakers are used for switching duty, they shall be UL listed as SWD type. Ground fault circuit interrupter protection as required by NEC shall be provided by ground fault circuit interrupting breakers unless otherwise shown. Main breaker shall be 22,000 AIR symmetrical at 240 volts ac. Branch circuit breakers shall have a minimum interrupting rating of 10,000 AIR symmetrical at 120/240 volts ac.

2-6 SAFETY SWITCHES: Quick-make, quick-break, NEMA type HD heavy duty switches. Unless otherwise shown, switches shall be fuse type, 3-pole, with solid neutral. Switches shall have interrupting rating equal to or greater than interrupting rating of the specified fuses and the system short circuit capacity at the point of each application. Voltage ratings shall be that of the system voltage at point of application.

2-7 METAL FRAMING: NEMA ML-1. Unless otherwise shown, mounting channels shall be cold rolled from mild strip steel, 12-gauge, 1-5/8 inches by 1-5/8 inches, with hot dipped galvanized finish, Unistrut P-1000, as manufactured by Unistrut, Wayne, Michigan, or approved equal.

2-8 NAMEPLATES, LEGEND PLATES, AND LABELS:

A. Nameplates: Laminated sheet plastic, approximately 1/16-inch-thick, with engraved white letters on a black background. Minimum height of letters, 5/16 inch. Card holders are not acceptable.

B. Legend Plates: Square D, Lexington, Kentucky, Type KN-3 standard legend plates, or approved equal.

C. Labels or Stencils: Minimum 1/4-inch-high letters. Embossed tape labels are acceptable for this purpose.

D. Control Wire Markers: Pressure-sensitive or heat shrink sleeve types, as manufactured by W. H. Brady Company, Milwaukee, Wisconsin, or approved equal.

2-9 FUSES: Standard single element type unless otherwise shown.

2-10 SECONDARY LIGHTNING PROTECTOR: Thyrite, disc type, rated for use at system voltage. Enclosure shall be weatherproof sealed and suitable for use in outdoor locations. Protector shall be suitable for mounting in 1/2-inch or 3/4-inch conduit opening and shall have 1/2-inch or 3/4-inch male conduit threads for mounting.

A. 240-Volt Protector: Line-to-line maximum voltage rating of 240 volts; line to neutral maximum voltage rating of 175 volts. Impulse sparkover voltage of 10 kv/microsecond pulse, 2,000 volts. IR discharge voltage of 10x20 microsecond current wave at 5,000 amperes, 1,000 volts; at 7,500 amperes, 1,200 volts; at 10,000 amperes, 1,400 volts. General Electric TLP175, or approved equal. Provide mounting bracket and ground strap as required. For three phase, provide 2 or 3 units as recommended by manufacturer.

2-11 TRANSIENT VOLTAGE PROTECTION VARISTOR: Suitable for use on system voltages up to 130 volts RMS. Rated transient energy for a 10x1000 microsecond pulse shall be a minimum of 50 joules. Peak rated current for an 8x20 microsecond pulse shall be 6,000 amperes. Maximum clamping voltage at 100 ampere 8x20 microsecond test pulse shall be 325 volts. General Electric V130LA20B, or approved equal.

PART 3: EXECUTION

3-1 RACEWAY:

A. General: Make cuts for electrical installation square, removing sharp edges. Make changes in direction of raceway with symmetrical bends or metal fittings. Bends shall not kink or reduce the internal diameter. Replace crushed, deformed, or clogged raceway. Clean raceway before pulling in conductors. In runs of conduit and tubing without wiring, install nylon pull string of minimum 100-pound strength, allowing 12 inches excess at each end. Do not use red lead or other nonconductive material at joint locations before joints are made. Make transitions between nonmetallic conduits and metallic boxes with manufacturer's standard adapters designed for such purpose. Follow manufacturer's recommendations for handling, bending, coupling, and installing nonmetallic conduit. Provide expansion joints as necessary for pvc. Make joints tight. Seal wall and roof penetrations weathertight and permanent.

B. Aboveground Conduit: Unless otherwise shown, raceway embedded in concrete or in masonry walls shall be rigid galvanized steel; raceway for installation concealed in hollow nonmasonry walls and surface mounted in nonfinished areas shall be EMT or flexible steel; exposed raceway shall be EMT; and raceway between vibrating equipment and outlet boxes shall be liquidtight flexible electrical conduit cable.

1. Run raceway plumb, level, and a minimum of 6 inches from uninsulated steam and hot water lines. Securely mount raceway using approved manufactured supports, connectors, and securing devices.

2. Run in a direct line with long sweeping bends and offsets.

C. Underground Conduit: Unless otherwise shown, raceway in contact with bare earth shall be rigid galvanized steel approved for direct burial.

1. Rigid galvanized steel conduit without encasement shall have watertight joints and shall be completely coated with two coats of an approved asphalt paint. Allow coating to dry thoroughly before backfilling. Contractor may install conduit and fittings coated with polyvinyl chloride permanently fused at the factory instead of coating conduit with asphalt paint.

2. Grout around conduit tie-ins entering manhole, vault, handhole, or building walls. Where conduit enters buildings, seal openings to prevent circulation of air or moisture. Obtain approval from Contracting Officer before backfilling. Minimum depth to top of underground conduit shall be in accordance with NEC Tables 300-5, unless otherwise shown.

D. Underground Cable: Direct burial type USE cable shall be run in trench. Where cable emerges from ground, it shall be protected by running it in rigid galvanized steel conduit starting one foot below grade and continuing to appropriate panel. Cable shall be protected in trench by magnetic marker tape and wood planking as shown.

3-2 WIRE AND CABLE:

A. Taps and Splices: Permitted only in junction or outlet boxes using factory-manufactured insulated-wire connectors, bolted and taped connectors, or crimp connectors. Use only CO/ALR connectors.

B. Secondary Voltage Wire and Cable: Where direct burial is shown, minimum burial depth is 24 inches.

3-3 WIRING DEVICES:

A. Mounting Heights: To centerline of plate.

1. Receptacles: 18 inches above floor or ground, except as specified below.

a. Above Kitchen Counters: 4 inches above countertops or backsplashes, or 46 inches above floor, whichever is higher.

b. Mechanical Rooms: 46 inches above floor.

c. Above Baseboard Radiation Units: 46 inches above floors.

d. Special Purpose Receptacles: As shown.

2. Switches and Combination Switch/Receptacles: 48 inches above floor.

B. Install receptacles and switches with a minimum of 6 inches lateral separation. Through-the-wall type boxes are not permitted.

C. Remove fiber washers on mounting screws before installing device. Ground receptacles installed in metal boxes with green grounding jumpers. Mounting and terminal screws shall be tight. Firmly attach plates, plumb and level.

3-4 FUSES: Install one complete set of fuses for all devices requiring fuses. Provide three spare sets of fuses of each fuse size and type used in the project.

3-5 METAL FRAMING: Install where electrical equipment is to be surface mounted to walls and where shown. Where two or more safety switches, starters, conduit, or similar items are to be installed side by side, support on metal framing, bolt together and brace as required to form a rigid structure. The installation shall be done in a neat and orderly manner as approved in advance by the Contracting Officer.

3-6 PANELBOARDS: Install flush or surface mounted as shown, with top no more than 78 inches above the floor. On flush mounted panels, paint the front cover including the door to match the adjacent surface, as specified in Section 09901. Provide circuit directory for each panelboard.

3-7 INDIVIDUALLY ENCLOSED CIRCUIT BREAKERS: Install with top of enclosure between 54 inches and 78 inches off ground or floor.

3-8 SECONDARY LIGHTNING PROTECTOR: Install on line side of main disconnect on main disconnect enclosure. Bond grounding wire to main grounding electrode conductor. Install according to manufacturer's recommendations.

3-9 NAMEPLATES, LEGEND PLATES, AND LABELS:

A. Install nameplates to identify all panels, control points, control centers, disconnect switches, and time switches. Fasten nameplates with finish screws or rivets.

1. Identify remotely mounted controls as to the equipment controlled.

2. Identify panels by the panel number, feeder number, and voltage of panel bus.

3. Identify safety switches and motor starters as to equipment controlled and circuits from which they are fed.

B. Install legend plates, in accordance with manufacturer's instructions, for all push-buttons, pilot lights, selector switches, and selector push-buttons.

END

PART 1: GENERAL

1-1 DESCRIPTION: The work of this section consists of underground secondary electrical wire and cable for service, distribution, and controls, not exceeding 600 volts, including connections to meter facilities.

1-2 QUALITY ASSURANCE: Section 16010. Meet requirements of local power company.

1-3 SUBMITTALS: In accordance with Section 01300. Catalog cuts for each type of wire, cable, and conduit.

1-4 PRODUCT HANDLING:

A. Delivery: Deliver materials and equipment in manufacturer's original, unopened, protective packaging. Cable ends shall be sealed to prevent contamination and moisture infiltration.

B. Storage: Store materials and equipment as directed, complying with manufacturer's recommendations and providing protection from the elements.

C. Cable Handling: Handle cable, cable insulation, and conductors carefully to prevent damage by cutting, abrasion, and excessive bending.

1-5 COORDINATION:

A. Before starting construction, field verify drawings and routing of distribution system with Contracting Officer.

B. Notify Contracting Officer two weeks before installing any direct burial cable. Do not install direct burial cable without presence of the Contracting Officer to observe the installation, unless his prior approval has been obtained.

C. Where coordination with a utility company is required, Contractor shall be responsible for coordinating the work with the utility company and assuring that all items for joint use in trench are installed.

PART 2: MATERIALS:

2-1 UNDERGROUND CONDUIT: Rigid galvanized steel, unless otherwise shown.

2-2 DIRECT BURIAL CONDUCTORS: Unless otherwise shown, service conductors shall be Type USE, feeders and branch circuits shall be Type UF. Conductor shall be copper unless otherwise shown. For protection of cable, wherever cable stubs up above grade, it shall be run in rigid galvanized steel conduit to panel.

2-3 CONDUCTORS IN CONDUIT: Type THW unless otherwise shown.

2-4 TRENCHING, BEDDING, AND BACKFILL FOR DIRECT BURIAL CABLE: Section 02221.

A. Paved Areas: BD-1, SB-2, and BF-1.

B. Pedestrian and Lawn Areas: BD-1, SB-2, and BF-2.

C. Nontraffic Areas: BD-1, SB-2, and BF-2.

2-5 TRENCHING, BEDDING AND BACKFILL FOR CONDUIT: Section 02221.

A. Paved Areas: BD-2, SB-3, and BF-1.

B. Pedestrian and Lawn Areas: BD-2, SB-3, and BF-2.

C. Nontraffic Areas: BD-2, SB-3, and BF-2.

2-6 UTILITY LINE MARKING: Section 02229.

2-7 RISER CONDUIT: For risers to overhead system, provide rigid galvanized steel conduit as shown, with 90-degree sweep bend to required burial depth, with weatherhead and drip loop. Size conduit per NEC. Where direct burial cable is specified, provide bushing on end of sweep bend. For risers to meter and breaker panels, provide rigid galvanized steel conduit above grade and to required burial depth.

2-8 GROUNDS:

A. Wire: Bare copper, size No. 8 AWG.

B. Rods: 10-foot-long, 3/4-inch diameter, copper coated steel rod.

PART 3: EXECUTION:

3-1 DIRECT BURIAL CABLE: Section 16050.

A. Where direct burial cable is routed under roads, walks, parking lots, or other paved areas, cable shall be in conduit at minimum depth of 24 inches as shown.

B. Install ground wire in trench with service and feeder circuit conductors. Connect to equipment grounds on both ends.

C. Where branch circuits are extended underground outside of buildings, a separate equipment grounding wire shall be included and bonded to the loads served even though the loads may be separately grounded at the load.

3-2 CONDUIT: Section 16050.

3-3 UTILITY LINE MARKING: Section 02229.

3-4 CABLE INSPECTION: Carefully inspect cable during handling to verify that the cable is free from visible defects. Report all cable damage to Contracting Officer, whether prior to installation, during installation, or discovered by test. Repair cable promptly, in accordance with recommendations of manufacturer and as approved by Contracting Officer. Show location of any repair on project record drawings.

3-5 CAELE BURIAL DEPTH: Minimum 24 inches below grade.

3-6 CABLE SLACK AND BENDS:

A. Leave sufficient slack, minimum 24 inches, of excess cable at all risers, transformer pads, pedestals, and terminal points.

B. The minimum acceptable bending radius of the cable is 12 times the overall diameter of the cable. The minimum radius specified is measured to the surface of the cable on the inside of the bend. No cable bends shall be made within 6 inches of a cable terminal base.

3-7 TRENCHING AND BACKFILLING: Section 02221.

3-8 RISER CONDUIT: Firmly secure conduit with galvanized steel brackets. Connection to power company facilities will be by power company.

END

PART 1: GENERAL

1-1 DESCRIPTION: The work of this section consists of furnishing and installing service entrance equipment, raceways, and conductors.

1-2 COORDINATION:

A. Permanent electric power of the phasing, voltage, and characteristics shown will be supplied by the power company. Coordinate all work with the Contracting Officer and the power company. Where work by the power company is required in conjunction with construction, such as installation of cable in common trench with other utilities, the Contractor is responsible for coordinating the work and ensuring that all required work is completed.

B. Where work is to be performed by the power company that requires payment to the power company, payment will be made by the Government. Where the Contractor identifies the need for work by the power company that requires payment and no known contractual arrangement by the Government has been made, the Contractor shall immediately notify the Contracting Officer.

1-3 RELATED WORK: Basic materials and methods - Section 16050; underground secondary - Section 16306.

1-4 QUALITY ASSURANCE: Section 16010. The electrical service shall meet the requirements of the power company.

PART 2: MATERIALS

2-1 SERVICE RACEWAY:

A. Aerial: Galvanized rigid steel conduit.

B. Underground: Size and material shown.

2-2 SERVICE MAST: Raintight, galvanized steel weatherhead, sized for conduit and number and size of service conductors. Provide an insulator bracket below the weatherhead for support of service drop. Condulets and fittings shall be weatherproof.

2-3 SERVICE CONDUCTORS: All conductors shall be copper. Stranded, with insulation voltage rating and type meeting or exceeding NEC requirements for the application.

2-4 SERVICE DISCONNECT: UL listed as "Service Entrance Equipment", externally operable and plainly marked whether in open or closed position, and capable of interrupting the maximum symmetrical short circuit current available. Pressure connectors shall be provided for attachment of service conductors. See Section 16050 for the following:

A. Panelboards.

B. Switches.

C. Individual enclosed circuit breaker.

D. Meter center. For 400 ampere, three phase, 4 wire incoming service with provision for 6 meters and two spaces, with single phase, 3 wire, two pole branch circuit breakers, as manufactured by Square D Company, and with same size matching tap box.

2-5 WIREWAY: As shown. Formed from galvanized code gauge sheet steel, complete with all fittings, plates, and closures; hinged latched covers. Raintight wireway shall be provided with gasketed conduit hubs for top mounted equipment.

2-6 METER SOCKET: Type approved by power company, weatherproof, complete with blank cover, single phase service for individual panel as shown on drawings.

2-7 METERS: Power company furnished.

2-8 POLE: Wood pole, 30 feet long, Class 5, full length penta treated as used by local utility company.

PART 3: EXECUTION

3-1 SERVICE RACEWAY:

A. Use lag screws on wood and bolts on steel or masonry. On thin skin buildings, use interior blocking as required. Conduit shall be raintight with arrangement to drain. Provide bushings at conduit ends.

B. For service on pole, securely support conduit with a minimum of two 2-hole galvanized pipe straps or brackets at maximum spacing of 5 feet apart.

3-2 SERVICE MAST: Firmly attach weatherhead to service raceway. Pull out a minimum of 3 feet of conductors from insulated head for later attachment to service. Connection to service shall provide a minimum drip loop of 6 inches below conductor entrance to weatherhead. Mount insulator bracket in accordance with NEC 230-24.

3-3 SERVICE CONDUCTORS: Without splice, except clamped or bolted connections may be used at meter socket. Make taps to service conductors with split-bolt connectors. For 3-wire systems, color code line 1, black; line 2, red; neutral, white.

3-4 SERVICE DISCONNECT: Install and ground in accordance with NEC and as shown.

3-5 METER CENTER: Locate and install as shown, as unobtrusively as practical. Bond and ground metal of pedestal to service ground.

3-6 WIREWAY: Install the wireway in accordance with NEC 362 and as shown. Service and feeder conductors may not be in same cross section of the wireway.

3-7 METER SOCKET: Install where shown.

3-8 METER: Power company will install meter.

3-9 POLE: Set pole where shown at minimum depth of 7 feet below grade. Utility company shall provide and install service to pole and hardware required for such service.

END

PART 1: GENERAL

1-1 DESCRIPTION: The work of this section consists of grounding electrical systems and noncurrent carrying metallic parts of electrical equipment and raceway.

1-2 QUALITY ASSUPANCE: Section 16010.

1-3 SUBMITTALS: In accordance with Section 01300. Triplicate results of made electrode ground resistance tests.

PART 2: MATERIALS

2-1 GROUNDING CONDUCTOR: Copper, without splice throughout its length, sized per NEC or as shown; bare or green insulated wire is acceptable unless otherwise shown.

2-2 MADE ELECTRODES: One piece copper clad steel rods, minimum of 3/4-inch diameter by 10 feet long. Do not use metallic conduit or pipe coated with lacquer or other nonconducting material.

2-3 BONDING JUMPERS: Bare copper. Jumpers for service equipment shall be the size of grounding electrode conductor which shall be sized per NEC Table 250-94. Jumpers for interior wiring raceways and enclosures shall be sized according to NEC Table 250-95.

2-4 EQUIPMENT GROUNDING CONDUCTOR: Section 16050 for color coding requirements.

PART 3: EXECUTION

3-1 GROUNDING CONDUCTORS: Protect ground conductors exposed to damage by conduit secured to stationary surfaces. Bond metal conduit at both ends to the ground wire.

3-2 MADE ELECTRODES: Where shown or as required by NEC, embed rods vertically into permanent moisture level, if possible. Provide two rods with 6-foot minimum distance between them if measured resistance to ground exceeds 25 ohms for one electrode.

3-3 SERVICE GROUNDING: Connect neutral of electrical systems to grounding conductor on supply side only of service entrance equipment within service equipment enclosure. Do not connect neutral to ground on load side of service disconnecting means except to electric ranges and dryers. Bond meter sockets to service neutral. Bond service equipment enclosures and service raceways to grounding conductor within service equipment enclosures. Provide service conduits with grounding locknuts or grounding bushings; provide service enclosures with grounding connectors, lugs, or clamps. Connect grounding conductor to grounding electrode system and to metallic cold water piping system near entrance at building, if available. Point of attachment shall be accessible and located in protected area. Attach grounding conductor to piping or electrodes with bolted brass or bronze clamps. Connect conductor to clamp by lugs or pressure connectors. Clamps of sheet metal type are not acceptable. Where grounding electrode includes an underground water piping system, assure continuity by providing bonding jumpers across water meters, nonconducting sections, and fittings which can be disconnected.

3-4 EQUIPMENT GROUNDS AND BONDS: Ground metallic raceway systems, enclosures, and noncurrent carrying metallic parts of electrical equipment. Enclosures and noncurrent carrying metal parts are considered grounded by connection to grounded metallic raceway system. Electrical continuity of raceway systems shall be assured, except that a separate insulated copper ground wire with the same type of insulation as the respective circuit shall be included in all feeder and branch circuits, to serve as the equipment grounding conductor and shall be sized according to NEC Table 250-95. Where raceways connect to enclosures, remove nonconducting coatings. Make raceway connections at enclosures tight to assure continuity or supplement with jumpers. Establish continuity between outlet boxes and receptacles by a bonding jumper. Use service grounding conductor and grounding electrode for wiring system as equipment and raceway ground. Do not use red lead or other nonconducting material at metallic conduit joints before assembly.

3-5 GROUNDING ELECTRODE SYSTEM: Where available on the premises at each building or structure served, grounding electrodes, including ground rings, metal underground water pipe, an effectively grounded metal building frame, and a concrete-encased electrode, shall be bonded together to form the grounding electrode system.

3-6 Unless otherwise shown, if other grounding systems, such as for a lightning protection system, are present at or within 50 feet of the building or structure served, bond the two systems together with bare copper ground wire, sized to the larger of the two grounding electrode conductor sizes.

END

PART 1: GENERAL

1-1 DESCRIPTION: The work of this section consists of providing complete lighting fixtures, with lamps, for each lighting fixture indicated.

1-2 QUALITY ASSURANCE: Section 16010.

1-3 SUBMITTALS: In accordance with Section 01300, submit manufacturers' data for the following items. Data shall include metal gauges, diffuser material, performance curves, coefficient of utilization and maintenance factors, ballast data, poles and standards. NEMA method ballast test temperature shall be provided.

1-4 PRODUCT HANDLING: Deliver fixtures and lamps in original packing cartons.

PART 2: MATERIALS

2-1 GENERAL LIGHTING FIXTURES: Complete with all accessories required for a complete and operable system. Plaster frames and flanges suitable for type of ceiling shall be provided for recessed fixtures. Plates, barriers, or rings shall be provided to cover any exposed ceiling material between fixture canopy or pan and outlet box. Fixtures installed in damp and wet locations shall be UL listed and marked "Suitable for Wet Locations."

2-2 EXTERIOR LIGHTING FIXTURES: Complete with bases, as required.

2-3 BALLASTS: Rated 120 volts, unless otherwise indicated, 60 hertz, high power factor type. Meeting following requirements:

A. Fluorescent Lamp Ballasts: Rapid start CBM certified by ETL, Class P, 40-watt, sound rating. For outdoor temperature ambient location, provide low temperature ballast suitable for use to minus 20 degrees F minimum.

B. Other: As required by future contract.

2-4 LAMPS: Provide for each fixture a lamp of the type, size, color, wattage, and voltage shown.

2-5 LENS AND ENCLOSURES: As indicated on plans.

PART 3: EXECUTION

3-1 GENERAL INTERIOR LIGHTING FIXTURES: Adjust fixture location as needed to avoid space conflicts. Mount at heights indicated, securely supported. Attach to outlet box if adequately supported. Support suspended fixtures by metal stems, hanging level in same horizontal plane. Do not use as a raceway for circuit conductors except for single branch circuit supplying the fixtures. Branch circuit wiring shall not pass through an outlet box that is an integral part of an incandescent fixture unless fixture is approved for the purpose. Flush and recessed fixtures shall have tap connection conductor, with insulation rated for 90 degrees C, run from fixture terminal connection to an outlet box at least 1 foot from fixture. Tap shall be between 4 and 6 feet long in metallic raceway. Wiring within fixtures shall be neatly arranged and protected from physical damage. Protect conductor insulation from abrasion where it passes through metal using chase nipples or equivalent.

3-2 EXTERIOR LIGHTING FIXTURES: Provide base with fixture. Adjust fixtures as required for even distribution. Ground each fixture to equipment grounding system.

3-3 BALLASTS: General preinstalled in fixtures. Remote ballasts shall be accessible in noncombustible locations.

3-4 LAMPS: Just prior to completion, supply new lamps in fixtures.

3-5 LENS AND ENCLOSURES: Clean, new, unbroken; install just prior to completion.

3-6 TESTS: Upon completion of lighting fixture installations, test all lighting circuits. Replace noisy or defective fixtures.

END

PART 1: GENERAL

1-1 DESCRIPTION: The work of this section consists of furnishing and installing detectors, manual fire alarm stations, fire alarm control panel, fire alarm bells, and other related items.

1-2 QUALITY ASSURANCE:

A. The system and all individual components shall meet the requirements of NEC, NFPA, UL, manufacturers' printed recommendations, and state and local codes as applicable. Individual components shall be UL listed.

B. The complete system, except the dialer, shall be provided by one manufacturer and shall be the System 3 Universal Alarm Control, by Pyrotronics, Inc., Cedar Knolls, New Jersey 07927. Other manufacturer's systems will be considered, provided they are approved as equal.

1-3 SUBMITTALS: In accordance with Section 01300, submit manufacturers' literature for detectors, manual stations, control panel including all specified modules, alarm bell, alarm horn, wire and raceway, detector removal tool, detector tester, batteries, and telephone dialer.

PART 2: MATERIALS

2-1 DETECTORS, GENERAL: Unless otherwise shown, all detectors shall be 24 volt dc plug-in type with an indicating light in either the base or detector to indicate that the particular detector has initiated an alarm condition. It shall be possible to connect a remote indicator light to the base to provide remote monitoring. Unless otherwise noted on drawings or specified, the detectors shall be flush mounting type. All system components shall be compatible with control unit 24 volt dc voltage.

2-2 FIRE DETECTOR - IONIZATION: UL 268 listed. Shall operate on the ionization principle and shall be activated by the presence of combustion products. The detector head shall be a plug-in unit containing two ionization chambers. The unit shall contain no moving parts. One chamber shall be for fire detection and the second chamber shall function as a reference, to stabilize the detector sensitivity for normal changes in environmental conditions. It shall be possible to electrically

check the detector's sensitivity, using a Sensitivity Test Set, Model SCU-3, and readjust the detector's sensitivity, as required. The measurement of detector sensitivity shall provide a precise electrical value as read on the test set meter. The amplifier-switching circuit, in the detector head, shall be entirely solid-state. The detector base shall have terminals for making all connections; no soldering shall be required. It shall be possible to secure the detector in the base to prevent unauthorized tampering. Shall be Pyrotronics DI-3.

2-3 FIRE DETECTOR - PHOTOELECTRIC: Shall operate on the photoelectric principle and shall respond to a sensitivity of 12 percent per foot obscuration. The detector head shall be a plug-in unit containing a solid state light emitting diode (LED) and a light sensing photodiode arranged in a labyrinth sensing chamber. The detector shall contain no moving parts. Pyrotronics DP-3.

2-4 FIRE DETECTOR - FLAME: Shall operate on the response to infrared radiation principle and shall be activated by the presence of flickering flame. The detector shall have provision for both a 5-second and 20-second delay. Pyrotronics DF-1S for surface installation and DF-1F for flush installation.

A. The detector head shall be a plug-in unit. The unit shall contain no moving parts. The detector shall contain a four-position switch for selecting any combination of two sensitivity settings and two delay settings.

B. The detector base shall have screw terminals for making all connections; no soldering shall be required. It shall be possible to secure the detector in the base to prevent unauthorized tampering.

2-5 FIRE DETECTOR - FIXED TEMPEPATURE/RATE OF RISE: Shall be surface mounted unit with 15 degrees F per minute rate-of-rise. Pyrotronics DT-135R. Where temperatures may normally rise to 100 degrees F where shown on drawings, unit shall be Pyrotronics DT-200R.

2-6 FIRE ALARM BELL: Pyrotronics Model BDC-624 for interior and Pyrotronics Model BDC-624 with WBK-2 Weatherproof Box with Bell Guard for exterior use. Provide end-of-line device, factory installed for end-of-line bell. Bell shall be polarized, vibrating type, with mechanism fully enclosed and dustproof. Bell shall be for 24 volt dc operation.

2-7 MANUAL FIRE ALARM STATION: Shall be single action type with alarm light, Pyrotronics MS-52C.

The station shall be of the non-coded type, and fully compatible with ionization and thermal fire detectors in same circuit. It shall be constructed so that once a station has been pulled, it can only be reset with the use of a special tool (supplied with manual station).

2-8 FIRE ALARM CONTROL PANEL: Shall be of solid state, modular design with provisions for adding additional modules at future time. A flush mount enclosure with key lockable, left hinged cover with dead front construction shall be provided. Enclosure shall be of sufficient size to accommodate modules for all required functions with batteries as applicable, plus space for a minimum of two additional modules. The detector circuits shall accommodate ionization, photoelectric, flame, or thermal detectors, as well as manual alarm stations intermixed as desired on the same circuit. The panel shall operate from a three-wire 120 volt ac supply. Each input shall be separately fused within the panel. It shall include lamps for system power, alarm, and trouble, as well as LED indicators for zone alarm, zone trouble, and audible signal circuit trouble. Momentary contact switches shall be provided for Reset/Lamp Test and Trouble Silence which shall silence the internal trouble signal sounding device. Alarm receipt shall override trouble. The control panel shall be Pyrotronics Model CP-31 with BC-31 Battery Charger/Transfer module with required number of ZN-30 Dual Ion Zone input modules and other modules as required, and an EA series enclosure and matching rail/bracket assembly. A Model MM-31 meter module and BM-31 battery module shall be included.

Additional circuitry and visual signaling for this capability shall be provided by add-on modules and enclosures as are necessary. Interconnection of these modules shall be by plug and harness assemblies which shall provide system power, supervision, lamp-testing functions, and such other circuitry as is necessary for an operable system. The control panel shall have one set of normally open and normally closed alarm operated relay contacts and one set of normally open and normally closed trouble operated relay contacts. All contacts shall be rated at 120 volts ac, 3 ampere. The alarm relay coil shall be supervised. In addition, the panel shall have built-in ground detection as well as plug-in connectors for emergency power. It shall be arranged so that alarm signal annunciation shall take precedence over a trouble signal. Terminals shall be provided so that the trouble indicators and controls can be located remotely. The sprinkler system in the building shall be supervised so that operation of

the system shall cause an alarm to be issued. Loss of air pressure in the dry-pipe valve unit shall also cause an alarm.

2-9 WIRE: Shall be as recommended by system manufacturer.

2-10 TELEPHONE DIALER: Ademco Model G-12. Unit shall be for 120 volt, 60 hertz operation with 12 volt gel-cell battery for standby.

PART 3: EXECUTION

3-1 WIRING: Wiring to be run concealed in walls and ceiling. Where exposed and impossible to conceal, wiring shall be run in EMT. Concealed wiring shall be EMT or flexible metallic.

3-2 TESTING: Upon completion, perform tests of the entire installation. Make tests in the presence of the Contracting Officer. Tests shall be performed by representative from Pyrotronics.

3-3 TELEPHONE DIALER: Install beside panel or as directed by Contracting Officer. Connect to telephone system at telephone panel. Program dialer with telephone numbers and voice message as directed.

END

PART 1: GENERAL

1-1 DESCRIPTION: The work of this section consists of furnishing and installing a conduit system suitable for use with detection equipment, as shown.

1-2 QUALITY ASSURANCE: All work shall meet the requirements of NEC.

1-3 SUBMITTALS: In accordance with Section 01300. Manufacturer's literature for all specified components of the security alarm system.

1-4 COORDINATION: Coordinate installation of telephone dialer with local telephone company and Park Service maintenance staff.

PART 2: MATERIALS

2-1 CONTROL PANEL: (Future.) Ademco 4080 surface mounted panel, as manufactured by Ademco, Syosset, New York, or approved equal. All control panel functions shall be within enclosure. All keyed switches in the system remote and local serving the same function shall match. Panel shall include:

A. Selectable automatic time delays to allow exit from building following activation of system, and one to allow entry into building for shut-off without activating alarm.

B. Automatic timer to limit audible alarm time, selectable from 5 or 10 minutes. Upon timing-out, system shall reactivate burglar loops.

C. Three burglar zones, each with shunting on-off switches and latching alarm indicator. Burglar loops shall accept either normally open or normally closed sensors.

D. 24-hour emergency circuit.

E. Yelper or siren driver with relay as required.

F. Door mounted light emitting diodes to indicate "on" and "activated".

G. Door mounted round key switch for activation and test of system, including exterior audio alarm and battery capability.

H. Provision for ac or dc operation.

I. 12 volt, 5-ampere-hour sealed lead acid rechargeable battery, with mounting bracket installed inside panel.

J. Battery charger.

K. Audible warning of shunted zone at set-up time.

2-2 SECONDARY LIGHTNING PROTECTION: Section 16050.

2-3 TRANSIENT VOLTAGE PROTECTION VARISTOR: Section 16050.

2-4 REMOTE KEY LOCK: Three-position keyed lock, in standard size stainless steel switch mounting plate, with light emitting diode for indicating "activated". Ademco 5246, manufactured by Ademco, Syosset, New York, or approved equal.

2-5 CONCEALED MAGNETIC CONTACT: Closed loop, suitable for use with up to 7/8-inch gap. Model No. 1059, as manufactured by Sentrol, Inc., Portland, Oregon, or approved equal.

2-6 HIGH SECURITY SURFACE MOUNT MAGNETIC CONTACT: Closed loop, suitable for use with up to 0.6-inch gap, 3-foot stainless steel flexible conduit. Model No. 2707, as manufactured by Sentrol, Inc., Portland, Oregon, or approved equal.

2-7 PASSIVE IR SENSOR: Model No. IR-60, as manufactured by Mosler Company, Hamilton, Ohio, or approved equal. 12-volt dc power shall be supplied from control panel.

2-8 WIRE:

A. Wiring of Burglar Loop Between Sensors and Control Panel: Copper, Type PF, twisted pair, 22 AWG or larger, with vinyl protective wrap, as recommended by manufacturer.

B. Wiring to Alarm Devices: No. 16 AWG or larger, Type PF.

C. Wiring Between Dialer and Telephone System: Copper, Type PF, twisted pair, No. 22 AWG or larger, with vinyl protective wrap.

2-9 TELEPHONE DIALER: Unit installed under Section 16721.

PART 3: EXECUTION

3-1 Install at locations shown or as directed by Contracting Officer, and according to manufacturer's recommendations.

3-2 WIRING: Route as approved by Contracting Officer. Wire shall be installed concealed, unless indicated otherwise, in EMT or flexible metallic conduit.

3-3 SECONDARY LIGHTNING PROTECTOR: Section 16050.

3-4 TRANSIENT VOLTAGE PROTECTION VARISTOR: Install across 120 volt input to control panel on load side of power on-off switch. Confirm that telephone company has installed gas tube protectors on the incoming telephone line and advise Contracting Officer.

3-5 OPERATING INSTRUCTIONS: Following installation and before final inspection of the system, demonstrate system to Contracting Officer and selected park personnel. At time of final inspection, again fully describe and demonstrate the following:

A. Switches, sensors, lights, and alarms.

B. Operation of system on loss of ac power.

C. Telephone dialer; include playing recorded messages.

D. Transmission of remote alarm to specified agency as applicable.

END

PART 1: GENERAL

1-1 DESCRIPTION: The work of this section consists of furnishing and installing a complete telephone raceway system, including provisions for termination facilities and other work in conjunction with the telephone company, as specified and as shown on the drawings.

1-2 CCORDINATION:

A. Coordinate all work with Contracting Officer and telephone company. Where work by the telephone company is required in conjunction with construction, such as prewiring of buildings or installation of cable in common trench with other facilities, Contractor is responsible for coordinating work and ensuring that all required work is completed.

B. Unless otherwise specified, where work is involved by the telephone company that requires payment to the telephone company, payment will be made by the Government. Where Contractor identifies the need for work by the telephone company that requires payment and no known contractual arrangement by the Government has been made, Contractor shall immediately notify Contracting Officer.

1-3 RELATED WORK: Basic materials and methods - Section 16050.

1-4 QUALITY ASSURANCE: Section 16010. The telephone raceway system and other facilities shall meet the requirements of the local telephone company.

1-5 SUBMITTALS: In accordance with Section 01300, submit catalog cuts for cabinets, outlet boxes, nozzles, and all covers.

1-6 DEFINITION: Bedding and backfill material types (BD, SB, BF) are defined in Section 02221.

PART 2: MATERIALS:

2-1 UNDERGROUND CONDUIT RISERS: Rigid galvanized steel, sized as shown. Use only couplings and fittings designed specifically for type of conduit shown.

2-2 CABLE BEDDING AND BACKFILL: Provide bedding and backfill for direct burial telephone cable in accordance with Section 02221 as follows:

A. Paved Areas: BD-1, SB-2, and BF-1.

B. Pedestrian and Lawn Areas: BD-1, SB-2, and BF-2.

C. Nontraffic Areas: BD-1, SB-2, and BF-2.

2-3 ABOVE GRADE RACEWAY: Unless otherwise shown, raceway shall be rigid galvanized steel conduit for exterior and EMT or metallic flexible conduit for interior and shall be sized as shown on drawings. Minimum size of conduit shall be 3/4 inch. Use only couplings and fittings designed specifically for type of conduit or raceway shown.

2-4 BOXES: Boxes include outlet, pull, and junction boxes. Boxes shall have sufficient free volume to accommodate wiring and devices.

A. Wall Boxes: In dry locations, wall boxes shall be 4-inch by 4-inch by 2-1/2-inch minimum galvanized sheet metal.

2-5 PLATES AND COVERS: One-piece metallic. Surface mounted installations shall have color blended covers of type designed for the box. Plates shall be color blended for flush boxes. In wet locations, plates shall be gasketed and weatherproof. Junction boxes shall have blank covers. Metal plates for outlet boxes shall have a center bushed hole. Screws shall have countersunk heads of finish to match plates.

2-6 CABINETS: Galvanized sheet metal of the size shown, NEMA Type 1, surface or flush mounted with hinged door. Hoffman No. A-6N64 with panel in crawl space, Hoffman No. A24R208HC for utility company panel or approved equals.

2-7 GROUND CONDUCTOR: Bare or green insulated No. 10 AWG conductor.

PART 3: EXECUTION

3-1 RACEWAY:

A. Underground Raceway:

1. Trenching and Bedding and Backfill: Section 02221.

2. Utility Line Marking: Section 02229.

B. Install interior raceway with maximum of 270 degrees of total bends between outlets or junction boxes; such runs shall not exceed 90 feet. Raceways for telephone will not be shared with raceways for power.

C. Install service conduit at the location shown on the drawings. Where telephone cabinet is required to be mounted on side of adjacent building, extend service conduit to cabinet, as shown on drawings.

D. Extend 3/4-inch raceway from each telephone wall outlet directly to the terminal cabinet.

3-2 BOXES: Install one box for each telephone outlet and junction point. Mount indoor outlets 18 inches above finished floor level unless otherwise shown. Mount wall mounted telephones at height as directed by Contracting Officer.

3-3 TELEPHONE CABINETS: Install as shown.

3-4 GROUNDING: Install one ground conductor in 1/2-inch conduit from the telephone cabinet to the electrical service ground source. Provide grounding bushings and ground conduit to grounding conductor at each end of conduit. Provide a 48-inch loop of conductor at cabinet end.

END

PART 1: GENERAL

1-1 DESCRIPTION: The work of this section consists of providing and installing heater complete with conduit, wire, fittings, and controls as specified and shown, and ready to operate.

1-2 OPERATION: Heaters shall be controlled by integral thermostats.

1-3 RELATED WORK SPECIFIED ELSEWHERE: General mechanical - Section 15010; basic materials and methods - Section 16050.

1-4 SUBMITTALS: In accordance with Section 01300. Submit manufacturer's literature, installation recommendations, parts lists, operating and maintenance instructions for the heaters, controls, and accessories.

PART 2: MATERIALS

2-1 ELECTRIC HEATER: Shall be Emerson-Chromalox space mod unit heater, or approved equal. Complete with mounting bracket and integral thermostat. Model number as shown on drawings.

2-2 CONDUIT, WIRING: Refer to Section 16050.

PART 3: EXECUTION

3-1 INSTALLATION: As recommended by the manufacturer and as shown.

END