

JULY 27, 2021

ATTENTION ALL REQUEST FOR BID (RFB) HOLDERS

RFB NO. 320013-REBID - ADDENDUM NO. 1

FEN OAK GREENHOUSE

BIDS DUE: AUGUST 3, 2021, 2:00 PM. DUE DATE AND
TIME ARE NOT CHANGED BY THIS ADDENDUM.

This Addendum is issued to modify, explain or clarify the original Request for Bid (RFB) and is hereby made a part of the RFB. Please attach this Addendum to the RFB.

PLEASE MAKE THE FOLLOWING CHANGES:

1. Table of Contents

Delete current Table of Contents; replace with new Table of Contents, issued with this Addendum..

2. General Requirements

Add "General Requirements", issued with this Addendum.

3. Construction Waste Management

Add "Construction Waste Management", issued with this Addendum.

4. Section 22 00 00 - Plumbing

Add "Plumbing", issued with this Addendum.

5. Section 23 11 00 – Fuel Facility Piping

Add "Fuel Facility Piping", issued with this Addendum.

6. Section 26 05 00 – General Electrical Requirements

Add "General Electrical Requirements" issued with this Addendum.

7. Sheet 005

Delete "Tag - H" reference to Plyco Doors.

Change "Tag - G" to read 4'0" x 6'8" Insulated Utility Door.

PLEASE NOTE THE FOLLOWING CONTRACTOR SUBMITTED QUESTIONS:

Q1: Is an electrical sub-panel needed?

A1: Yes, contractor to provide a [Square D QO 125 Amp 12-Space Outdoor Main Lug Load Center with Ground Bar](#) and Main Breaker. Installation location noted on Sheet 003.

Q2: Is the contractor responsible for water supply installation and hose bibs?

A2: Yes.

Q3: What size of gas supply line should be provided?

A3: The gas supply line should be ¾".

If any additional information about this Addendum is needed, please call Ryan Shore at 608/445-0109, shore@countyofdane.com.

Sincerely,
Ryan Shore
Project Manager

Enclosures:

- Table of Contents
- General Requirements
- Construction Waste Management
- Section 22 00 00 – Plumbing
- Section 23 11 00 – Fuel Facility Piping
- Section 26 05 00 – General Electrical Requirements

SECTION 00 01 10

TABLE OF CONTENTS

DIVISION 00 - PROCUREMENT AND CONTRACTING REQUIREMENTS

- 00 01 01 - Project Manual Cover Page
- 00 01 10 - Table of Contents
- 00 11 16 - Invitation to Bid
- 00 21 13 - Instructions to Bidders
- 00 41 13 - Bid Form
- 00 43 36 – Subcontractor Form
- 00 52 96 - Sample Public Works Construction Contract
- 00 61 12 - Sample Bid Bond
- 00 61 13.13 - Sample Performance Bond
- 00 61 13.16 - Sample Payment Bond
- 00 72 13 - General Conditions of Contract
- 00 73 00 - Supplementary Conditions
- 00 73 11 - Fair Labor Practices Certification

DIVISION 01 - GENERAL REQUIREMENTS

- 01 00 00 - General Requirements
- 01 74 19 - Construction Waste Management, Disposal & Recycling

DIVISION 22 – PLUMBING

- 22 00 00 – Plumbing

DIVISION 23 – PIPING

- 23 11 00 – Facility Fuel Piping

DIVISION 26 - ELECTRICAL

- 26 05 00 - General Electrical Requirements

DRAWINGS

Plot drawings on 8.5” x 11” (ANSI A) or 11” x 17” (ANSI B) paper for correct scale or size.

- Cover Page
- Framing & Footing Details
- Equipment Plan
- Elevations
- Electrical Plan
- Mechanical Plan
- Typical Sections
- Site Plan
- Fen Oak Power Plan Sheet
- Inlet Shutters
- Exhaust Shutter Fan
- Exhaust Fan Installation
- HAF Fan
- Heater
- Thermostat

END OF SECTION

SECTION 01 00 00

GENERAL REQUIREMENTS

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
1. Summary
 2. Summary of the Work
 3. Contractor Use of Premises
 4. Applications for Payment
 5. Change Procedures
 6. Alternates
 7. Lump Sum Allowances for Work
 8. Coordination
 9. Cutting and Patching
 10. Conferences
 11. Progress Meetings
 12. Job Site Administration
 13. Submittal Procedures
 14. Proposed Products List
 15. Shop Drawings
 16. Product Data
 17. Samples
 18. Manufacturers' Instructions
 19. Manufacturers' Certificates
 20. Quality Assurance / Quality Control of Installation
 21. References
 22. Interior Enclosures
 23. Protection of Installed Work
 24. Parking
 25. Staging Areas
 26. Occupancy During Construction and Conduct of Work
 27. Protection
 28. Progress Cleaning
 29. Products
 30. Transportation, Handling, Storage and Protection
 31. Product Options
 32. Substitutions
 33. Starting Systems
 34. Demonstration and Instructions
 35. Contract Closeout Procedures
 36. Final Cleaning
 37. Adjusting
 38. Operation and Maintenance Data
 39. Spare Parts and Maintenance Materials

40. As-Built and Record Drawings and Specifications

1.2 SUMMARY OF THE WORK

- A. Project Description: Perform the Work as specified and detailed in Construction Documents package. Contractor to provide services for the construction of a greenhouse
- B. Work by Owner: Not applicable.
- C. Permits: Prior to commencement of the Work, Contractor to secure any and all necessary permits for completion of the Work and facility occupancy. Provide Public Works, Project Manager with copies of all permits.
- D. Diggers Hotline:
 - 1. It is General Contractor's responsibility to contact Diggers Hotline to have all utility locations marked prior to excavation and planning excavation so as not to delay the Work.
 - 2. Use Diggers Hotline to obtain information on safe working clearances from overhead lines.
 - 3. Completely comply with all requirements of each affected utility company.
 - 4. It is General Contractor's responsibility to contact & hire private utility locating services if necessary.

1.3 CONTRACTOR USE OF PREMISES

- A. Limit use of premises to allow work by Contractors or Subcontractors and access by Owner.
- B. Coordinate utility outages and shutdowns with Owner.
- C. Contractors or Subcontractors shall not visit the site if they are or have recently been ill.

1.4 APPLICATIONS FOR PAYMENT

- A. Submit each Application for Payment on AIA G702™ and G703™ forms or approved contractors invoice form. Contractor shall have these forms notarized and signed.
- B. Content and Format: Utilize Schedule of Values for listing items in Application for Payment.
- C. Payment Period: Monthly.
- D. Submit Applications for Payment to Public Works Project Manager for approval & processing for payment.

1.5 CHANGE PROCEDURES

- A. Contractor's costs for Products, delivery, installation, labor, insurance, payroll, taxes, bonding, equipment rental, overhead and profit will be included in Change Orders authorizing expenditure of funds from contingency allowance.

1.6 ALTERNATES

- A. Owner shall review and accept or reject alternates quoted on Bid Form.
- B. Coordinate related work and modify surrounding work as required.
- C. Schedule of Alternates: there are no alternates proposed for this project.

1.7 LUMP SUM ALLOWANCES FOR WORK

- A. Not Applicable.

1.8 COORDINATION

- A. Coordinate scheduling, submittals, and work of various sections of Specifications to assure efficient and orderly sequence of installation of interdependent construction elements.
- B. Verify utility requirement characteristics of operating equipment are compatible with building utilities.
- C. Coordinate space requirements and installation of mechanical and electrical work indicated diagrammatically on Drawings.
- D. Contractor shall provide Public Works Project Manager with work plan that ensures the Work's completion within required time & schedule.
- E. All activities shall be coordinated in advance with Public Works Project Manager unless noted otherwise in these specifications.
- F. Public Works Project Manager may choose to photograph or videotape site or workers as the Work progresses.

1.9 CUTTING AND PATCHING

- A. Employ skilled and experienced installer to perform cutting and patching new work; restore work with new Products.
- B. Submit written request in advance of cutting or altering structural or building enclosure elements.
- C. Fit work tight to adjacent elements. Maintain integrity of wall, ceiling, or floor construction; completely seal voids.

- D. Refinish surfaces to match adjacent finishes.

1.10 CONFERENCES

- A. Project shall have pre-bid conference; see Instructions to Bidders.
- B. Owner will schedule preconstruction conference after Award of Contract for all affected parties.
- C. Contractor shall submit Construction Schedule at pre-construction meeting.
- D. When required in individual Specification section, convene pre-installation conference at project site prior to commencing work of Section.
- E. .

1.11 PROGRESS MEETINGS

- A. Day & time of progress meetings to be determined at pre-construction meeting.
- B. General Contractor shall schedule and administer meetings throughout progress of the Work at minimum of one (1) per week with Public Works Project Manager, involved Dane County staff & other individuals as required.
- C. General Contractor shall preside at meetings, record minutes, and distribute copies within two (2) business days to those attending & those affected by decisions made.
- D. Owner shall schedule and administer meetings throughout progress of the Work at minimum of one (1) per week.
- E. Owner shall preside at meetings, record minutes, and distribute copies within two (2) business days to those affected by decisions made.
- F. Attendance at progress meetings by General Contractor, subcontractors, or their authorized representative, is mandatory.
- G. Contractors shall give verbal reports of progress on the Work, discuss schedule for upcoming period and present all conflicts, discrepancies or other difficulties for resolution.
- H. In-person meetings shall be limited & shall follow current *Public Health - Madison & Dane County* procedures & recommendations (see publichealthmdc.com/documents/office_space_checklist.pdf and publichealthmdc.com/coronavirus/forward-dane/current-order). Whenever possible, hold meetings via teleconference or videoconference, to be hosted by contractor or consultant. Dane County reserves right to mandate safe physical distancing & use of facemasks by all personnel while inside any County facility or on any County grounds.

1.12 JOB SITE ADMINISTRATION

- A. Contractor shall have project superintendent on site minimum of four (4) hours per day during progress of the Work.
- B. Contractor shall not change their project superintendent or project manager for duration of the Work without written permission of Public Works Project Manager.

1.13 SUBMITTAL PROCEDURES

- A. Submittal form to identify Project, Contractor, Subcontractor or supplier; and pertinent Construction Documents references.
- B. Apply Contractor's stamp, signed or initialed, certifying that review, verification of Products required, field dimensions, adjacent construction work, and coordination of information is in accordance with requirements of the Work and Construction Documents.
- C. Identify variations from Construction Documents and Product or system limitations that may be detrimental to successful performance of completing the Work.
- D. Revise and resubmit submittals as required; identify all changes made since previous submittal.

1.14 PROPOSED PRODUCTS LIST

- A. Within fifteen (15) business days after date of Award of Contract, submit complete list of major Products proposed for use, with name of manufacturer, trade name, and model number of each Product.

1.15 SHOP DRAWINGS

- A. Submit number of copies that Contractor & Architect / Engineer require, plus one (1) copy that shall be retained by Public Works Project Manager.

1.16 PRODUCT DATA

- A. Submit number of copies that Contractor requires, plus one (1) copy that shall be retained by Public Works Project Manager.
- B. Mark each copy to identify applicable products, models, options, and other data. Supplement manufacturer's standard data to provide information unique to this Project.

1.17 SAMPLES

- A. Submit samples to illustrate functional and aesthetic characteristics of Product.
- B. Submit samples of finishes from full range of manufacturers' standard colors, textures, and patterns for Public Works Project Manager's selection.

1.18 MANUFACTURERS' INSTRUCTIONS

- A. When specified in individual Specification sections, submit manufacturers' printed instructions for delivery, storage, assembly, installation, start-up, adjusting, and finishing, in quantities specified for Product Data.

1.19 MANUFACTURERS' CERTIFICATES

- A. When specified in individual Specification sections, submit manufacturers' certificate to Public Works Project Manager for review, in quantities specified for Product Data.
- B. Indicate material or Product conforms to or exceeds specified requirements. Submit supporting reference data, affidavits, and certifications as appropriate.

1.20 QUALITY ASSURANCE / QUALITY CONTROL OF INSTALLATION

- A. Monitor quality control over suppliers, manufacturers, Products, services, site conditions, and workmanship, to produce work of specified quality.
- B. Comply fully with manufacturers' instructions.
- C. Comply with specified standards as minimum quality for the Work except when more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.

1.21 REFERENCES

- A. Conform to reference standard by date of issue current as of date for receiving bids.
- B. Should specified reference standard conflict with Construction Documents, request clarification from Public Works Project Manager before proceeding.

1.22 INTERIOR ENCLOSURES

- A. Provide temporary partitions as required to separate work areas from Owner occupied areas, to prevent distribution of dust and moisture into Owner occupied areas, and to prevent damage to existing materials and equipment.

1.23 PROTECTION OF INSTALLED WORK

- A. Protect installed work and provide special protection where specified in individual Specification sections.

1.24 PARKING

- A. Arrange for temporary parking areas to accommodate construction personnel. Parking shall be available at the Work site.

- B. All contractors and their employees shall cooperate with General Contractor and others in parking of vehicles to avoid interference with normal operations and construction activities.
- C. Do not obstruct existing service drives and parking lots with equipment, materials and / or vehicles. Keep accessible for Owner's use at all times.

1.25 STAGING AREAS

- A. Coordinate staging areas with Public Works Project Manager prior to starting the Work.
- B. On-site space for use as staging areas and storage of materials is limited and will be apportioned among various Contractors as their needs dictate with due regard for storage requirements of each Contractor. Each Contractor shall be responsible for safety of equipment and materials that are stored on site.

1.26 OCCUPANCY DURING CONSTRUCTION AND CONDUCT OF WORK

- A. Contractors are asked to not work at facility if they are ill with something contagious.
- B. All contractors are expected to leave work areas in conditions; such that area can be occupied immediately upon leaving area.
- C. Smoking is prohibited on Dane County property.
- D. Owner reserves right at any time to dismiss from premises any Contractor or construction personnel that do not uphold requirements of this Section.
- E. Owner shall not be held liable for any lost time, wages, or impacts to construction schedule by any Contractor or construction personnel dismissed for failure to uphold requirements of this Section.
- F. Areas of existing facility will be occupied during period when the Work is in progress. Work may be done during normal business hours (7:00 am to 7:00 pm), but confer with Owner, schedule work and store materials so as to interfere as little as possible with normal use of premises.
- G. Work shall be done and temporary facilities furnished so as not to interfere with access to any occupied area and so as to cause least possible interference with normal operation of facility or any essential service thereof.
- H. Contractor shall, at all times, provide approved, safe walkways and facility entrances for use by Owner, employees and public.
- I. Contractor shall provide adequate protection for all parts of facility, its contents and occupants wherever the Work under this Contract is to be performed.
- J. Each Contractor shall arrange with Owner to make necessary alterations, do new work, make connections to all utilities, etc., and at such times as will not cause interruption of

utility services to facility. Contractor doing this work shall protect, cap, cut off and / or replace and relocate existing pipes, electrical work and other active utilities encountered which may interfere with new construction work.

- K. New work in extension of existing work shall correspond in all respects with that to which it connects or similar existing work unless otherwise indicated or specified.
 - 1. Existing work shall be cut, altered, removed or replaced as necessary for performance of Contract obligations.
 - 2. Work remaining in place, damaged or defaced by reason of work done under this Contract shall be restored equal to its condition at time of Award of Contract.
 - 3. If removal of work exposes discolored or unfinished surfaces or work out of alignment, such surfaces shall be refinished or materials replaced as necessary to make continuous work uniform and harmonious.
- L. Contractor is not responsible for providing & maintaining temporary toilet facilities.
- M. Contractor & subcontractors shall follow all current *Public Health - Madison & Dane County* procedures & recommendations (see publichealthmdc.com/documents/office_space_checklist.pdf and publichealthmdc.com/coronavirus/forward-dane/current-order). Dane County reserves right to mandate safe physical distancing & use of facemasks by all personnel while inside any County facility or on any County grounds.

1.27 PROTECTION

- A. Contractor shall protect from damage / injury all trees, shrubs, hedges, plantings, grass, mechanical, electrical & plumbing equipment, walks and driveways and pay for any damage to same resulting from insufficient or improper protection.
- B. Contractor shall provide and maintain barricades & signage to prohibit public access to construction site.

1.28 PROGRESS CLEANING

- A. Maintain areas free of waste materials, debris, and rubbish. Maintain site in clean and orderly condition.

1.29 PRODUCTS

- A. Products: Means new material, machinery, components, equipment, fixtures, and systems forming the Work, but does not include machinery and equipment used for preparation, fabrication, conveying and erection of the Work. Products may also include existing materials or components specifically identified for reuse.
- B. Do not use materials and equipment removed from existing premises, except as specifically identified or allowed by Construction Documents.

1.30 TRANSPORTATION, HANDLING, STORAGE AND PROTECTION

- A. Transport, handle, store and protect Products in accordance with manufacturer's instructions.

1.31 PRODUCT OPTIONS

- A. Where definite material is specified, it is not intentional to discriminate against "equal" product made by another manufacturer. Intention is to set definite standard of material quality. Should bidder choose to bid materials other than those specified, bidder shall submit said materials specifications to Public Works Project Manager for approval at least seven (7) business days prior to Bid Due Date.
- B. Products and materials that are not specified, but have been approved for use by Public Works Project Manager shall be identified in addenda to all bidding contractors.
- C. Requests for material or product substitutions submitted after Bid Due Date may be considered. Owner reserves right to approve or reject substitutions based on Specification requirements and intended use.

1.32 SUBSTITUTIONS

- A. Public Works Project Manager shall consider requests for Substitutions only within fifteen (15) calendar days after date of Public Works Construction Contract.
- B. Document each request with complete data substantiating compliance of proposed Substitution with Construction Documents.
- C. Limit each request to one (1) proposed Substitution for Public Works Project Manager's consideration.
- D. Substitutions shall not change contract price established at Bid Due Date.

1.33 STARTING SYSTEMS

- A. Provide written notification prior to start-up of each equipment item or system.
- B. Ensure that each piece of equipment or system is ready for operation.
- C. Execute start-up under supervision of responsible persons in accordance with manufacturers' instructions.
- D. Submit written report that equipment or system has been properly installed and is functioning correctly.

1.34 DEMONSTRATION AND INSTRUCTIONS

- A. Demonstrate operation and maintenance of Products to Owner's personnel prior to date of final inspection.

- B. Demonstrate start-up, operation, control, adjustment, trouble-shooting, servicing, maintenance, and shutdown of each item of equipment at agreed-upon times, at designated location.
- C. Owner may choose to photograph or videotape demonstration session; demonstration and demonstrator shall be to level of satisfaction of Owner.

1.35 CONTRACT CLOSEOUT PROCEDURES

- A. Submit written certification that Construction Documents have been reviewed, the Work has been inspected, and the Work is complete in accordance with Construction Documents and ready for [Public Works, Waste & Renewables] Project Manager's inspection.
- B. Submit final Application for Payment identifying total adjusted Contract Sum / Price, previous payments, and amount remaining due.

1.36 FINAL CLEANING

- A. Execute final cleaning prior to final inspection.
- B. Clean interior and exterior surfaces exposed to view.
- C. Remove waste and surplus materials, rubbish, and construction facilities from site.

1.37 ADJUSTING

- A. Adjust operating Products and equipment to ensure smooth and unhindered operation.

1.38 OPERATION AND MAINTENANCE MANUAL

- A. Provide two (2) bound, hard-copy operation and maintenance manuals that include all systems, materials, products, equipment, mechanical and electrical equipment and systems supplied and installed in the Work. Provide electronic version of operation and maintenance manual also.

1.39 SPARE PARTS AND MAINTENANCE MATERIALS

- A. Provide Products, spare parts, maintenance and extra materials in quantities specified in individual Specification Sections.
- B. Deliver to the Work site and place in location as directed.

1.40 AS-BUILT AND RECORD DRAWINGS AND SPECIFICATIONS

- A. Contractor-produced Drawings and Specifications shall remain property of Contractor whether Project for which they are made is executed or not. Contractor shall furnish Public Works Project Manager with original marked up redlines of Construction Documents' drawings and specifications that shall include all Addendums, Change

Orders, Construction Bulletins, Field Directives, on-site changes, field corrections, etc.
These are project As-Built Drawings & Specifications. Record Drawings &
Specifications shall be created from these As-Built by Public Works.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

END OF SECTION

SECTION 01 74 19

CONSTRUCTION WASTE MANAGEMENT, DISPOSAL & RECYCLING

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Summary
 - 2. Waste Management Goals
 - 3. Construction and / or Demolition Waste Management
 - 4. Waste Management Plan
 - 5. Reuse
 - 6. Recycling
 - 7. Materials Sorting and Storage On Site
 - 8. Lists of Recycling Facilities Processors and Haulers
 - 9. Waste Management Plan Form
- B. Related Sections:
 - 1. Section 01 00 00 - General Requirements

1.2 WASTE MANAGEMENT GOALS

- A. Dane County requires that as many waste materials as possible produced as result of this project be salvaged, reused or recycled in order to minimize impact of construction waste on landfills and to minimize expenditure of energy and cost in fabricating new materials. Additional information may be found in Dane County Green Building Policy, Resolution 299, 1999-2000.

1.3 CONSTRUCTION AND / OR DEMOLITION WASTE MANAGEMENT

- A. All construction and demolition waste suitable for recycling may go to Dane County Construction & Demolition Recycling Facility located at 7102 US Hwy 12, Madison, located across from Yahara Hills Golf Course. This facility can receive mixed loads of construction and demolition waste. For complete list of acceptable materials, see landfill.countyofdane.com/services/construction.
- B. Dane County Landfill, also at 7102 US Hwy 12, Madison, must receive all other waste from this project. landfill.countyofdane.com/services/landfill.

1.4 WASTE MANAGEMENT PLAN

- A. Contractor shall develop Waste Management Plan (WMP) for this project. Contact the Dane County Special Projects & Materials Manager with questions. Outlined in RECYCLING section of this specification are examples of materials that can be recycled or reused as well as recommendations for waste sorting methods.
- B. Contractor shall complete WMP and include cost of recycling / reuse in Bid. Submit WMP to Public Works Project Manager within fifteen (15) business days of Bid Due date. Copy of blank WMP form is in this Section. Submittal shall include cover letter and WMP form with:

1. Information on:
 - a. Types of waste materials produced as result of work performed on site;
 - b. Estimated quantities of waste produced;
 - c. Identification of materials with potential to be recycled or reused;
 - d. How materials will be recycled or reused;
 - e. On-site storage and separation requirements (on site containers);
 - f. Transportation methods; and
 - g. Destinations.

1.5 REUSE

- A. Contractors and subcontractors are encouraged to reuse as many waste materials as possible. Investigate salvage for materials not reusable on site.

1.6 RECYCLING

- A. These materials may be recycled at Dane County Construction & Demolition Recycling Facility:
 1. Wood.
 2. Wood Pallets.
 3. PVC Plastic (pipe, siding, etc.).
 4. Asphalt & Concrete.
 5. Bricks & Masonry.
 6. Vinyl Siding.
 7. Cardboard.
 8. Metal.
 9. Unpainted Gypsum Drywall.
 10. Shingles.
- B. These materials can be recycled elsewhere in Dane County area:
 1. Fluorescent Lamps.
 2. Foam Insulation & Packaging (extruded and expanded).
 3. Carpet Padding.
 4. Barrels & Drums.
- C. All materials must be recycled at WDNR permitted waste processing facilities that adhere to all State Statutes.

1.7 MATERIALS SORTING AND STORAGE ON SITE

- A. Contractor shall provide separate containers for recyclable materials. Number of containers will be dependent upon project and site conditions.
- B. Contractor shall provide on-site locations for subcontractors supplied recycling containers to help facilitate recycling.
- C. Dane County allows mixed loads of recycled materials only per instructions at landfill.countyofdane.com/services/construction.

1.8 LISTS OF RECYCLING FACILITIES PROCESSORS AND HAULERS

- A. Refer to landfill.countyofdane.com/services/construction for information on Dane County Construction & Demolition Recycling Facility.
- B. Web site landfill.countyofdane.com/recycle-locations lists current information for Dane County Recycling Markets. Contractors can also contact Allison Rathack, 608/266-4990, or local city, village, town recycling staff listed at site landfill.countyofdane.com/resources/local-contacts. Statewide listings of recycling / reuse markets are available from UW Extension at uwgb.edu/solid-hazardous-waste-education-center/.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

END OF SECTION

WASTE MANAGEMENT PLAN FORM



Contractor Name: _____

Address: _____

Phone No.: _____ Recycling Coordinator: _____

MATERIAL	ESTIMATED QUANTITY	DISPOSAL METHOD (CHECK ONE)	RECYCLING / REUSE COMPANY OR DISPOSAL SITE
Salvaged & reused building materials	_____ cu. yds. _____ tons	_____ Recycled _____ Reused _____ Landfilled _____ Other	Name: _____
Wood	_____ cu. yds. _____ tons	_____ Recycled _____ Reused _____ Landfilled _____ Other	Name: _____
Wood Pallets	_____ units	_____ Recycled _____ Reused _____ Landfilled _____ Other	Name: _____
PVC Plastic	_____ cu. ft. _____ lbs.	_____ Recycled _____ Reused _____ Landfilled _____ Other	Name: _____
Asphalt & Concrete	_____ cu. ft. _____ lbs.	_____ Recycled _____ Reused _____ Landfilled _____ Other	Name: _____
Bricks & Masonry	_____ cu. ft. _____ lbs.	_____ Recycled _____ Reused _____ Landfilled _____ Other	Name: _____
Vinyl Siding	_____ cu. ft. _____ lbs.	_____ Recycled _____ Reused _____ Landfilled _____ Other	Name: _____
Cardboard	_____ cu. ft. _____ lbs.	_____ Recycled _____ Reused _____ Landfilled _____ Other	Name: _____
Metals	_____ cu. yds. _____ tons	_____ Recycled _____ Reused _____ Landfilled _____ Other	Name: _____
Unpainted Gypsum / Drywall	_____ cu. yds. _____ tons	_____ Recycled _____ Reused _____ Landfilled _____ Other	Name: _____
Shingles	_____ cu. yds. _____ tons	_____ Recycled _____ Reused _____ Landfilled _____ Other	Name: _____
Fluorescent Lamps	_____ cu. ft. _____ lbs.	_____ Recycled _____ Reused _____ Landfilled _____ Other	Name: _____
Foam Insulation	_____ cu. ft. _____ lbs.	_____ Recycled _____ Reused _____ Landfilled _____ Other	Name: _____
Carpet Padding	_____ cu. ft. _____ lbs.	_____ Recycled _____ Reused _____ Landfilled _____ Other	Name: _____
Barrels & Drums	_____ units	_____ Recycled _____ Reused _____ Landfilled _____ Other	Name: _____
Glass	_____ cu. yds. _____ tons	_____ Recycled _____ Reused _____ Landfilled _____ Other	Name: _____

WASTE MANAGEMENT PLAN FORM

Other	_____	<input type="checkbox"/> Recycled <input type="checkbox"/> Reused <input type="checkbox"/> Landfilled <input type="checkbox"/> Other	Name: _____
Other	_____	<input type="checkbox"/> Recycled <input type="checkbox"/> Reused <input type="checkbox"/> Landfilled <input type="checkbox"/> Other	Name: _____
Other	_____	<input type="checkbox"/> Recycled <input type="checkbox"/> Reused <input type="checkbox"/> Landfilled <input type="checkbox"/> Other	Name: _____
Other	_____	<input type="checkbox"/> Recycled <input type="checkbox"/> Reused <input type="checkbox"/> Landfilled <input type="checkbox"/> Other	Name: _____
Other	_____	<input type="checkbox"/> Recycled <input type="checkbox"/> Reused <input type="checkbox"/> Landfilled <input type="checkbox"/> Other	Name: _____

SECTION 22 00 00

PLUMBING

PART 1 - GENERAL

1.01 DESCRIPTION

- A. Work Included: Provide plumbing where shown on the Drawings, as specified herein, and as needed for a complete and proper installation including, but not necessarily limited to:
1. Domestic Cold Water Piping.
 2. Plumbing Fixtures and Trim.
- B. Related Work:
1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.
- C. Work of Other Sections:
1. Openings for new Plumbing work in new construction walls, floors, roof, ceiling, etc. shall be provided by the General Contractor. Location and size of these openings shall be the responsibility of the Plumbing Contractor.
 2. Electrical line voltage wiring (110 volts and greater) by the Electrical Contractor. Wiring diagrams shall be furnished to the Electrical Contractor by the Plumbing Contractor.
 3. Roofing, exterior wall and related exterior openings shall be caulked, sealed and patched by the General Contractor.
 - 4.

1.02 GENERAL PROVISIONS

- A. This specification Section is a general description of the work requirements. The particular descriptions are not intended to be all-inclusive. Bidders shall also refer to the Drawings.
- B. Prior to submitting a bid, the Contractor shall call the Project Manager's attention (in writing only) to any materials or items of work believed to be inadequate. Bidders are required to visit the premises, take measurements, inspect existing conditions and limitations, and obtain first hand information necessary to submit a bid. The intent of the Contract is to obtain complete system installations, tested, ready for operation. No extras will be allowed because Contractor's misunderstanding of the scope work involved.
- C. Everything essential for the completion of the work implied to be covered by these Specifications to make the system ready for normal and proper operation must be furnished and installed by this Contractor. Accordingly, any omission from either the

plans or the Specifications, or both of details necessary for the proper installation and operation of the system shall not relieve this Contractor from furnishing such detail in full and proper manner.

- D. The Drawings show various details indicating the general arrangement of the plumbing work, sizes and locations of piping, equipment, etc. The said Drawings with figures, lettering, etc., shall be considered a part of these Specifications and no charge or alternation shall be made in any case unless ordered by the Engineer.
- E. In addition to the Plumbing work, refer to the Plumbing work shown on the general Construction Drawings of the building as being part of this Contract, unless specified to be done by other contractors.

1.03 QUALITY ASSURANCE

- A. Use adequate number of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.
- B. Without additional cost to the Owner, provide such other labor and materials as required to be complete the work of the Section in accordance, with the requirements of governmental agencies having jurisdiction, regardless of whether such materials and associated labor are called for elsewhere in the Contract Documents.
- C. In acceptance or rejection of installed work, the Project Manager shall make no allowance for lack of skill on the part of the Workmen.
- D. For the actual field fabrication, installation and testing of the Plumbing work, use only thoroughly trained and experienced workmen complete familiar with the items required and manufacturer's current recommended methods of installation.
- E. Reference Standards:

ANSI	American National Standards Institute
ASME	American Society of Mechanical Engineers
ASSE	American Society of Sanitary Engineering
ASTM	American Society of Testing and Material
AWWA	American Waterworks Association
CISPI	Cast Iron Soil Pipe Institute
FM	Factory Mutual
MCA	Mechanical Contractors Association
NEC	National Electric Code
NEMA	National Electrical Manufacturers Association
NFPA	National Fire Protection Association
NSF	National Sanitation Foundation
WQA	Water Quality Association

1.04 CODES AND PERMITS

- A. This contractor must comply with building codes and other ordinances in force where the building is located as far as same apply to his work.

- B. Plumbing work shall meet all Federal, State, Local Codes, ordinances and utility regulations.
 - 1. In the event of conflict between or among specified requirements and pertinent regulations, the more stringent requirement will govern when so directed by the Engineer.
- C. Plumbing Contractor must secure permits from proper offices and pay all legal fees as may be necessary for fulfilling the requirements of these specifications.
- D. Submit one (1) copy of all permits to the Owner.

1.05 COORDINATION

- A. Cooperate and coordinate with other trades to assure that all systems pertaining to the Plumbing work shall be installed in the best feasible arrangement. Coordinate as required with all other trades to share space in common areas and to provide the maximum of access to each system.
- B. Arrange plumbing work in neat, well organized manner with piping and similar services running with primary lines of building construction, and with minimum of 8 foot overhead clearance, where possible.
- C. Locate equipment properly to provide easy access, and arrange entire plumbing work with adequate access for operation and maintenance.
- D. Give right-of-way to piping, which must slope for drainage.
- E. Where Plumbing work is to connect to existing, the Contractor must field verify all connection points before beginning any rough-in work. Verify gravity flow lines and proper invert elevations required prior to starting piping installation.

1.06 PLUMBING SYSTEM IDENTIFICATION

- A. General: Provide adequate marking of plumbing system and control equipment to allow identification and coordination of maintenance activities and maintenance manuals.
 - 1. Furnish and install adequate marking, tagging and labeling of all *accessible and exposed* Plumbing equipment, piping and control devices, per ANSI A13.1-1981. Accessible locations shall include all ceiling spaces above accessible ceilings.
- B. Equipment: Identify all major Plumbing equipment with plastic-laminate signs of 2" high painted stencils and contrasting background. Provide test of sufficient clarity and lettering to convey adequate information at each location and mount permanently. Identify control equipment by 1-1/2" x 4" plastic laminate nameplates with 1/4" high lettering.
- C. Piping: Identify piping once every 30 feet at each branch, at termination of lines, and near valve or equipment connections. Place flow directional arrows at each piping

system for identification of flow direction. Provide lettering of the appropriate size to convey information on wrap-around signage, adhesive-backed or paint stenciled labels.

- D. Valves: Identify all valves with 1-1/2" diameter polished brass tags with stamp-engraved labels or plastic laminate tags. Prefix or color-code tags for each generic piping service. Prepare and submit valve tag schedule, listing location, service and tag description, and incorporate in Instruction Operations Manual.
- E. Operational Labels: *Where* needed for proper or adequate information on operation and maintenance of Plumbing systems, provide tags or labels of plastic or laminated card stock, typewritten to convey the message.

1.07 FLOOR, WALL, ROOF AND CEILING OPENINGS

- A. The General Contractor will be required to leave openings in ceiling, floors, walls, roof, partitions, etc., as required to install the Plumbing work specified or shown on the Drawings. The Plumbing Contractor is responsible for correct size and location of his openings. Where penetrations through existing construction are required, they shall be the responsibility of the Plumbing Contractor.
 - 1. Pipe Sleeves: Schedule 40 black steel pipe, 1" larger than carrier pipe.
- B. The Plumbing Contractor shall set sleeves and anchors for all equipment, etc., and shall provide watertight seals on pipes through exterior walls, floors and roof and where noted on the Drawings.
- C. Pack annular space between sleeves and pipe with fiberglass insulation and seal with approved caulking materials. Where penetrations occur through fire-rated walls or floors, fill space with fire-resistive insulation similar to high-temperature mineral wool, US Gypsum Thermafiber batts or Cera-blanket FS insulation by Tremco. Seal openings with UL approved fire-resistive fire stop caulk/sealant or assembly.
 - 1. Fireproof plastic piping through fire-rated construction per approved UL listed assembly.
- D. Provisions for openings, holes and clearances through walls, floors, ceilings and partitions to be made in advance of construction of such parts of the building.
- E. If the Plumbing Contractor should neglect to inform the General Contractor of his opening requirements and that portion of the Building construction has been completed, the Plumbing Contractor shall pay the General Contractor for providing such openings.
- F. Make arrangements with various other contractors for all special framing, spacing and chases. Plumbing Contractor is responsible for correct size and location.

1.08 CUTTING AND PATCHING

- A. General: Refer to Division 1 General Requirements.

- B. Perform all cutting and patching required for complete installation of the HVAC systems, unless specifically noted otherwise. Provide all materials required for patching unless otherwise noted.
 - 1. All cutting and patching necessary of structural members to install any Plumbing work shall not be done without permission, and then only carefully done under the direction of the Architect and General Contractor.
- C. The Contractor shall not endanger any work of other trades by demolition, cutting, digging or otherwise. Any cost caused by defective or ill-timed cutting and patching work shall be borne by the contractor responsible. Each contractor requiring cutting and patching shall hire men skilled in such cutting and patching to do the work.
 - 1. All patching work in existing areas shall match existing work and restore the finish to its original condition in material, quality, texture, finish and color unless specifically noted or scheduled otherwise.

1.09 TESTS AND INSPECTIONS

- A. All plumbing tests shall be conducted in the presence of and to the satisfaction of the Governing Authorities, Architect/ Engineer, and Owner or his authorized representative.
- B. The Plumbing Contractor shall be responsible for applying tests and ordering inspections as required by Federal, State and local Code and Inspection authorities.
 - 1. All work shall remain exposed until it has been tested, inspected and approved.

1.10 TEMPORARY SERVICES

- A. Provide temporary services for all plumbing services to the existing facility to maintain function of sanitary, storm, natural gas and water services during the construction period.

1.11 TRENCHING AND BACKFILLING

- A. Trench, excavate and tunnel to place all piping and other related work necessary at the elevations indicated or required, as shown on the Drawings.
 - 1. Cut bottom of trench to grade, make trench 12" wider than the widest dimension of the pipe.
 - 2. All pipes shall be laid on a compacted bed of sand 6" deep. Do not lay piping on large stones, rocks or bricks.
- B. Backfill in layers and compact sufficiently to prevent settlement. Backfill with damp sand and fine gravel mixture.
 - 1. Exterior locations shall be backfilled to 12" of grade with sand and fine gravel mixture and the remainder with native compacted topsoil.
 - 2. Do not start backfill operations until plumbing work has been properly inspected and approved.

1.12 EQUIPMENT ACCESS

- A. *General:* All valves, equipment and accessories shall be installed to permit access to equipment for maintenance, servicing or repairs. Relocation of piping, or equipment to accomplish equipment access shall be completed by this Contractor at no additional cost.

1.13 EQUIPMENT SUPPORTS

- A. *General:* Provide all supporting steel and related materials not indicated on structural drawings as required for the installation of equipment and materials, including angles, channels, beams and hangers.

1.14 GUARANTEE

- A. All material and workmanship must be new and first class in every respect; the plumbing equipment must be turned over to the owner in complete working order and free from mechanical or performance defects.
- B. The Plumbing Contractor must guarantee all labor and materials for one (1) year from the completion of the plumbing system. Maintain and repair plumbing equipment for the above period, unless such defects are clearly the result of bad management after plumbing system is turned over to the Owner.
- C. Before final acceptance of the plumbing work, the Plumbing Contractor shall have the entire apparatus and system in complete and satisfactory operation and shall maintain same in satisfactory and continuous operation for a period of ten days prior to the date of acceptance; fuel to be furnished by Owner.
- D. The Plumbing Contractor shall submit to the Engineer in triplicate, at the completion of his work, a certified statement, signed by a principal of the firm, stating that the system has been fully installed and is operating within the intent of the Drawings and Specifications and that all system components have been tested and adjusted. This statement shall be submitted before the system is presented to the Owner for final inspection.

1.15 SUBMITTALS

- A. Refer to Division 1 for additional submittal requirements.
- B. The Plumbing Contractor will be held responsible for correction of work deemed necessary by the Project Manager due to proceeding with the work without shop drawings that have final approval.
- C. Shop drawings shall include data on physical dimensions, gauges, materials of construction and capacities.
 - 1. Incomplete drawings will be disapproved.
- D. This Contractor will be responsible for all figures and dimensions shown on the shop drawings. Approval of shop drawings describing equipment that cannot fit in the space

allotted does not relieve this Contractor from providing equipment that will meet the space requirements.

E. Submit an electronic copy of shop drawings to the Project Manager for approval, with complete detail for all equipment, materials, etc., to be furnished and installed for this project as follows:

1. Valves.
2. Pipe and piping specialties.
3. Insulation systems.
4. Plumbing fixtures.
5. Instructions and O&M manuals(2 copies).
6. As-built Drawings (1 copy).

1.16 HOUSEKEEPING AND CLEANUP

A. Periodically as work progress and/or as directed by the Architect/Engineer, the Contractor shall remove waste materials from the building and leave the area of the work room clean. Upon completion of work remove all tools, scaffolding, broken and waste materials, etc., from the site.

1.17 LUBRICATION

A. Upon completion of the work and before turning over to the Owner, clean and lubricate all bearings except sealed and permanently lubricated bearings. Use only lubricant recommended by the manufacturer.

1. The Contractor is responsible for maintaining lubrication of all mechanical equipment under his contract until work is accepted by the Owner.

B. Furnish a chart with each piece of equipment listed, itemizing location for lubricant required and recommended periods of lubrication. Incorporate chart in Instruction Manual.

1.18 INSTRUCTIONS AND MANUALS

A. Upon completion of the installation, but before final acceptance of the system, the Plumbing Contractor shall instruct the Owner on the care and operation of all parts of the Plumbing system.

B. Assemble two (2) complete sets of manufacturer's printed operating and maintenance instructions for all mechanical equipment and installed under this contract. Prepare in bound copies complete with index tabs. Information must include parts lists, equipment warranties, and wiring diagrams. Submit bound copies to Architect for disbursement.

1.19 AS-BUILT DRAWINGS

A. During construction maintain a set of prints showing installed as-built work for the project.

- B. Upon completion of construction before final acceptance, provide a set of as-built drawings to the Architect/Engineer.

PART 2 - PRODUCTS

2.01 DOMESTIC WATER PIPE SCHEDULE

A. Above Ground Piping:

1. Type 'L' copper water tube, H(hard drawn) temper, ASTM B88; with cast copper fittings, ANSI B16.18; wrought copper fittings, ANSI B16.22; lead-free(less than 0.2%) solder, ASTM B32; flux ASTM B813.
2. PEXa tubing approved for potable water piping: Crosslinked Polyethylene, ASTM F876 & ASTM F877. Fittings: Insert type fittings with cold flaring memory type fittings equal to Uponor. Crimp or compression ring fittings will not be allowed.
3. Copper mechanical grooved fittings and couplings on roll grooved pipe(propress) may be used in lieu of soldered fittings.

B. Below Ground: 2-1/2" and Smaller:

1. Type 'K' copper water tube, O(annealed-soft) temper, ASTM B88; with cast copper fittings, ANSI B16.18; wrought copper fittings, ANSI B16.22; lead-free(less than 0.2%) solder, ASTM B32; flux ASTM B813; or cast copper flared pressure fittings, ANSI B16.26.
2. PEXa tubing approved for potable water piping: Crosslinked Polyethylene, ASTM F876 & ASTM F877. Fittings: Insert type fittings with cold flaring memory type fittings equal to Uponor. Crimp or compression ring fittings will not be allowed.

2.02 VALVES

A. Approved Manufacturers:

1. Conbraco Apollo;
2. Milwaukee;
3. Watts;
4. Nibco.

B. Check valves:

1. 2" and smaller: Bronze, screwed, Y-pattern, 200# WOG, swing check type.

C. Ball valves:

1. 2" and smaller: Two or Three piece, bronze-body, chrome-plated bronze ball, Teflon seat and packing, 400 pig WOG, with stem extensions on insulated piping. Appollo 70-200 series.

2.03 PIPE HANGERS

A. Piping:

1. Split ring hangers with supporting rods.
 2. Adjustable clevis.
- B. Multiple or Trapeze Hangers:
1. Steel channels with welded spacers and hanger rods.
- C. Floor Support:
1. Painted steel pipe saddle, stand and bolted floor flange.
- D. Copper Pipe Supports:
1. All supports, fasteners, clamps, etc. directly connected to copper piping shall be copper-plated or polyvinylchloride(PVC)-coated.
 2. Where steel strut supports are used, provide isolation collar between supports/clamp and copper piping.
- E. Approved Manufacturers: Fee and Mason, B-line, Grinnell or approved equal.

2.04 ACCESS

- A. General: All piping, conduit and accessories shall be installed to permit access to equipment for maintenance. Any relocation of piping, equipment or accessories required to provide maintenance access shall be accomplished by the Contractor at no additional cost.
- B. Removable Access Plates: Where only hand access is sufficient for valve access, provide removable plate-type access unit of minimum size which will facilitate required access.
1. Provide units of type, style, design, material and finish appropriate for location and exposure in each instance.
 2. In exposed surfaces of occupied spaces provide round plate units, flush floor units and frameless low-profile wall units, primed-for-paint in painted surfaces and polished chrome or stainless steel finish in other surfaces.
- C. Walls:
1. Smith #4767 flush wall stainless steel cover plate with screw latch lock in finished tile walls at wet locations.
 2. Smith #4760 or #4765 with bonderized prime-coated steel face and screw latch lock in walls of other finished rooms.
- E. Floors:
1. 1. Smith #4910 with aluminum or nickel-bronze non-skid top.

2.05 PIPE INSULATION

- A. General: Provide composite piping insulation (insulation, jackets, coverings, sealers, mastics, and adhesives) with ratings not exceeding flame spread of 25 and a smoke developed of 50 in active return air plenums. Ratings in all other areas shall not exceed

a flame spread of 25 and a smoke developed of 150 (test method ASTM E-84). Comply with all codes regarding the use of foam insulation.

- B. Insulate piping located in interior space, including (but not necessarily limited to) the following services:
 - 1. Interior cold and hot domestic water piping.
- C. Insulate each piping system with one of the following types and thickness of insulation, except as otherwise indicated (Installer's option where more than one type is indicated).
 - 1. Fibrous Glass: Minimum density 3 lb./cu.ft., thermal conductivity of not more than 0.23 at 75 degrees F mean temperature, suitable for temperatures to 450 degrees F. Kraft-reinforced, foil-vapor barrier, laminate all-service jacket, factory applied to insulation with a self-sealing pressure sensitive adhesive lap, maximum permeance of 0.02 perms and minimum beach puncture resistance of 50 units.
 - 2. Elastomeric Insulation: Closed-cell type, with minimum nominal density of 5.5 lbs./cu.ft., thermal conductivity shall be not more than 0.27 at 75 degrees F mean temperature, and maximum water vapor transmission of 0.17 perm/inch. The material shall be suitable for a temperature range from 220 degrees F to minus 40 degrees F.
- D. Insulation Installation Schedule:

<u>Service</u>	<u>Pipe Size</u>	<u>Insulation Thickness</u>
1. Hot Water Piping	Less than 1"	1"
	1-1/4 thru 4"	1"
2. Cold Water Piping	Less than 1"	1/2"
	1-1/4" thru 4"	1"

2.06 OTHER MATERIALS

- A. Provide other materials, not specifically described but required for a complete and proper installation, as selected by the Contractor subject to the approval of the Architect.

PART 3 - EXECUTION

3.01 SURFACE CONDITIONS

- A. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.

3.02 SITE UTILITIES

- A. Advise the General Contractor of site conditions or inverts inconsistent with the plumbing layout and proposed flow line prior to proceeding.

3.03 PLUMBING SYSTEM LAYOUT

- A. Lay out the plumbing system in careful coordination with the Drawings, determining proper elevations for all components of the system and using only the minimum number of bends to produce a satisfactorily functioning system.
- B. Follow the general layout shown on the Drawings in all cases except where other work may interfere.
- C. Lay out pipes to fall within partition, wall, or roof cavities, and to not require furring other than that as shown on the Drawings.
- D. Where work is to connect to existing, Plumbing contractor must field verify all connection points before beginning any rough-in work. Verify all connecting invert elevations and flow lines of new work connected to existing gravity drainage.

3.04 TRENCHING AND BACKFILLING

- A. Perform trenching and backfilling associated with the work of this Section in strict accordance with the provisions of Division 2 of these Specifications and consistent with the national, state and local plumbing codes.
- B. Cut bottom of trenches to grade. Make trenches 12" wider than the greatest dimension of the pipe.
- C. Bedding and backfilling:
 - 1. Install piping promptly after trenching. Keep trenches open as short a time as practicable.
 - 2. Under the building, install pipes on a 6" bed of damp sand. Backfill to bottom of slab with damp sand.
 - 3. Outside the building, install underground piping on a 6" bed of damp sand. Backfill to within 12" of finish grade with damp sand. Backfill remainder with native topsoil.
 - 4. Do not backfill until installation has been approved and until Project Record Documents have been properly annotated.

3.05 INSTALLATION OF PIPING AND EQUIPMENT, GENERAL

- A. General:
 - 1. Proceed as rapidly as the building construction will permit.
 - 2. Thoroughly clean items before installation. Cap pipe openings to exclude dirt until fixtures are installed and final connections have been made.
 - 3. Cut pipe accurately, and work into place without springing or forcing properly clearing window, doors, and other openings. Excessive cutting or other weakening of the building will not be permitted.
 - 4. Show no tool marks or threads on exposed plated, polished, or enameled connections from fixtures. Tape all finished surfaces to prevent damage during construction.

5. Make changes in directions with fittings; make changes in main sizes with eccentric reducing fittings. Unless otherwise noted, install water supply and return piping with straight side of eccentric fittings at top of the pipe.
6. Run horizontal water piping with an adequate pitch upwards in direction of flow to allow complete drainage.
7. Provide sufficient swing joint, ball joints, expansion loops, and devices necessary for a flexible piping system, whether or not shown on the Drawings.
8. Support piping independently at pumps, coils, tanks, and similar locations, so that weight of pipe will not be supported by the equipment.
9. Pipe the drains from pump glands, drip pans, relief valves, air vents, and similar locations, to spill an open sight drain, floor drain, or other acceptable discharge point, and terminate with a plain and unthreaded pipe 6" above the drain.
10. Securely bolt all equipment, isolators, hangers, and similar items in place.
11. Support each item independently from other pipes. Do not use wire for hanging or strapping pipes.
12. Provide complete dielectric isolation between ferrous and non-ferrous metals.
13. Provide union and shut off valves suitably located to facilitate maintenance and removal of equipment and apparatus.

B. Equipment access:

1. Install piping, equipment, and accessories to permit access for maintenance. Relocate items as necessary to provide such access, and without additional cost to the Owner.
2. Provide access doors where valves, motors, or equipment requiring access for maintenance are located in wall or chases or above ceilings. Coordinate location of access doors with other trades as required.

3.06 PIPE JOINTS

A. Copper tubing:

1. Cut square, remove burrs, and clean inside of female fitting to a bright finish.
 - a. Apply solder flux with brush to tubing.
 - b. Remove internal parts of solder-end valves prior to soldering.
2. Provide dielectric unions at points of connection of copper tubing to ferrous piping and equipment.
3. For joining copper tubing, use the following:
 - a. Water piping 3" and smaller: 95-5 solder;
 - b. Water piping larger than 3": "Sil-fos" brazing;
 - c. Underground: "Sil-fos" brazing.

B. Screwed piping:

1. Deburr cuts.
 - a. Do not ream exceeding internal diameter of the pipe.
 - b. Thread to requirements of ANSI B2.1.
2. Use Teflon tape on male thread prior to joining other services.
3. Use litharge and glycerin on joint prior to cleaning for air and oil piping.

C. PEX Tube Joints:

1. Installed per ASTM F-1807 with insert-type fittings with cold memory flaring as manufactured by Uponor are approved.
2. Brass compression type fittings with threaded nut, compression ring and insert will not be acceptable.
3. Provide copper type L manifolds, where manifold distribution is used with labeled quarter turn ball valve stops for each service line.
4. Install piping and fittings per manufacturers recommendations.

D. Leaky joints:

1. Remake with new material.
2. Remove leaking section and/or fitting as directed.
3. Do not use thread cement or sealant to tighten joint.

3.07 PIPE SUPPORTS

- A. Support suspended piping with clevis or trapeze hangers and rods.
- B. Space hangers and support for horizontal steel pipes according to the following schedule:

<u>Pipe size:</u>	<u>Maximum spacing on centers:</u>
1-1/4" and smaller:	8'-0"
1-1/2" to 3":	10'-0"
4" to 5":	14'-0"

- C. Space hangers and supports for horizontal copper tubing according to the following schedule:

<u>Tube size:</u>	<u>Maximum spacing on centers:</u>
1" and smaller:	6'-0"
1-1/2":	7'-0"
2":	8'-0"
2-1/2":	9'-0"
3" and larger:	10'-0"

- D. Provide sway bracing on hangers longer than 18".
- E. Support vertical piping with riser clamps secured to the piping and resting on the building structure. Provide at each floor unless otherwise noted.
- F. Provide insulation continuous through hangers and rollers. Protect insulation by galvanized steel shields.
- G. Arrange pipe supports to prevent excessive deflection, and to avoid excessive bending stress.
- H. Hubless piping:

1. Provide hangers on the piping at each side of, and within 6" of, hubless pipe coupling so the coupling will bear no weight.
2. Do not provide hangers on couplings.
3. Provide hangers adequate to maintain alignment and to prevent sagging of the pipe.
4. Make adequate provision to prevent shearing and twisting of the pipe and the joint.

3.08 SLEEVES AND OPENINGS

- A. Provide sleeves for each pipe passing through walls, partitions, floors, roofs, and ceilings.
 1. Set pipe sleeves in place before concrete is placed.
 2. For uninsulated pipe, provide sleeves two pipe sizes larger than the pipe passing through, or provide a minimum of 1/2" clearance between inside and outside of the pipe.
 3. For insulated pipe, provide sleeves of adequate size to accommodate the full thickness of pipe covering, with clearance for packing and caulking.
- B. Caulk the space between sleeve and pipe or pipe covering, using a noncombustible, permanently plastic, waterproof, non-staining compound which leaves a smooth finished appearance, or pack with noncombustible asbestos cotton, or fiberglass to within 1/2" of both wall faces, and provide the waterproof compound described above.
- C. Finish and escutcheons:
 1. Smooth up rough edges around sleeves with plaster or spackling compound.
 2. Provide 1" wide chrome or nickel plated escutcheons on all pipes exposed to view where passing through walls, floors, partitions, ceilings, and similar locations.
 - a. Size the escutcheons to fit pipe and covering.
 - b. Hold escutcheons in place with set screw.

3.09 VALVES

- A. Provide valves in water and gas systems. Locate and arrange so as to give complete regulation of apparatus, equipment, and fixtures.
- B. Provide valves in at least the following locations:
 1. In branches and/or headers of water piping serving a group of fixtures.
 2. On both sides of apparatus and equipment.
 3. For shutoff of risers and branch mains.
 4. For flushing and sterilizing the system.
 5. Where shown on the Drawings.
- C. Locate valves for easy accessibility and maintenance.

3.10 BACKFLOW PREVENTION

- A. Protect plumbing fixtures, faucets with hose connections, and other equipment having plumbing connection, against possible back siphonage.
- B. Arrange for testing of backflow devices as required by the governmental agencies having jurisdiction.

3.11 PLUMBING FIXTURE INSTALLATION

- A. Installation:
 - 1. Set fixtures level and in proper alignment with respect to walls and floors, and with fixtures equally spaced.
 - 2. Provide supplies in proper alignment with fixtures and with each other.
- B. Grout wall and floor mounted fixtures watertight where the fixtures are in contact with walls and floors.
- C. Caulk deck-mounted trim at the time of assembly, including fixture and casework mounted. Caulk self-rimming sinks installed in casework.

3.12 OTHER TESTING AND ADJUSTING

- A. Provide personnel and equipment, and arrange for and pay the costs of, all required tests and inspections required by governmental agencies having jurisdiction.
- B. Where test show materials or workmanship to be deficient, replace or repair as necessary, and repeat the tests until the specified standards are achieved.
- C. Adjust the system to optimum standards of operation.

END OF SECTION

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SECTION 23 11 00
FACILITY FUEL PIPING

PART 1 - GENERAL

SCOPE

This section contains specifications for fuel pipe and fuel pipe fittings for this project. Included are the following topics:

PART 1 - GENERAL

- Scope
- Related Work
- Reference
- Reference Standards
- Shop Drawings
- Quality Assurance
- Delivery, Storage, and Handling
- Design Criteria
- Welder Qualifications
- Natural Gas Service

PART 2 - PRODUCTS

- Natural Gas
- Vents and Relief Valves
- Unions and Flanges

PART 3 - EXECUTION

- Preparation
- Erection
- Welded Pipe Joints
- Threaded Pipe Joints
- Lube Oil Systems
- Natural Gas
- Vents and Relief Valves
- Unions and Flanges
- Gaskets
- Piping System Leak Tests
- Construction Verification Items
- Piping System Leakage Test Report

REFERENCE

Applicable provisions of Division 1 govern work under this section.

REFERENCE STANDARDS

ANSI B16.3	Malleable Iron Threaded Fittings
ASTM A53	Pipe, Steel, Black and Hot-Dipped, Zinc Coated Welded and Seamless
ASTM A234	Pipe Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and Elevated Temperatures

SHOP DRAWINGS

Refer to division 1, General Conditions, Submittals.

Contractor shall submit schedule indicating the ASTM specification number of the pipe being proposed along with its type and grade and sufficient information to indicate the type and rating of fittings for each service.

TYPE E OR S STEEL PIPE:

Mill certification papers, also known as material test reports, for the pipe furnished for this project, in English.

1 Heat numbers on these papers to match the heat numbers stenciled on the pipe. Chemical analysis indicated
2 on the mill certification papers to meet or exceed the requirements of the referenced ASTM specification.
3

4 **QUALITY ASSURANCE**

5 Order all Type E and Type S steel pipe with heat numbers rolled, stamped, or stenciled to each length or each
6 bundle, depending on the size of the pipe, and in accordance with the appropriate ASTM specification.
7

8 Any installed material not meeting the specification requirements must be replaced with material that meets
9 these specifications without additional cost to the Owner.
10

11 **DELIVERY, STORAGE, AND HANDLING**

12 Promptly inspect shipments to insure that the material is undamaged and complies with specifications.
13

14 Cover pipe to eliminate rust and corrosion while allowing sufficient ventilation to avoid condensation. Do
15 not store materials directly on grade. Protect pipe, tube, and fitting ends so they are not damaged. Where end
16 caps are provided or specified, take precautions so the caps remain in place.
17

18 Offsite storage agreements will not relieve the contractor from using proper storage techniques.
19

20 Storage and protection methods must allow inspection to verify products.
21

22 **DESIGN CRITERIA**

23 Use only new material, free of defects, rust and scale, and meeting the latest revision of ASTM specifications
24 as listed in this specification.
25

26 Construct all piping for the highest pressures and temperatures in the respective system in accordance with
27 ANSI B31, but not less than 125 psig unless specifically indicated otherwise.
28

29 Non-metallic piping will be acceptable only for the services indicated. It will not be acceptable in occupied
30 spaces and ventilation plenum spaces, including plenum ceilings.
31

32 Where weld fittings or mechanical grooved fittings are used, use only long radius elbows having a centerline
33 radius of 1.5 pipe diameters.
34

35 Where ASTM A53 grade A pipe is specified, ASTM A53 grade B pipe may be substituted at Contractor's
36 option. Where the grade or type is not specified, Contractor may choose from those commercially available.
37

38 **WELDER QUALIFICATIONS**

39
40 Before any metallic welding is performed, Contractor to submit his Standard Welding Procedure
41 Specification together with the Procedure Qualification Record as required by Section IX of the ASME Boiler
42 and Pressure Vessel Code and/or the National Certified Pipe Welding Bureau.
43

44 Before any polyethylene fusion welding is performed, Contractor to submit certification that the welders to
45 be used on this project have successfully demonstrated proper welding procedures in accordance with the
46 Code of Federal Regulations, Title 49, Part 192, Section 192.285.
47

48 The A/E or DFD reserves the right to test the work of any welder employed on the project, at the Contractor's
49 expense. If the work of the welder is found to be unsatisfactory, the welder shall be prevented from doing
50 further welding on the project.
51

52 **NATURAL GAS SERVICE**

53 All charges for the gas service as shown on the plans, including the connection from the main in the street or
54 other location to the gas meter, shall be paid by this Contractor, including setting of gas meter(s) and all work
55 performed by the gas company.
56

1
2 **PART 2 - PRODUCTS**
3
4

5 **NATURAL GAS**
6

7 2" and Smaller: ASTM A53, type E or S, standard weight (schedule 40) black steel pipe with ASTM
8 A197/ANSI B16.3 class 150 black malleable iron threaded fittings or ASTM A234 grade WPB/ANSI B16.9
9 standard weight, seamless, carbon steel weld fittings.
10

11 2-1/2" and Larger: ASTM A53, type E or S, standard weight black steel pipe with ASTM A234 grade
12 WPB/ANSI B16.9 standard weight, seamless, carbon steel weld fittings.
13

14 **VENTS AND RELIEF VALVES**

15 Use pipe and pipe fittings as specified for the system to which the relief valve or vent is connected.
16

17 **UNIONS AND FLANGES**

18 2" and Smaller: ASTM A197/ANSI B16.3 malleable iron unions with brass seats. Use black malleable iron
19 on black steel piping and galvanized malleable iron on galvanized steel piping. Use unions of a pressure class
20 equal to or higher than that specified for the fittings of the respective piping service but not less than 250 psi.
21

22 2-1/2" and Larger: ASTM A181 or A105, grade 1 hot forged steel flanges of threaded, welding and of a
23 pressure class compatible with that specified for valves, piping specialties and fittings of the respective piping
24 service. Flanges smaller than 2-1/2" may be used as needed for connecting to equipment and piping
25 specialties. Use raised face flanges ANSI B16.5 for mating with other raised face flanges on equipment with
26 flat ring or full face gaskets. Use ANSI B16.1 flat face flanges with full face gaskets for mating with other
27 flat face flanges on equipment.
28

29 Provide ASTM A 193 B7 grade bolts and A 194 2H grade nuts & hardened washers for connections (Star
30 washers for grounding.)
31

32 **GASKETS**

33 Fuel Oil and Natural Gas Systems: Branded, compressed, non-asbestos sheet gaskets. Klingsil C4401,
34 Garlock 3000, JM Clipper 978-C or approved equal.
35

36 **PART 3 - EXECUTION**
37

38 **PREPARATION**

39 Remove all foreign material from interior and exterior of pipe and fittings.
40

41 **ERECTION**

42 Install all piping parallel to building walls and ceilings and at heights which do not obstruct any portion of a
43 window, doorway, stairway, or passageway. Where interferences develop in the field, offset or reroute piping
44 as required to clear such interferences. In all cases, consult drawings for exact location of pipe spaces, ceiling
45 heights, door and window openings, or other architectural details before installing piping.
46

47 Provide anchors, expansion joints, swing joints and/or expansion loops so that piping may expand and
48 contract without damage to itself, equipment, or building.
49

50 Mitered ells, notched tees, and orange peel reducers are not acceptable. On threaded piping, bushings are not
51 acceptable.
52

53 "Weldolets" and "Threadolets" may be used for branch takeoffs up to one-half (1/2) the diameter of the main.
54

55 Do not route piping through transformer vaults or above transformers, panelboards, or switchboards,
56 including the required service space for this equipment, unless the piping is serving this equipment.

1
2 Install all valves, and piping specialties, including items furnished by others, as specified and/or detailed.
3 Make connections to all equipment installed by others where that equipment requires the piping services
4 indicated in this section.
5

6 **WELDED PIPE JOINTS**

7 Make all welded joints by fusion welding in accordance with ASME Codes, ANSI B31, and State Codes
8 where applicable.
9

10 All pipe welding shall be completed by Qualified Welders in accordance with the Contractor's Procedure
11 Specifications.
12

13 Contractor will ensure that these steps are followed where pipe sections will be joined by welding:

- 14 1. Cleaning – Welding surfaces will be clean and free of defects.
- 15 2. Alignment – Inside diameter of piping components will be aligned as accurately as possible. Internal
16 misalignment shall not exceed 1/16".
- 17 3. Spacing – Pipe sections will be spaced to allow deposition of weld filler material through the entire
18 weld joint thickness.
- 19 4. Girth Butt Welds:
 - 20 a. Girth butt welds shall be complete penetration welds.
 - 21 b. Concavity will not exceed 1/32"
 - 22 c. Under cuts will not exceed 1/32"
 - 23 d. As welded surfaces are permitted however surfaces will be free from coarse ripples,
24 grooves, abrupt ridges and valleys.
25

26 Electrodes shall be Lincoln, or approved equal, with coating and diameter as recommended by the
27 manufacturer for the type and thickness of work being done.
28

29 **THREADED PIPE JOINTS**

30 Use a Teflon based thread lubricant or Teflon tape when making joints; no hard setting pipe thread cement
31 or caulking will be allowed.
32
33
34

35 **NATURAL GAS**

36 Pitch horizontal piping down 1" in 60 feet in the direction of flow. Install a 4" minimum depth dirt leg at the
37 bottom of each vertical run and at each appliance. When installing mains and branches, cap gas tight each
38 tee or pipe end which will not be immediately extended. All branch connections to the main shall be from
39 the top or side of the main.
40
41

42 Do not install gas pipe in a ventilation air plenum.
43

44 If an above ground vent terminates in an area subject to snow accumulation, terminate the line at least five
45 feet above grade.
46

47 Install a shut off valve at each appliance. Provide a valved connection at the main for equipment and
48 appliances furnished by others.
49

50 Piping through a roof shall be run through an approved roof penetration with flashing and counter flashing.
51

52 Each gas pressure reducing valve vent and relief valve vent shall be run separately to a point outside of the
53 building, terminated with a screened vent cap, and located according to gas utility regulations.
54

55 Clean all welded piping before all regulators and control valves. Test by placing target cloth over piping and
56 blow with compressed air. Clean piping until target cloth is clean and free of debris.

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VENTS AND RELIEF VALVES

Install vent and relief valve discharge lines as indicated on the drawings, as detailed, and as specified for each specific valve or piping specialty item. In no event is a termination to occur less than six feet above a roof line.

UNIONS AND FLANGES

Install a union or flange, as required, at each automatic control valve and at each piping specialty or piece of equipment which may require removal for maintenance, repair, or replacement. Where a valve is located at a piece of equipment, locate the flange or union connection on the equipment side of the valve. Concealed unions or flanges are not acceptable.

GASKETS

Store horizontally in cool, dry location and protect from sunlight, water and chemicals. Inspect flange surfaces for warping, radial scoring or heavy tool marks. Inspect fasteners, nuts and washers for burrs or cracks. Replace defective materials.

Align flanges parallel and perpendicular with bolt holes centered without using excessive force. Center gasket in opening. Lubricate fastener threads, nuts and washers with lubricant formulated for application.

Draw flanges together evenly to avoid pinching gasket. Tighten fasteners in cross pattern sequence (12 – 6 o'clock, 3 – 9 o'clock, etc.), one pass by hand and four passes by torque wrench at 30% full torque, 60% full torque and two passes at full torque per ASME B16.5.

PIPING SYSTEM LEAK TESTS

Verify that the piping system being tested is fully connected to all components and that all equipment is properly installed, wired, and ready for operation. If required for the additional pressure load under test, provide temporary restraints at expansion joints or isolate them during the test. Verify that hangers can withstand any additional weight load that may be imposed by the test.

Provide all piping, fittings, blind flanges, and equipment to perform the testing.

Conduct pressure test with test medium of air or water unless specifically indicated. Minimum test time is indicated in the table below; additional time may be necessary to conduct an examination for leakage. Each test must be witnessed by the Division's representative. If leaks are found, repair the area with new materials and repeat the test; caulking will not be acceptable.

For hydrostatic tests, use clean water and remove all air from the piping being tested by means of air vents or loosening of flanges/unions. Measure and record test pressure at the high point in the system.

For air tests, gradually increase the pressure to not more than one half of the test pressure; then increase the pressure in steps of approximately one-tenth of the test pressure until the required test pressure is reached. Examine all joints and connections with a soap bubble solution or equivalent method. The piping system exclusive of possible localized instances at pump or valve packing shall show no evidence of leaking. After testing is complete, slowly release the pressure in a safe manner.

Measure natural gas system test pressure with a water manometer or an equivalent device calibrated in increments not greater than 0.1 inch water column. System will not be approved until it can be demonstrated that there is no measurable loss of test pressure during the test period.

Conduct fuel oil system test so as not to impose a pressure of more than 10 psig on the tank. Instead of a pressure test, suction lines may be tested under a vacuum of not less than 20 inches of mercury maintained for at least one hour

System	Pressure	Medium	Duration
---------------	-----------------	---------------	-----------------

Natural gas	100 psig	Air	24 hr
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1
2 All pressure tests are to be documented on a Division of Facilities Development form included in this
3 specification.
4
5 On piping that cannot be tested because of connection to an active line, provide temporary blind flanges
6 and hydrostatically test new section of piping. After completion of test, remove temporary flanges and
7 make final connections to piping. Die penetrate test pass weld or x-ray the piping that was not
8 hydrostatically tested up to the active system.
9
10 **CONSTRUCTION VERIFICATION ITEMS**
11 Contractor is responsible for utilizing the construction verification checklists supplied under specification
12 Section 23 08 00 in accordance with the procedures defined for construction verification in Section 01 91 01
13 or 01 91 02.

14
15 END OF SECTION

PIPING SYSTEM LEAKAGE TEST REPORT

State of Wisconsin
Department of Administration
Division of Facilities Development

Date
Submitted: _____

Project Name: _____

Location: _____ DFD Project No: _____

Contractor: _____

- | | | |
|--------------------------------------|--|------------------------------------|
| <input type="checkbox"/> HVAC | <input type="checkbox"/> Refrigeration | <input type="checkbox"/> Controls |
| <input type="checkbox"/> Power Plant | <input type="checkbox"/> Plumbing | <input type="checkbox"/> Sprinkler |

Test Medium: Air Water Other _____

Test performed per specification section No. _____

Specified Test Duration _____ Hours Specified Test Pressure _____ PSIG

System Identification: _____

Describe Location: _____

Test Date: _____

Start Test Time: _____ Initial Pressure: _____ PSIG

Stop Test Time: _____ Final Pressure: _____ PSIG

Tested By: _____ Witnessed By: _____

Title: _____ Title: _____

Signed: _____ Signed: _____

Date: _____ Date: _____

Comments: _____

SECTION 26 05 00

GENERAL ELECTRICAL REQUIREMENTS

PART 1 - GENERAL

1.01 SCOPE

- A. Conditions of the Contract and portions of Division One of this Project Manual apply to this Section as though repeated herein.

1.02 GENERAL PROVISIONS

- A. In general, the work includes: Electrical work and the kindred materials and operations as indicated on the drawings and as specified in the following articles of Section 26 05 00.
- B. Job Information: Obtain at building including:
 - 1. Conditions affecting this Section of the Work.
 - 2. Accessibility
 - 3. Storage space.

1.03 GENERAL REQUIREMENTS

- A. This Section of the Specifications applies to all electrical work. Section 01 00 00 form a part of these specifications and the Contractor shall consult them in detail. Electrical work indicated in other Sections of the Specifications to be done by the Electrical Contractor shall be included in the Work of this Section.

1.04 DEFINITIONS

- A. Certain terms used herein; on the drawings; and in the contract documents, shall be defined as follows:
- B. Provide: Furnish and install complete and ready for service.
- C. Exposed: Exposed to view in any room, hallway, passageway, or outside.
- D. Approval: The approval of the Engineer in writing or by signed rubber stamp applied to drawings, illustrations, etc.

1.05 INTENT OF DRAWINGS AND SPECIFICATIONS

- A. These specifications and attendant drawings are intended to cover a complete installation of systems. The omission of expressed reference to any item of labor or material necessary for the proper execution of the work in accordance with present practice of the trade shall not relieve the Contractor from providing such additional labor and materials.

1.06 DRAWINGS

- A. The Electrical drawings do not attempt to show the complete details of building construction which affect the electrical installation. The Contractor shall refer to the architectural, civil, structural and mechanical drawings for additional details which affect the proper installation of this work. The Contractor is cautioned that diagrams showing electrical connections and/or circuiting are diagrammatic only and must not be used for obtaining lineal runs of wire to conduit. Wiring diagrams do not necessarily show the exact physical arrangement of the equipment.

1 1.07 MATERIAL AND EQUIPMENT

2 A. All material and equipment shall be new and of the quality used for the purpose in good commercial
3 practice, and shall be standard product of reputable manufacturers. Each major component of
4 equipment shall have the manufacturer's name, catalog number, and capacity or rating on a nameplate,
5 securely affixed on the equipment in a conspicuous place.

6 1.08 SUBSTITUTION AND APPROVAL OF MATERIAL

7 A. See Section 01 00 00.

8 B. Such requests shall be accompanied by three copies of all necessary illustrations, cuts, drawings and
9 descriptions of material proposed for substitution and shall fully describe all points in which it differs
10 from the articles specified. Two copies will be retained by the Engineer and one copy returned to the
11 Contractor with approval or revisions indicated thereon.

12 1.09 DAMAGE TO OTHER WORK

13 A. The Electrical Contractor will be held rigidly responsible for all damages to the work of his own or
14 any other trade resulting from the execution of his work. It shall be the Contractor's responsibility to
15 adequately protect his work at all times. All damages resulting from his operations shall be repaired
16 or the damaged portions replaced by the party originally performing the work, (to the entire
17 satisfaction of the Engineer), and all cost thereof shall be borne by the Contractor responsible for the
18 damage.

19 1.10 COOPERATION WITH OTHER TRADES

20 A. This Contractor shall completely cooperate with all other trades in the matter of planning and
21 executing of the work. Every reasonable effort shall be made to prevent conflict and interferences as
22 to space requirements, dimensions, locations, openings, sleeving or other matters which tend to delay
23 or obstruct the work of any trade.

24 1.11 NEGLIGENCE

25 A. Should the Contractor fail to provide materials, templates, etc., or other necessary information causing
26 delay or expense to another party, he shall pay the actual amount of the damages to the party who
27 sustained the loss.

28 1.12 FIELD CHANGES

29 A. Should any change in drawings or specifications be required to comply with local regulations and/or
30 field conditions, the Contractor shall refer same to Engineer for approval before any work which
31 deviates from the original requirements of the drawings and specifications is started. In the event of
32 disagreements as to the necessity of such changes, the decision of the Engineer shall be final.

33 1.13 CUTTING AND PATCHING IN NEW CONSTRUCTION

34 A. As necessary and with approval to permit the installation of conduit or any part of the work under this
35 branch. Any cost caused by defective or ill-timed work shall be by the party responsible therefor.
36 Patching of holes, openings, etc. resulting from the work of this branch shall be furnished by this
37 contractor.

38 B. See Section 01 00 00 for additional requirements.

39 1.14 COMPLETION DATES

40 A. This Contractor shall be in a position to meet all completion dates established by the Engineer and
41 shall furnish all labor of all classes required to meet such schedules and completion dates.
42

1 1.15 STANDARDS, CODES AND PERMITS

- 2 A. All work shall be installed in accordance with National, State and Local electrical codes, laws,
3 ordinances and regulations. Comply with all applicable OSHA regulations.
- 4 B. All materials shall have a U.L. label where a U.L. standards and/or test exists.
- 5 C. Prepare and submit to all authorities having jurisdiction, for their approval, all applications and
6 working drawings required by them.
- 7 D. Secure and pay for all permits and licenses required.

8 1.16 CLEAN-UP

- 9 A. This Contractor shall at all times keep the premises free from excessive accumulation of waste
10 material or rubbish resulting from his work, including tools, scaffolding and surplus materials, and he
11 shall leave his work broom clean or its equivalent.
- 12 B. In case of dispute, Engineer may order the removal of such rubbish and charge the cost to the
13 responsible contractor as determined by the Engineer. At the time of final clean-up all fixtures and
14 equipment shall be thoroughly cleaned and left in proper condition for their intended use.

15 1.17 SHOP DRAWINGS

- 16 A. Submit to Engineer for review, copies of manufacturer's shop drawings and/or equipment brochure
17 depicting:
- 18 1. Lighting Fixtures
- 19 2. Photovoltaic System
- 20 3. Other materials at the request of the Engineer
- 21 B. Shop drawings shall bear the Contractor's stamp indicating approval.
- 22 C. Any equipment fabrication prior to shop drawing review shall be at the Contractor's risk.

23 1.18 WORKMANSHIP

- 24 A. The installation of all work shall be made so that its several component parts will function as a
25 workable system complete with all accessories necessary for its operation, and shall be left with all
26 equipment properly adjusted and in working order. The work shall be executed in conformity with
27 the best accepted standard practice of the trade so as to contribute to efficiency and appearance. It
28 shall also be executed so that the installation will conform and adjust itself to the building structure,
29 its equipment and its usage.

30 1.19 DRAWINGS OF OTHER TRADES

- 31 A. The Contractor shall consult the drawings of the work for the various other trades; field layouts of the
32 parties performing the work of the other trades; their shop drawings, and he shall be governed
33 accordingly in laying out his work.
- 34 B. Specifically examine shop drawings to confirm voltage, current characteristics, and other wiring
35 requirements for utilization equipment. Bring any discrepancies to the attention of the A/E.

36 1.20 FIELD MEASUREMENTS

- 37 A. The Contractor shall take all field measurements necessary for his work and shall assume the full
38 responsibility for their accuracy.
- 39

1 1.20 STRUCTURAL INTERFERENCES

2 A. Should any structural interferences prevent the installation of the outlets, running of conduits, etc., at
3 points shown on drawings, the necessary minor deviation therefrom, as determined by the Engineer,
4 may be permitted. Minor changes in the position of the outlets or equipment if decided upon before
5 any work has been done by the Contractor shall be made without additional charge.

6 1.21 EXAMINATION OF PLANS, SPECIFICATIONS AND SITE

7 A. Before submitting a bid, the Contractor shall visit the site and familiarize himself with all features of
8 the building and site which may affect the execution of his work. No extra payment will be allowed
9 for the failure to obtain this information. If in the opinion of the Contractor there are omissions or
10 errors in the plans or specifications, the Contractor shall clarify these points with the Engineer before
11 submitting his bid. In lieu of written clarification by addendum, resolve all conflicts in favor of the
12 greater quantity or better quality.

13 1.22 GUARANTEE

14 A. The Contractor shall unconditionally guarantee his work and all components thereof, excluding
15 lamps, for a period of one year from the date of his final payment. He shall remedy any defects in
16 workmanship and repair or replace any faulty equipment which shall appear within the guarantee
17 period to the entire satisfaction of the Engineer at no additional charge.

18 1.23 TEMPORARY WIRING AND SERVICE

19 A. None required.

20 1.24 ELECTRICAL SERVICE

21 A. The electrical service is existing.

22 1.25 BRANCH CIRCUIT WIRING

23 A. See plans for general arrangement of circuits, conduit runs, and ratings of branch circuits and special
24 circuits.

25 B. Provide everything necessary to comply with the general scheme shown, including all types of
26 control.

27 C. Circuit numbers as shown on plans are for contractor to plan his wiring and for estimating purposes.
28 These numbers are not necessarily consecutive numbers of the panelboard breakers. Balanced load on
29 bus is to be the determining factor in arrangement of circuits. Balance loading to within 7 1/2%.

30 D. Minimum size of lighting system branch circuit conductors to be #12 AWG.

31 E. Conductors terminating at wired outlets shall extend at least eight (8) inches beyond outlet box
32 conduit fitting.

33 F. 120 volt circuit home runs greater than 50 feet in length shall have #10 AWG minimum size between
34 panel and first receptacle or fixture outlet.

35 G. The use of single-phase, multi-wire branch circuits with a common neutral is not permitted. All
36 branch circuits shall be furnished and installed with an individual accompanying neutral, sized the
37 same as the phase conductors.

38 1.26 MOTOR WIRING

39 A. Unless otherwise indicated on the drawings or elsewhere in these specifications, all motors shall be
40 furnished by others.

41 B. Motors shall be set in place by others and the associated motor starters and controllers shall be turned
42 over to this Contractor for erection and line voltage power wiring.

43 C. Any contractor supplying starters and controllers that are not part of this contract shall index same and

- 1 provide this Contractor with instructions as to proper location in sufficient time to permit the
2 installation of a concealed raceway system.
- 3 D. Where this Contractor is required to provide control wiring, the Contractor supplying the controllers
4 shall provide all necessary and required wiring diagrams for proper installation.
- 5 E. Low voltage (less than 115 volts) control wiring shall be by others, unless noted elsewhere in the
6 specifications except that this Contractor shall extend circuit to associated transformers, wire and
7 connect to same.
- 8 F. This Contractor shall examine the plans and specifications of other sections and shall include in his
9 bid all control wiring, as referenced to be performed by Section 26 05 00.
- 10 G. Required disconnect switches furnished by other sections shall be installed by Section 26 05 00.
11 Furthermore, this Contractor shall provide all disconnect switches required by code that are not
12 furnished by other sections.

13 1.27 SPECIAL OUTLETS

- 14 A. General: Furnish and install outlets, wiring and receptacles accordingly, at locations required by
15 equipment serviced or otherwise as directed. Extend wiring to outlets on equipment and make final
16 connection.

17 1.28 IDENTIFICATION

- 18 A. General:
- 19 1. Materials and equipment installed under this Section shall be clearly identified as listed below.
 - 20 2. Locate identification conspicuously.
 - 21 3. Terminology to be approved by Engineer.
 - 22 4. See plans for any additional items to be identified.
 - 23 5. Loads such as motors shall be described by function rather than by the system of arbitrary
24 number as shown on electrical plans.
 - 25 6. Use abbreviations sparingly.
- 26 B. Laminated Bakelite Plates: Engraved plastic nameplate shall be securely screwed or riveted to the
27 following equipment. Size 1" x 4" with 3/8" high letters; unless space available dictates differently.
- 28 1. Each panelboard, contactor, time switch, starter or disconnect switch. Locate on inside cover
29 of panels.
 - 30 2. Each feeder at all accessible locations.
 - 31 3. Each end of empty conduit runs to indicate the intended use of the conduit and the location of
32 opposite end. Use room numbers that are permanently assigned.
- 33 C. Typewritten Directory: Each panelboard both new and existing shall be provided with a typewritten
34 directory attached to the inside of panel door and covered with clear plastic indicating load served and
35 rooms served by each protective device in the respective panel. Spares and spaces shall be clearly
36 identified.
- 37
- 38 D. Switch Station:
- 39 1. All key switches shall be engraved indicating controlled item.
 - 40 2. All remote switches shall be engraved indicating controlled item.
- 41 E. Conductor Identification:
- 42 1. Identify each conductor at each wiring device, connector or splice point with permanently
43 attached wrap-around adhesive markers as manufactured by Brady Co. or 3M.
 - 44 2. This identification shall include branch circuit number, control circuit, or any other appropriate
45 number or lettering that will expedite future tracing and trouble shooting.

1 1.29 LOCATIONS OF OUTLETS AND WIRING DEVICES

2 A. Outlets:

- 3 1. Locations of outlets and electrical equipment on the drawings are approximate only. Unless
4 otherwise indicated on the drawings or established in the specifications, the exact locations of
5 electrical outlets shall be established in the field by directive from the Engineer. Generally,
6 outlets shall be located as required for proper installation of equipment served and otherwise
7 locations shall be established by construction or code requirements and such as to be
8 coordinated with equipment of other trades.
- 9 2. This Section shall consult with the Engineer and refer to all details, sections, elevations and
10 equipment plans and the plans of other trades for exact location.
- 11 3. The Engineer reserves the right to make reasonable changes in the location of outlets,
12 apparatus or equipment up to the time of roughing in. Such changes as directed shall be made
13 by the Contractor without additional compensation.
- 14 4. Dimensions taken by scale shall not be used to establish rough-in locations.

15 B. Wiring Devices:

- 16 1. The approximate location of wiring devices are indicated on the drawings; the specific location
17 shall be determined in accordance with "Location of Outlets" of these specifications and as
18 follows.
- 19 2. This Section is referred to equipment plans, equipment shop drawings, elevation drawings and
20 other detail or dimensional drawings, and he shall consult with the Engineer before installation
21 of proceeding with any work dependent upon this information.
- 22 3. Generally, wiring devices shall be located as follows:
- 23 a. Wall receptacles shall generally be centered 15" above the finished floor and 6" above
24 surface of built-in counters and tables where same abuts wall and 4" above
25 backsplashes if counters are so equipped.
- 26 b. Special purpose receptacles shall be located as required by equipment served.
- 27 c. Switches shall be centered 48" above finished floor on latch side of door opening with
28 edge of plate not more than 12" from door frame, except as noted on the drawings.
- 29 d. In hazardous areas, the location of wiring devices shall be established by Code
30 requirements which shall take precedence over conflicting information on the drawings
31 or included herein.

32 1.30 TELEPHONE SYSTEM

- 33 A. No work required.

34 1.31 SEALING AND FIREPROOFING

- 35 A. Sealing and fireproofing of openings between conduit, cable tray, wireway, trough, cablebus, busduct,
36 etc. and fire rated surfaces shall be the responsibility of the contractor whose work penetrates the
37 opening.
38 Sealing and fireproofing shall use materials and methods complying with ASTM E814 requirements
39 requirements appropriate to the rating of the material penetrated.
- 40 C. Materials by Dow-Corning, 3M, Specified Technologies, Inc., and Chase-Foam are acceptable if in
41 accordance with (B) above.
- 42 D. Submit manufacturer's penetration details to authority having jurisdiction. Details shall confirm
43 method's compliance with ASTM E814.
- 44 E. Include copies of penetration details in Project Operation and Maintenance Manuals.

END OF SECTION 26 05 00