



**Department
of
Public Works
Infrastructure
Services Division
Facilities Development
& Management Section**

**4TH & HIGHLAND AVENUE PARKING STRUCTURE
RTU REPLACEMENT**

324 West Highland Avenue
Milwaukee, Wisconsin

December, 2012

Project Number RM5445149301
Official Notice No. 131

CITY OF MILWAUKEE, WISCONSIN
DEPARTMENT OF PUBLIC WORKS
INFRASTRUCTURE SERVICES DIVISION
FACILITIES DEVELOPMENT &
MANAGEMENT SECTION

PROJECT MANUAL
GOVERNING THE
4th & HIGHLAND AVENUE PARKING STRUCTURE
RTU REPLACEMENT
324 WEST HIGHLAND AVE
MILWAUKEE, WISCONSIN

Project No. **RM54451149301**

December, 2012

TABLE OF CONTENTS

<u>TABLE OF CONTENTS</u>	<u>PAGE NO.</u>
<u>BIDDING REQUIREMENTS</u>	
00030 City of Milwaukee General Official Notice	00030/1
00031 City of Milwaukee Specific Official Notice	00031/1
00100 Instructions to Bidders	00100/1-2
<u>GENERAL CONDITIONS</u>	
00700 General Conditions	00700/1-4
00821 Inspection Charges	00821/1
00822 Prevailing Wage Scale	00822/1-32
00850 Drawing Schedule	00850/1
<u>GENERAL REQUIREMENTS</u>	
01010 Summary of Work	01010/1-2
01210 Project Meetings	01210/1-2
01300 Submittals and Permits	01300/1-3
01500 Job Site Utilities, Facilities, and Security	01500/1-4
01505 Construction Waste Management	01505/1-4
01600 Materials and Equipment	01600/1-3
01700 Cleaning and Project Close-Out	01700/1-3
<u>TECHNICAL SPECIFICATIONS</u>	
<u>DIVISION 07 MOISTURE PROTECTION</u>	
070150.91 Roofing Restoration	070150.91/1-6
<u>DIVISION 23 HEATING, VENTILATING, AND AIR-CONDITIONING (HVAC)</u>	
230500 Common Work Results for HVAC	230500/1-4
230513 Common Motor Requirements for HVAC Equipment	230513/1-2
230593 Testing, Adjusting, and Balancing For HVAC	230593/1-8
231123 Facility Natural-Gas Piping	231123/1-4
232113 Hydronic Piping	232113/1-2
235100 Breechings, Chimneys, and Stacks	235100/1-2
237413 Packaged, Outdoor, Central-Station Air-Handling Units	237413/1-8
<u>DIVISION 24 THROUGH 25</u>	
Not Used	
<u>DIVISION 26 ELECTRICAL</u>	
260500 Common Work Results for Electrical	260500/1-3
260519 Low-Voltage Electrical Power Conductors and Cables	260519/1
260526 Grounding and Bonding for Electrical Systems	260526/1-2
260529 Hangers and Supports for Electrical Systems	260529/1-3
260533 Raceways and Boxes for Electrical Systems	260533/1-4
262726 Wiring Devices	262726/1-2
262816 Enclosed Switches and Circuit Breakers	262816/1-3

00030/1

CITY OF MILWAUKEE
GENERAL OFFICIAL NOTICE
TO CONTRACTORS

Separate sealed bids for each project will be received until 10:30 A.M. of the bid opening date at which time bids will be publicly opened and read for furnishing all material and doing all work for each project in accordance with the requirements of the respective Official Notice on the bid form furnished in accordance with plans, specifications, contract documents, and proposed form of contract on file in the office of the Department of Public Works, Municipal Building, 841 N. Broadway, Room 506, Milwaukee, Wisconsin, 53202.

PROSPECTIVE BIDDERS ARE TO CAREFULLY EXAMINE AND REVIEW ALL CONTRACT DOCUMENTS AND MATERIALS IN SAID OFFICE BEFORE SUBMITTING BID.

AFFIDAVITS OF NO INTEREST MUST ACCOMPANY THE BIDS, AND THE FAILURE OF PROSPECTIVE BIDDERS TO COMPLY WITH THESE REQUIREMENTS MAY DISQUALIFY THE BID.

THE CONTRACTOR/LESSEE AGREES TO COMPLY WITH ALL APPLICABLE REQUIREMENTS OF THE AMERICANS WITH DISABILITIES ACT OF 1990, 42 U.S.C. § 12101, ET. SEQ. THE TDD NUMBER FOR PUBLIC WORKS IS (414) 286-2025.

As part of the bid each bidder shall submit a list of anticipated subcontractors and the class of work to be performed by each, which list should not be added to nor altered without the written consent of the Commissioner of Public Works.

All contractor(s) and subcontractor(s) are required to furnish or have on file a certificate of insurance in accordance with the insurance provisions of the General Specifications.

All contractor(s) and subcontractor(s) are subject to the prevailing wage rates and hours of labor as prescribed by the Common Council of the City of Milwaukee consistent with provisions of Section 66.0903 of the Wisconsin Statutes.

Copies of the actual work classifications and wage and fringe benefit rates enforced on this project are available in Room 506 of the Municipal Building.

Corporate surety will be required on performance and payment bonds for all projects listed in the following Official Notices. All applicable charter and Statutory provisions and ordinances, all the provisions of this official notice, invitation to bid, general and detailed specifications, special provisions, proposal, schedule of fixed prices, addendum and plans for this project and all other contract documents set forth in the invitation to bid will be incorporated and made part of the contract as if therein set forth in full.

Tie bids, when the lowest ones, will be decided by the Commissioner of Public Works.

The Commissioner of Public Works reserves the right to reject any or all bids.

Signed: GHASSAN KORBAN,
Commissioner of Public Works

Countersigned: MARTIN MATSON,
City Comptroller

CITY OF MILWAUKEE
SPECIFIC OFFICIAL NOTICE NO. 131-2012Important Notice:

The Invitation to Bid, all bid documents and the Plans & Specifications for the project listed will be available electronically to prospective bidders via <http://www.mpw.net/bids/docs/131-2012>. Any required addenda or responses related to the listed projects will be posted on said website. Bidders are encouraged to utilize this electronic method of obtaining bid documents as the Department of Public Works intends to solely use this method for future projects. At this time however, a limited number of hard copies of the above documents will also be available at address listed below. IF YOU ONLY PRINT THE DOCUMENTS FROM THE WEBSITE AND WOULD LIKE YOUR COMPANY'S NAME PLACED ON THE PLAN HOLDERS' LIST, PLEASE CALL 414-286-3314.

Sealed bids will be opened on Monday, January 07, 2013 at 10:30 A.M. for the **4TH AND HIGHLAND PARKING STRUCTURES, RTU REPLACEMENT**, located at 324 West Highland Avenue, Milwaukee, WI.

Bid Security Required: Bond, Certified Check, Cashier's Check, or Cash to accompany bid: 10% of Contractor's Base Bid

Time for Completion: 60 Working Days.

Liquidated Damages, per diem: \$150.00

The MWSBE requirement for this project is 25% of the contract base bid.
(African American: 5.57%, WBE: 0%, SBE: 19.43%)

The residency requirement for this project is 40% of all hours worked on the project.

The apprenticeship requirements for this project are: **1 Roofer**

The contractor shall specifically note the MWSBE, residency, and apprenticeship forms for this project. If the forms are not filled out properly, it will be cause for rejection of the bid.

Plans and project manual will be furnished to the prospective bidders upon payment of a \$10.00 non-refundable fee in room 506, Frank P. Zeidler Municipal Building, 841 North Broadway, Milwaukee, Wisconsin 53202. For general questions call 414-286-3314.

A \$10.00 per set additional non-refundable fee is required to obtain bid documents by mail. Plans are sent via U.S. mail unless other arrangements are made by the contractor.

Contractor must comply with all provisions of the CITY OF MILWAUKEE GENERAL OFFICIAL NOTICE TO CONTRACTORS published herein and at http://mpw.milwaukee.gov/services/bids_home

Pre-Bid Meeting: A Pre-Bid Meeting is scheduled for Thursday, December 27, 2012, at 2:00 p.m. in Room 606 of the Frank P. Zeidler Municipal Building, 841 North Broadway, Milwaukee, Wisconsin. Bidder participation is urged to become familiar with all aspects of the project and bidding requirements.

Signed

GHASSAN KORBAN
Commissioner of Public Works

SECTION 00100: INSTRUCTIONS TO BIDDERS

See also Instructions to Bidders in the "General Specifications" of the Department of Public Works, City of Milwaukee, Wisconsin, dated October 26, 2012, and all subsequent addenda.

BID FORM:

Submit a lump sum price for the work as indicated on the drawings and specified herein, complete in every respect.

Bids will not be accepted in any form except on the bid form included with this project manual.

The contractor must recognize and abide by the right of the Owner (City of Milwaukee) to accept or reject any or all bids in the best interests of the City.

UNIT PRICES:

Each bidder shall provide on the bid proposal the following unit prices. The unit prices will be used for additions to work required under the contract.

Unit Price 1:

State the amount to be added to the Base Bid (per penetration) to relocate roof penetrations approximately 25 inches west of existing penetrations. Include cost to restore roofing (making it water proof) at existing location per drawing ME202 (Mechanical/Electrical Roof Plans).

CONTRACT AWARD:

The Commissioner of Public Works will award the contract on the basis of the Base Bid only as funds permit.

CONTRACT BREAKDOWN:

Shortly after the award of the contract, each contractor shall submit a list showing the cost breakdown of the items in his contract. This list will be used as a basis for estimates of work completed for partial payment.

SITE VISIT:

All contractors shall visit the site, consult the drawings and project manual, be familiar with the work of other contractors and determine for himself all conditions affecting the work.

Failure by a contractor to be familiar with the project shall not release him from any obligation under this contract to complete the work in strict conformity with the plans and project manual and all City, State and Federal Codes or regulations pertaining to the work.

TIME FOR COMPLETION:

The time for completion is stated in the Specific Official Notice. The contractor may begin procuring materials and off-site fabricating (as appropriate and approved by engineer) on the date on the Notice to Proceed. The Notice to Proceed will be sent to the contractor directly following the signing of the contract.

BASE BID EXCLUSIONS:

TAB Work shall be performed by others under a separate contract with the City.

00100/2

ADDITIONAL PLANS/PROJECT MANUALS

The successful contractor will be responsible for furnishing all additional copies of plans, project manuals, addenda, etc., as may be needed by the contractor and subcontractors. The City will cooperate by making originals available to the contractor's printer of choice.

SECTION 00700: GENERAL CONDITIONS1. SCOPE:A. Index:

1. Scope
2. DPW General Specifications
3. Definitions
4. Control of Work and Materials
5. Samples and Tests
6. Project Coordination
7. Supervision of Work
8. Technical Specifications and Drawings
9. Safety Regulations
10. Code Rules

2. Department of Public Works General Specifications:

Provisions of the Department of Public Works General Specifications dated January 31, 1992, and subsequent addenda except as may be modified or expanded upon in this project manual, shall apply to all contractors and subcontractors working on the project. Copies of the General Specifications may be obtained from the Department of Public Works General Office, Room 501 Zeidler Municipal Building, 841 North Broadway, Milwaukee, Wisconsin, or from the Facilities Development and Management Section, Room 602, Zeidler Municipal Building.

3. Definitions:

- A. Owner: City of Milwaukee.
- B. Facilities Manager: The Facilities Manager of the Facilities Development and Management Section.
- C. Project Inspector: The authorized representative of the Commissioner assigned to make detailed inspection of any or all portions of the work and materials thereof. These inspections are not a substitute to those required by the Department of Neighborhood Services for permit and code compliance.
- D. Addenda: Written or graphic instruments issued prior to the execution of the contract which modify or interpret the bidding documents, including drawings and project manual by additions, deletions, clarifications or corrections. Addenda will become part of the contract documents when the contract is executed.
- E. Contract Drawings: Drawings of the work to be done as listed hereafter in Section 00850 Drawing Schedule and/or Section 00870 Plans and Details.
- F. Utility: WE Energies.
- G. End User: City of Milwaukee.

4. Control of Work and Materials:

- A. Detail and Shop Drawings: Shop drawings and other additional drawings which may be

required for each contract of the work shall be prepared by each respective contractor unless otherwise directed by the Facilities Manager. Prints shall be the same size as contract documents when practical. Prints of each drawing shall be submitted to the Facilities Manager for approval before proceeding with the work. Changes ordered by the Facilities Manager shall be made and revised prints submitted as above. The Facilities Manager's approval of drawings shall not relieve the contractor of responsibility for errors.

- B. Primary Lines and Grades: The City of Milwaukee will mark two building corners along a line and will establish a benchmark, with a relative elevation, within close proximity to the site. Once established by the City, the contractor shall preserve all points and benchmark as long as needed during construction. The contractor will bear all costs associated with re-establishing points and benchmark.
 - C. Construction Lines and Grades: The contractor must bear sole responsibility for the correct transfer of all construction lines and grades from the primary lines and grades points. He shall take such measurements from existing work as may be necessary to insure the proper construction of his work.
 - D. Material Orders and Shipping Statements: The contractor shall furnish to the Facilities Manager at least two (2) copies of all material orders and shipping statements. Itemized weights of the materials and individual units of finished work shall be shown.
 - E. Weighing of Materials and Fabricated Units: The weighing of materials and fabricated units such as structural steel, casings, etc., when required, shall be done in the presence of the Commissioner's representative. The contractor shall be responsible for the satisfactory weighing of such materials and units.
 - F. Consignment and Delivery of Materials: The materials for the work shall be consigned to the contractor and he shall be responsible for the delivery of all materials required for the completion of the contract.
5. Samples and Tests:
- A. Method of Sampling: Samples of the materials proposed or furnished for the work may be taken by the Commissioner at any time; at the point of manufacture, point of delivery or site of work. They will be selected, as far as practicable, in accordance with standard methods of sampling such materials as specified in the standard of the American Society for Testing Material. All sampling shall be done by authorized representatives of the Commissioner. Selections will be in an orderly and systematic manner, insuring samples representative of the lot.
 - B. A.S.T.M. Standards: Wherever the abbreviation A.S.T.M. is used in connection with the number of a standard specification, the specification referred to shall be the Standard of the American Society for Testing Materials, designated by that number, including all revisions in effect on the date of award of the contract. Should a revised or amended standard be issued by the American Society for Testing Materials which, in the opinion of the Commissioner, conflicts with or causes undesirable changes in the standards referred to herein, the Commissioner reserves the right, by means of addenda to the project manual, to continue under the provisions of the pertinent standard referred to herein.
 - C. Cost of Test Specimens and Samples: All test specimens of metals and all samples of non-metals required for tests shall be furnished by the contractor without cost to the City.
 - D. Costs of Tests: All tests on test specimens of metals will be made at the expense of the

contractor and the original test on samples of non-metals will be made at the expense of the City. In all cases, the testing procedure will be in accordance with Standard A.S.T.M. tests for such materials. Subsequent tests of non-metals requested by the contractor, when such tests are permitted by A.S.T.M. Specifications and approved by the Commissioner or subsequent tests ordered by the Commissioner will be made at the expense of the contractor.

6. Project Coordination:

- A. Contractors are required, so far as possible, to arrange work and to dispose of materials so as not to interfere with the work or storage of materials of other contractors or City forces engaged upon the work.
- B. Contractors shall give full cooperation to other trades and furnish any information necessary to permit the work of all trades to be installed satisfactorily and with the least possible interference or delay.
- C. Where the work of a contractor will be installed in close proximity to the work of other trades, or where there is evidence that the work of a contractor will interfere with the work of other trades, he shall assist in working out space conditions to make satisfactory adjustments.
- D. If a contractor installs work before coordinating it with other trades or so as to cause interference with work of other trades, he shall make necessary changes in his work to correct the condition without extra charge.
- E. Contractors are required to join their work to that of others in a proper manner, and in accordance with the spirit of the plans and project manual, and to perform the work in the proper sequence in relation to that of other contractors, and as may be directed by the Project Inspector.

7. Supervision of Work:

- A. Contractors shall furnish the services of an experienced engineer or superintendent.
- B. He shall be constantly in charge of the installation of the work together with all subcontractors, skilled workers, helpers, and labor required to unload, transfer, erect, connect up, adjust, start, operate and test each system.
- C. He shall be thoroughly acquainted with and be responsible for the various subcontractors' work so that it is properly coordinated and supervised to the satisfaction of the Commissioner of Public Works or his representative.
- D. Upon written notice to a contractor of the lack of such coordination and supervision, the Commissioner of Public Works may authorize such services as may be required and deduct the cost of this service at an hourly rate of \$60.00 per hour per worker from the contract for the work.

8. Technical Specifications and Drawings:

A. Governing order of Contract Documents:

- 1. The following provision modifies DPW General Specifications Item 2.1.3.1:

Anything mentioned in the Technical Specifications and not shown on the drawings or shown on the drawings and not mentioned in the Technical Specifications, shall be as if

shown on or mentioned in both. In case of difference between drawings and Technical Specifications, the Technical Specifications shall govern. In case of any discrepancy in drawings or Technical Specifications, the matter shall be immediately submitted to Facilities Development and Management Section for decision. Said discrepancy shall not be adjusted by the contractor.

B. All contractors shall have complete sets of plans and project manuals on the job site at all times.

9. Safety Regulations:

All work shall be done in accordance with the safety requirements referenced in the International Building Code, as adopted and amended by the State of Wisconsin and OSHA.

10. Code Rules:

The rulings, regulations and laws of the following shall be complied with in the completion of this project:

- International IBC Existing Building Code, as amended and adopted by the State of Wisconsin (Renovations/Remodeling)
- International Building Code, as amended and adopted by the State of Wisconsin (New Construction)
- Plumbing and Drainage Codes of the City of Milwaukee
- Ordinances of the City of Milwaukee
- National Board of Fire Underwriters
- OSHA
- NFPA
- FAA
- NEC
- IEEE
- UL

00821/1

SECTION 00821: INSPECTION CHARGES

The contractor will be charged a fee for inspection for each and every day such inspection is required after the time allowed for completion has expired.

The amount of the fee for inspection shall be \$325.00 per day.

Rev. 2/08

The time allowed for completion is stated in the Specific Official Notice and shall start with the date on the Notice to Proceed which will be sent to the contractor directly following the signing of the contract. The time allowed includes the time required for fabricating and procuring material and doing the work at the building site.

PREVAILING WAGE RATE DETERMINATION

Issued by the State of Wisconsin
 Department of Workforce Development
 Pursuant to s. 66.0903, Wis. Stats.
 Issued On: 01/13/2012
 Amended On: 03/02/2012

DETERMINATION NUMBER: 201200107

EXPIRATION DATE: Prime Contracts MUST Be Awarded or Negotiated On Or Before 12/31/2012. If NOT, You MUST Reapply.

PROJECT NAME: ALL PUBLIC WORKS PROJECTS UNDER SEC. 66.0903, STATS.-CITY OF MILWAUKEE

PROJECT LOCATION: MILWAUKEE CITY, MILWAUKEE COUNTY, WI

CONTRACTING AGENCY: CITY OF MILWAUKEE-DEPT OF PUBLIC WORKS

CLASSIFICATION:	Contractors are responsible for correctly classifying their workers. Either call the Department of Workforce Development (DWD) with trade or classification questions or consult DWD's Dictionary of Occupational Classifications & Work Descriptions on the DWD website at: dwd.wisconsin.gov/er/prevailing_wage_rate/Dictionary/dictionary_main.htm .
OVERTIME:	<p>Time and one-half must be paid for all hours worked:</p> <ul style="list-style-type: none"> - over 10 hours per day on prevailing wage projects - over 40 hours per calendar week - Saturday and Sunday - on all of the following holidays: January 1; the last Monday in May; July 4; the 1st Monday in September; the 4th Thursday in November; December 25; - The day before if January 1, July 4 or December 25 falls on a Saturday; - The day following if January 1, July 4 or December 25 falls on a Sunday. <p>Apply the time and one-half overtime calculation to whichever is higher between the Hourly Basic Rate listed on this project determination or the employee's regular hourly rate of pay. Add any applicable Premium or DOT Premium to the Hourly Basic Rate before calculating overtime.</p> <p>A DOT Premium (discussed below) may supersede this time and one-half requirement.</p>
FUTURE INCREASE:	When a specific trade or occupation requires a future increase, you MUST add the full hourly increase to the "TOTAL" on the effective date(s) indicated for the specific trade or occupation.
PREMIUM PAY:	If indicated for a specific trade or occupation, the full amount of such pay MUST be added to the "HOURLY BASIC RATE OF PAY" indicated for such trade or occupation, whenever such pay is applicable.
DOT PREMIUM:	This premium only applies to highway and bridge projects owned by the Wisconsin Department of Transportation and to the project type heading "Airport Pavement or State Highway Construction." DO NOT apply the premium calculation under any other project type on this determination.
APPRENTICES:	Pay apprentices a percentage of the applicable journey person's hourly basic rate of pay and hourly fringe benefit contributions specified in this determination. Obtain the appropriate percentage from each apprentice's contract or indenture.
SUBJOURNEY:	Subjourney wage rates may be available for some of the trades or occupations indicated below with the exception of laborers, truck drivers and heavy equipment operators. Any employer interested in using a subjourney classification on this project MUST complete Form ERD-10880 and request the applicable wage rate from the Department of Workforce Development PRIOR to using the subjourney worker on this project.

This document **MUST BE POSTED** by the **CONTRACTING AGENCY** in at least one conspicuous and easily accessible place **on the site of the project**. A local governmental unit may post this document at the place normally used to post public notices if there is no common site on the project. This document **MUST** remain posted during the entire time any worker is employed on the project and **MUST** be physically incorporated into the specifications and all contracts and subcontracts. If you have any questions, please write to the Equal Rights Division, Labor Standards Bureau, P.O. Box 8928, Madison, Wisconsin 53708 or call (608) 266-6861.

The following statutory provisions apply to local governmental unit projects of public works and are set forth below pursuant to the requirements of s. 66.0903(8), Stats.

s. 66.0903 (1) (f) & s. 103.49 (1) (c) "PREVAILING HOURS OF LABOR" for any trade or occupation in any area means 10 hours per day and 40 hours per week and may not include any hours worked on a Saturday or Sunday or on any of the following holidays:

1. January 1.
2. The last Monday in May.
3. July 4.
4. The first Monday in September.
5. The 4th Thursday in November.
6. December 25.
7. The day before if January 1, July 4 or December 25 falls on a Saturday.
8. The day following if January 1, July 4 or December 25 falls on a Sunday.

s. 66.0903 (10) RECORDS; INSPECTION; ENFORCEMENT.

(a) Each contractor, subcontractor, or contractor's or subcontractor's agent performing work on a project of public works that is subject to this section shall keep full and accurate records clearly indicating the name and trade or occupation of every person performing the work described in sub. (4) and an accurate record of the number of hours worked by each of those persons and the actual wages paid for the hours worked.

s. 66.0903 (11) LIABILITY AND PENALTIES.

(a) 1. Any contractor, subcontractor, or contractor's or subcontractor's agent who fails to pay the prevailing wage rate determined by the department under sub. (3) or who pays less than 1.5 times the hourly basic rate of pay for all hours worked in excess of the prevailing hours of labor is liable to any affected employee in the amount of his or her unpaid wages or his or her unpaid overtime compensation and in an additional amount as liquidated damages as provided under subd. 2., 3., whichever is applicable.

2. If the department determines upon inspection under sub. (10) (b) or (c) that a contractor, subcontractor, or contractor's or subcontractor's agent has failed to pay the prevailing wage rate determined by the department under sub. (3) or has paid less than 1.5 times the hourly basic rate of pay for all hours worked in excess of the prevailing hours of labor, the department shall order the contractor to pay to any affected employee the amount of his or her unpaid wages or his or her unpaid overtime compensation and an additional amount equal to 100 percent of the amount of those unpaid wages or that unpaid overtime compensation as liquidated damages within a period specified by the department in the order.

3. In addition to or in lieu of recovering the liability specified in subd. 1. as provided in subd. 2., any employee for and in behalf of that employee and other employees similarly situated may commence an action to recover that liability in any court of competent jurisdiction. If the court finds that a contractor, subcontractor, or contractor's or subcontractor's agent has failed to pay the prevailing wage rate determined by the department under sub. (3) or has paid less than 1.5 times the hourly basic rate of pay for all hours worked in excess of the prevailing hours of labor, the court shall order the contractor, subcontractor, or agent to pay to any affected employee the amount of his or her unpaid wages or his or her unpaid overtime compensation and an additional amount equal to 100 percent of the amount of those unpaid wages or that unpaid overtime compensation as liquidated damages.

5. No employee may be a party plaintiff to an action under subd. 3. unless the employee consents in writing to become a party and the consent is filed in the court in which the action is brought. Notwithstanding s. 814.04 (1), the court shall, in addition to any judgment awarded to the plaintiff, allow reasonable attorney fees and costs to be paid by the defendant.

BUILDING OR HEAVY CONSTRUCTION

Includes sheltered enclosures with walk-in access for the purpose of housing persons, employees, machinery, equipment or supplies and non-sheltered work such as canals, dams, dikes, reservoirs, storage tanks, etc. A sheltered enclosure need not be "habitable" in order to be considered a building. The installation of machinery and/or equipment, both above and below grade level, does not change a project's character as a building. On-site grading, utility work and landscaping are included within this definition. Residential buildings of four (4) stories or less, agricultural buildings, parking lots and driveways are NOT included within this definition.

SKILLED TRADES

<u>CODE</u>	<u>TRADE OR OCCUPATION</u>	<u>HOURLY BASIC RATE OF PAY</u>	<u>HOURLY FRINGE BENEFITS</u>	<u>TOTAL</u>
		\$	\$	\$
101	Acoustic Ceiling Tile Installer	33.43	19.31	52.74
102	Boilermaker	31.09	21.87	52.96
103	Bricklayer, Blocklayer or Stonemason Future Increase(s): Add \$.50 on 6/01/2012; Add \$1.45/hr on 6/01/2013 Premium Increase(s): DOT PREMIUM: Pay two times the hourly basic rate on Sunday, New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day & Christmas Day.	35.58	16.37	51.95
104	Cabinet Installer	29.06	15.16	44.22
105	Carpenter Premium Increase(s): DOT PREMIUM: Pay two times the hourly basic rate on Sunday, New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day & Christmas Day.	33.43	19.31	52.74
106	Carpet Layer or Soft Floor Coverer	31.68	18.55	50.23
107	Cement Finisher	30.87	16.33	47.20
108	Drywall Taper or Finisher Future Increase(s): Add \$2.20/hr on 6/1/2012	28.97	17.74	46.71
109	Electrician Future Increase(s): Add \$1.40/hr on 6/1/2012. Add \$1.60/hr on 6/1/2013. Premium Increase(s): DOT PREMIUM: Pay two times the hourly basic rate on Sunday, New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day & Christmas Day.	31.54	20.95	52.49
110	Elevator Constructor	43.79	25.48	69.27
111	Fence Erector	27.00	0.00	27.00
112	Fire Sprinkler Fitter	36.82	19.03	55.85
113	Glazier	32.25	16.20	48.45
114	Heat or Frost Insulator	33.28	22.45	55.73

Fringe Benefits Must Be Paid On <u>All</u> Hours Worked		HOURLY BASIC RATE OF PAY	HOURLY FRINGE BENEFITS	TOTAL
CODE	TRADE OR OCCUPATION	\$	\$	\$
115	Insulator (Batt or Blown)	23.62	11.55	35.17
116	Ironworker	31.31	21.54	52.85
117	Lather	31.68	18.41	50.09
118	Line Constructor (Electrical)	35.97	18.08	54.05
119	Marble Finisher	31.16	16.27	47.43
120	Marble Mason	35.53	15.92	51.45
121	Metal Building Erector	21.05	7.82	28.87
122	Millwright	28.30	23.29	51.59
123	Overhead Door Installer	26.53	0.00	26.53
124	Painter Future Increase(s): Add \$2.20/hr on 6/1/2012. Premium Increase(s): Add \$.20/hr for paperhanging; Add \$.35/hr for bridge, iron and drywall; Add \$.75/hr for spraying and sandblasting; Add \$.60/hr for EIFS work; Add \$1.00/hr for lead based paint removal.	28.97	17.74	46.71
125	Pavement Marking Operator	26.00	0.00	26.00
126	Piledriver	28.11	23.94	52.05
127	Pipeline Fuser or Welder (Gas or Utility)	30.52	18.84	49.36
129	Plasterer	20.13	1.03	21.16
130	Plumber	36.97	17.47	54.44
132	Refrigeration Mechanic	37.21	19.04	56.25
133	Rofer or Waterproofor Future Increase(s): Add \$.50/hr. effective 06/01/2012	29.40	15.05	44.45
134	Sheet Metal Worker	37.20	16.37	53.57
135	Steamfitter	38.26	19.49	57.75
137	Teledata Technician or Installer Premium Increase(s): DOT PREMIUM: Pay two times the hourly basic rate on Sunday, New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day & Christmas Day.	24.65	15.67	40.32
138	Temperature Control Installer	29.63	19.17	48.80
139	Terrazzo Finisher	18.00	5.35	23.35
140	Terrazzo Mechanic	31.16	16.27	47.43

Fringe Benefits Must Be Paid On <u>All</u> Hours Worked		HOURLY BASIC RATE OF PAY	HOURLY FRINGE BENEFITS	TOTAL
CODE	TRADE OR OCCUPATION	\$	\$	\$
141	Tile Finisher	23.76	16.05	39.81
142	Tile Setter	29.95	15.64	45.59
143	Tuckpointer, Caulker or Cleaner Premium Increase(s): DOT PREMIUM: Pay two times the hourly basic rate on Sunday, New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day & Christmas Day.	34.35	15.92	50.27
144	Underwater Diver (Except on Great Lakes)	36.20	18.81	55.01
146	Well Driller or Pump Installer	25.32	15.30	40.62
147	Siding Installer	36.60	16.37	52.97
150	Heavy Equipment Operator - ELECTRICAL LINE CONSTRUCTION ONLY	27.42	15.10	42.52
151	Light Equipment Operator -ELECTRICAL LINE CONSTRUCTION ONLY	28.78	15.16	43.94
152	Heavy Truck Driver - ELECTRICAL LINE CONSTRUCTION ONLY	17.80	9.00	26.80
153	Light Truck Driver - ELECTRICAL LINE CONSTRUCTION ONLY	23.38	12.48	35.86
154	Groundman - ELECTRICAL LINE CONSTRUCTION ONLY	21.30	10.97	32.27

TRUCK DRIVERS

Fringe Benefits Must Be Paid On <u>All</u> Hours Worked		HOURLY BASIC RATE OF PAY	HOURLY FRINGE BENEFITS	TOTAL
CODE	TRADE OR OCCUPATION	\$	\$	\$
201	Single Axle or Two Axle	32.32	16.75	49.07
203	Three or More Axle Future Increase(s): Add \$1.75/hr on 6/1/2012; Add \$1.85/hr on 6/1/2013. Premium Increase(s): DOT PREMIUM: Pay two times the hourly basic rate on Sunday, New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day & Christmas Day.	22.50	16.19	38.69
204	Articulated, Euclid, Dumptor, Off Road Material Hauler	33.32	17.60	50.92
205	Pavement Marking Vehicle	19.25	10.84	30.09
207	Truck Mechanic	24.91	15.35	40.26

LABORERS

Fringe Benefits Must Be Paid On <u>All</u> Hours Worked		HOURLY BASIC RATE OF PAY	HOURLY FRINGE BENEFITS	TOTAL
CODE	TRADE OR OCCUPATION	\$	\$	\$
301	General Laborer Premium Increase(s): Add \$.11 for mortar mixer, fork lift operator, air and electric equipment and power buggy operators; Add \$.22 for jackhammer operator, certified welder, gunite machineman.	28.82	15.61	44.43
302	Asbestos Abatement Worker	21.58	17.83	39.41
303	Landscaper	12.50	2.20	14.70
310	Gas or Utility Pipeline Laborer (Other Than Sewer and Water)	19.14	15.53	34.67
311	Fiber Optic Laborer (Outside, Other Than Concrete Encased) Premium Increase(s): DOT PREMIUMS: Pay two times the hourly basic rate on New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day & Christmas Day.	17.24	15.00	32.24
314	Railroad Track Laborer	17.00	1.06	18.06

**HEAVY EQUIPMENT OPERATORS
SITE PREPARATION, UTILITY OR LANDSCAPING WORK ONLY**

Fringe Benefits Must Be Paid On <u>All</u> Hours Worked		HOURLY BASIC RATE OF PAY	HOURLY FRINGE BENEFITS	TOTAL
CODE	TRADE OR OCCUPATION	\$	\$	\$
501	Air Track, Rotary or Percussion Drilling Machine &/or Hammers, Blaster; Asphalt Milling Machine; Boring Machine (Directional, Horizontal or Vertical); Backhoe (Track Type) Having a Mfgr's Rated Capacity of 130,000 Lbs. or Over; Backhoe (Track Type) Having a Mfgr's Rated Capacity of Under 130,000 Lbs., Backhoe (Mini, 15,000 Lbs. & Under); Bulldozer or Endloader (Over 40 hp); Compactor (Self-Propelled 85 Ft Total Drum Width & Over, or Tractor Mounted, Towed & Light Equipment); Concrete Batch Plant, Batch Hopper; Concrete Breaker (Large, Auto, Vibratory/Sonic, Manual or Remote); Crane, Shovel, Dragline, Clamshells; Forklift (Machinery Moving or Steel Erection, 25 Ft & Over); Gradall (Cruz-Aire Type); Grader or Motor Patrol; Master Mechanic; Mechanic or Welder; Robotic Tool Carrier (With or Without Attachments); Scraper (Self Propelled or Tractor Drawn) 5 cu yds or More Capacity; Tractor or Truck Mounted Hydraulic Backhoe; Tractor or Truck Mounted Hydraulic Crane (10 Tons or Under); Tractor (Scraper, Dozer, Pusher, Loader); Trencher (Wheel Type or Chain Type Having Over 8 Inch Bucket).	32.32	18.18	50.50
502	Backfiller; Broom or Sweeper; Bulldozer or Endloader (Under 40 hp); Environmental Burner; Forestry Equipment, Timbco, Tree Shear, Tub Grinder, Processor; Jeep Digger; Screed (Milling Machine); Skid Rig; Straddle Carrier or Travel Lift; Stump Chipper; Trencher (Wheel Type or Chain Type Having 8 Inch Bucket & Under).	33.32	17.60	50.92

Fringe Benefits Must Be Paid On <u>All</u> Hours Worked				
CODE	TRADE OR OCCUPATION	HOURLY BASIC RATE OF PAY	HOURLY FRINGE BENEFITS	TOTAL
		\$	\$	\$
503	Air Compressor (&/or 400 CFM or Over); Augers (Vertical & Horizontal); Compactor (Self-Propelled 84 Ft Total Drum Width & Under, or Tractor Mounted, Towed & Light Equipment); Crusher, Screening or Wash Plant; Farm or Industrial Type Tractor; Forklift; Generator (&/or 150 KW or Over); Greaser; High Pressure Utility Locating Machine (Daylighting Machine); Mulcher; Oiler; Post Hole Digger or Driver; Pump (3 Inch or Over) or Well Points; Refrigeration Plant or Freeze Machine; Rock, Stone Breaker; Skid Steer Loader (With or Without Attachments); Vibratory Hammer or Extractor, Power Pack.	32.32	17.59	49.91
504	Work Performed on the Great Lakes Including Diver; Wet Tender or Hydraulic Dredge Engineer.	36.20	18.81	55.01
505	Work Performed on the Great Lakes Including Crane or Backhoe Operator; Assistant Hydraulic Dredge Engineer; Hydraulic Dredge Leverman or Diver's Tender; Mechanic or Welder; 70 Ton & Over Tug Operator. Premium Increase(s): Add \$.50/hr for friction crane, lattice boom or crane certification (CCO).	37.45	19.45	56.90
506	Work Performed on the Great Lakes Including Deck Equipment Operator or Machineryman (Maintains Cranes Over 50 Tons or Backhoes 115,000 Lbs. or More); Tug, Launch or Loader, Dozer or Like Equipment When Operated on a Barge, Breakwater Wall, Slip, Dock or Scow, Deck Machinery.	26.80	18.52	45.32
507	Work Performed on the Great Lakes Including Deck Equipment Operator, Machineryman or Fireman (Operates 4 Units or More or Maintains Cranes 50 Tons or Under or Backhoes 115,000 Lbs. or Under); Deck Hand, Deck Engineer or Assistant Tug Operator; Off Road Trucks - Great Lakes ONLY.	27.75	19.15	46.90

**HEAVY EQUIPMENT OPERATORS
EXCLUDING SITE PREPARATION, UTILITY, PAVING LANDSCAPING WORK**

Fringe Benefits Must Be Paid On <u>All</u> Hours Worked				
CODE	TRADE OR OCCUPATION	HOURLY BASIC RATE OF PAY	HOURLY FRINGE BENEFITS	TOTAL
		\$	\$	\$
508	Boring Machine (Directional); Crane, Tower Crane, Pedestal Tower or Derrick, With or Without Attachments, With a Lifting Capacity of Over 100 Tons, Self-Erecting Tower Crane With a Lifting Capacity of Over 4,000 Lbs., Crane With Boom Dollies; Crane, Tower Crane, Pedestal Tower or Derrick, With Boom, Leads &/or Jib Lengths Measuring 176 Ft or Over; Master Mechanic. Premium Increase(s): Crane Operators with CCO certification add \$.50/hr. Cranes with boom length over 200 ft. not exceeding 300 ft. OR lifting capacity over 200 ton not exceeding 300 ton add \$.50/hr. Over 300 ton OR 300 ft. add \$.01/hr. per foot OR ton whichever is greater.	39.16	19.10	58.26

Fringe Benefits Must Be Paid On <u>All</u> Hours Worked		HOURLY BASIC RATE OF PAY	HOURLY FRINGE BENEFITS	TOTAL
CODE	TRADE OR OCCUPATION	\$	\$	\$
509	Backhoe (Track Type) Having a Mfgr's Rated Capacity of 130,000 Lbs. or Over; Boring Machine (Horizontal or Vertical); Caisson Rig; Crane, Tower Crane, Portable Tower, Pedestal Tower or Derrick, With or Without Attachments, With a Lifting Capacity of 100 Tons or Under, Self-Erecting Tower Crane With A Lifting Capacity Of 4,000 Lbs. & Under; Crane, Tower Crane, Portable Tower, Pedestal Tower or Derrick, With Boom, Leads &/or Jib Lengths Measuring 175 Ft or Under; Pile Driver; Versi Lifts, Tri-Lifts & Gantrys (20,000 Lbs. & Over). Premium Increase(s): Crane Operators with CCO certification add \$.50/hr.	38.66	19.10	57.76
510	Backhoe (Track Type) Having a Mfgr.'s Rated Capacity of Under 130,000 Lbs., Backhoe (Mini, 15,000 Lbs. & Under); Concrete Bump Cutter, Grinder, Planing or Grooving Machine; Concrete Laser/Screed; Concrete Paver (Slipform); Concrete Pump (Over 46 Meter), Concrete Conveyor (Rotec or Bidwell Type); Concrete Slipform Placer Curb & Gutter Machine; Concrete Spreader & Distributor; Dredge (NOT Performing Work on the Great Lakes); Forklift (Machinery Moving or Steel Erection, 25 Ft & Over); Gradall (Cruz-Aire Type); Hydro-Blaster (10,000 PSI or Over); Milling Machine; Skid Rig; Traveling Crane (Bridge Type). Premium Increase(s): Crane Operators with CCO certification add \$.50/hr.	38.16	19.10	57.26
511	Air, Track, Rotary or Percussion Drilling Machine &/or Hammers, Blaster; Bulldozer or Endloader (Over 40 hp); Compactor (Self-Propelled 85 Ft Total Drum Width & Over, or Tractor Mounted, Towed & Light Equipment); Concrete Pump (46 Meter & Under), Concrete Conveyor (Rotec or Bidwell Type); Crane (Carry Deck, Mini) or Truck Mounted Hydraulic Crane (10 Tons or Under); Environmental Burner; Gantrys (Under 20,000 Lbs.); Grader or Motor Patrol; High Pressure Utility Locating Machine (Daylighting Machine); Manhoist; Material or Stack Hoist; Mechanic or Welder; Railroad Track Rail Leveling Machine, Tie Placer, Extractor, Tamper, Stone Leveler or Rehabilitation Equipment; Roller (Over 5 Ton); Scraper (Self Propelled or Tractor Drawn) 5 cu yd or More Capacity; Screed (Milling Machine); Sideboom; Straddle Carrier or Travel Lift; Tining or Curing Machine; Tractor (Scraper, Dozer, Pusher, Loader); Tractor or Truck Mounted Hydraulic Backhoe; Tractor or Truck Mounted Hydraulic Crane (10 Tons or Under); Trencher (Wheel Type or Chain Type Having Over 8-Inch Bucket). Premium Increase(s): Crane Operators with CCO certification add \$.50/hr.	38.16	19.10	57.26
512	Backfiller; Broom or Sweeper; Bulldozer or Endloader (Under 40 hp); Compactor (Self-Propelled 84 Ft Total Drum Width & Under, or Tractor Mounted, Towed & Light Equipment); Concrete Batch Plant, Batch Hopper; Concrete Breaker (Large, Auto, Vibratory/Sonic, Manual or Remote); Concrete Conveyor System; Concrete Finishing Machine (Road Type); Fireman (Pile Driver & Derrick NOT Performing Work on the Great Lakes); Grout Pump; Hoist (Tugger, Automatic); Industrial Locomotives; Jeep Digger; Lift Slab Machine; Mulcher; Robotic Tool Carrier (With or Without Attachments); Roller (Rubber Tire, 5 Ton or Under); Screw or Gypsum Pumps; Stabilizing or Concrete Mixer (Self-Propelled or 14S or Over); Stump Chipper; Trencher (Wheel Type or Chain Type Having 8-Inch Bucket & Under); Winches & A-Frames.	37.47	19.10	56.57

Fringe Benefits Must Be Paid On <u>All</u> Hours Worked		HOURLY BASIC RATE OF PAY	HOURLY FRINGE BENEFITS	TOTAL
CODE	TRADE OR OCCUPATION	\$	\$	\$
513	Air Compressor (&/or 400 CFM or Over); Air, Electric or Hydraulic Jacking System; Augers (Vertical & Horizontal); Boatmen (NOT Performing Work on the Great Lakes); Boiler (Temporary Heat); Crusher, Screening or Wash Plant; Elevator; Farm or Industrial Type Tractor; Fireman (Asphalt Plant NOT Performing Work on the Great Lakes); Forklift; Generator (&/or 150 KW or Over); Greaser; Heaters (Mechanical); Loading Machine (Conveyor); Oiler; Post Hole Digger or Driver; Prestress Machine; Pump (3 Inch or Over) or Well Points; Refrigeration Plant or Freeze Machine; Rock, Stone Breaker; Skid Steer Loader (With or Without Attachments); Vibratory Hammer or Extractor, Power Pack.	30.44	19.10	49.54
514	Gas or Utility Pipeline, Except Sewer & Water (Primary Equipment). Future Increase(s): Add \$2/hr. on 1/1/2013.	34.89	19.68	54.57
515	Gas or Utility Pipeline, Except Sewer & Water (Secondary Equipment).	31.26	17.40	48.66
516	Fiber Optic Cable Equipment	25.74	15.85	41.59

SEWER, WATER OR TUNNEL CONSTRUCTION
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Includes those projects that primarily involve public sewer or water distribution, transmission or collection systems and related tunnel work (excluding buildings).

SKILLED TRADES

CODE	TRADE OR OCCUPATION	HOURLY BASIC RATE OF PAY	HOURLY FRINGE BENEFITS	TOTAL
		\$	\$	\$
103	Bricklayer, Blocklayer or Stonemason	35.53	15.92	51.45
105	Carpenter Premium Increase(s): DOT PREMIUM: Pay two times the hourly basic rate on Sunday, New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day & Christmas Day.	33.43	19.31	52.74
107	Cement Finisher Future Increase(s): Add \$1.86 on 6/1/12; Add \$1.87 on 6/1/13; Add \$1.87 on 6/1/14; Add \$1.87 on 6/1/15; Add \$1.75 on 6/1/16. Premium Increase(s): DOT PREMIUMS: 1) Pay two times the hourly basic rate on Sunday, New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day & Christmas Day. 2) Add \$1.40/hr when the Wisconsin Department of Transportation or responsible governing agency requires that work be performed at night under artificial illumination with traffic control and the work is completed after sunset and before sunrise.	27.14	19.22	46.36
109	Electrician Future Increase(s): Add \$1.40/hr on 6/1/2012. Add \$1.60/hr on 6/1/2013. Premium Increase(s): DOT PREMIUM: Pay two times the hourly basic rate on Sunday, New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day & Christmas Day.	31.54	20.95	52.49
111	Fence Erector	27.00	0.00	27.00
116	Ironworker Premium Increase(s): DOT PREMIUM: Pay two times the hourly basic rate on Sunday, New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day & Christmas Day.	31.31	22.22	53.53
118	Line Constructor (Electrical)	35.97	18.08	54.05
125	Pavement Marking Operator	26.00	0.00	26.00
126	Piledriver	28.11	23.94	52.05
130	Plumber	36.18	16.86	53.04
135	Steamfitter	35.81	19.04	54.85
137	Teledata Technician or Installer	24.65	15.17	39.82

Fringe Benefits Must Be Paid On <u>All</u> Hours Worked		HOURLY BASIC RATE OF PAY	HOURLY FRINGE BENEFITS	TOTAL
CODE	TRADE OR OCCUPATION	\$	\$	\$
143	Tuckpointer, Caulker or Cleaner	34.30	15.47	49.77
144	Underwater Diver (Except on Great Lakes)	36.20	18.81	55.01
146	Well Driller or Pump Installer	24.22	14.80	39.02
150	Heavy Equipment Operator - ELECTRICAL LINE CONSTRUCTION ONLY	27.42	15.10	42.52
151	Light Equipment Operator -ELECTRICAL LINE CONSTRUCTION ONLY	28.78	15.16	43.94
152	Heavy Truck Driver - ELECTRICAL LINE CONSTRUCTION ONLY	17.80	9.00	26.80
153	Light Truck Driver - ELECTRICAL LINE CONSTRUCTION ONLY	23.38	12.48	35.86
154	Groundman - ELECTRICAL LINE CONSTRUCTION ONLY	21.30	10.97	32.27

TRUCK DRIVERS

Fringe Benefits Must Be Paid On <u>All</u> Hours Worked		HOURLY BASIC RATE OF PAY	HOURLY FRINGE BENEFITS	TOTAL
CODE	TRADE OR OCCUPATION	\$	\$	\$
201	Single Axle or Two Axle	23.00	8.64	31.64
203	Three or More Axle	17.54	13.41	30.95
204	Articulated, Euclid, Dumptor, Off Road Material Hauler Future Increase(s): Add \$1.75/hr on 6/1/2012; Add \$1.85/hr on 6/1/2013. Premium Increase(s): DOT PREMIUM: Pay two times the hourly basic rate on Sunday, New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day & Christmas Day.	22.50	16.19	38.69
205	Pavement Marking Vehicle	19.25	10.84	30.09
207	Truck Mechanic	17.54	13.41	30.95

LABORERS

Fringe Benefits Must Be Paid On <u>All</u> Hours Worked		HOURLY BASIC RATE OF PAY	HOURLY FRINGE BENEFITS	TOTAL
CODE	TRADE OR OCCUPATION	\$	\$	\$
301	General Laborer Future Increase(s): Add \$1.73/hr on 6/4/2012. Premium Increase(s): Add \$1.92 for bottomman; Add \$2.03 for concrete manhole builder, bracer, jointman, or pipelayer; Add \$4.83 for blaster. Add \$2.00 for all tunnel work under 15 lbs. compressed air; Add \$2.00 for 0-30 lbs. compressed air; Add \$3.00 for over 30 lbs. compressed air.	27.72	15.61	43.33

Fringe Benefits Must Be Paid On <u>All</u> Hours Worked				
CODE	TRADE OR OCCUPATION	HOURLY BASIC RATE OF PAY	HOURLY FRINGE BENEFITS	TOTAL
		\$	\$	\$
303	Landscaper	12.50	2.20	14.70
304	Flagperson or Traffic Control Person	22.50	12.90	35.40
311	Fiber Optic Laborer (Outside, Other Than Concrete Encased)	17.09	14.40	31.49
314	Railroad Track Laborer	17.00	1.06	18.06

**HEAVY EQUIPMENT OPERATORS
SEWER, WATER OR TUNNEL WORK**

Fringe Benefits Must Be Paid On <u>All</u> Hours Worked				
CODE	TRADE OR OCCUPATION	HOURLY BASIC RATE OF PAY	HOURLY FRINGE BENEFITS	TOTAL
		\$	\$	\$
521	Backhoe (Track Type) Having a Mfgr.'s Rated Capacity of 130,000 Lbs. or Over; Caisson Rig; Crane, Tower Crane, Pedestal Tower or Derrick, With Boom, Leads &/or Jib Lengths Measuring 176 Ft or Over; Crane, Tower Crane, Pedestal Tower or Derrick, With or Without Attachments, With a Lifting Capacity of Over 100 Tons, Self-Erecting Tower Crane With a Lifting Capacity Of Over 4,000 Lbs., Crane With Boom Dollies; Master Mechanic; Pile Driver. Premium Increase(s): Crane Operators with CCO certification add \$.50/hr. Cranes with boom length over 200 ft. not exceeding 300 ft. OR lifting capacity over 200 ton not exceeding 300 ton add \$.50/hr. Over 300 ton OR 300 ft. add \$.01/hr. per foot OR ton whichever is greater.	39.16	19.10	58.26
522	Backhoe (Track Type) Having a Mfgr.'s Rated Capacity of Under 130,000 Lbs., Backhoe (Mini, 15,000 Lbs. & Under); Boring Machine (Directional); Concrete Bump Cutter, Grinder, Planing or Grooving Machine; Concrete Laser/Screed; Concrete Paver (Slipform); Concrete Pump (Over 46 Meter), Concrete Conveyor (Rotec or Bidwell Type); Concrete Spreader & Distributor; Crane, Tower Crane, Portable Tower, Pedestal Tower or Derrick, With Boom, Leads &/or Jib Lengths Measuring 175 Ft or Under; Crane, Tower Crane, Portable Tower, Pedestal Tower or Derrick, With or Without Attachments, With a Lifting Capacity of 100 Tons or Under, Self-Erecting Tower Crane With a Lifting Capacity of 4,000 Lbs. & Under; Dredge (NOT Performing Work on the Great Lakes); Milling Machine; Skid Rig; Telehandler; Traveling Crane (Bridge Type). Future Increase(s): Add \$2.05/hr on 6/4/2012. Premium Increase(s): Add \$.25/hr for operating tower crane.	33.91	18.55	52.46

Fringe Benefits Must Be Paid On <u>All</u> Hours Worked		HOURLY BASIC RATE OF PAY	HOURLY FRINGE BENEFITS	TOTAL
CODE	TRADE OR OCCUPATION	\$	\$	\$
523	Air Track, Rotary or Percussion Drilling Machine &/or Hammers, Blaster; Boring Machine (Horizontal or Vertical); Bulldozer or Endloader (Over 40 hp); Crane (Carry Deck, Mini) or Truck Mounted Hydraulic Crane (10 Tons or Under); Concrete Pump (46 Meter & Under), Concrete Conveyor (Rotec or Bidwell Type); Concrete Slipform Placer Curb & Gutter Machine; Gradall (Cruz-Aire Type); Grader or Motor Patrol; Hydro-Blaster (10,000 PSI or Over); Manhoist; Material or Stack Hoist; Mechanic or Welder; Roller (Over 5 Ton); Scraper (Self Propelled or Tractor Drawn) 5 cu yd or More Capacity; Screed (Milling Machine); Sideboom; Straddle Carrier or Travel Lift; Tractor (Scraper, Dozer, Pusher, Loader); Tractor or Truck Mounted Hydraulic Backhoe; Tractor or Truck Mounted Hydraulic Crane (10 Tons or Under); Trencher (Wheel Type or Chain Type Having Over 8-Inch Bucket). Future Increase(s): Add \$2.05/hr on 6/4/2012. Premium Increase(s): Add \$.25/hr for operating tower crane.	32.96	18.55	51.51
524	Backfiller; Broom or Sweeper; Bulldozer or Endloader (Under 40 hp); Compactor (Self-Propelled 85 Ft Total Drum Width & Over, or Tractor Mounted, Towed & Light Equipment); Concrete Batch Plant, Batch Hopper; Concrete Breaker (Large, Auto, Vibratory/Sonic, Manual or Remote); Concrete Conveyor System; Concrete Finishing Machine (Road Type); Environmental Burner; Fireman (Pile Driver & Derrick NOT Performing Work on the Great Lakes); Forestry Equipment, Timbco, Tree Shear, Tub Grinder, Processor; Hoist (Tugger, Automatic); Grout Pump; Jeep Digger; Lift Slab Machine; Mulcher; Power Subgrader; Pump (3 Inch or Over) or Well Points; Robotic Tool Carrier (With or Without Attachments); Roller (Rubber Tire, 5 Ton or Under); Screw or Gypsum Pumps; Stabilizing or Concrete Mixer (Self-Propelled or 14S or Over); Stump Chipper; Tining or Curing Machine; Trencher (Wheel Type or Chain Type Having 8-Inch Bucket & Under); Winches & A-Frames.	30.89	18.12	49.01
525	Air Compressor (&/or 400 CFM or Over); Air, Electric or Hydraulic Jacking System; Augers (Vertical & Horizontal); Compactor (Self-Propelled 84 Ft Total Drum Width & Under, or Tractor Mounted, Towed & Light Equipment); Crusher, Screening or Wash Plant; Farm or Industrial Type Tractor; Fireman (Asphalt Plant NOT Performing Work on the Great Lakes); Generator (&/or 150 KW or Over); Heaters (Mechanical); High Pressure Utility Locating Machine (Daylighting Machine); Loading Machine (Conveyor); Post Hole Digger or Driver; Refrigeration Plant or Freeze Machine; Rock, Stone Breaker; Skid Steer Loader (With or Without Attachments); Vibratory Hammer or Extractor, Power Pack. Future Increase(s): Add \$2.05/hr on 6/4/2012. Premium Increase(s): Add \$.25/hr for operating tower crane.	30.51	18.55	49.06
526	Boiler (Temporary Heat); Forklift; Greaser; Oiler.	29.44	18.10	47.54
527	Work Performed on the Great Lakes Including Diver; Wet Tender or Hydraulic Dredge Engineer.	36.20	18.81	55.01

Fringe Benefits Must Be Paid On <u>All</u> Hours Worked		HOURLY BASIC RATE OF PAY	HOURLY FRINGE BENEFITS	TOTAL
CODE	TRADE OR OCCUPATION	\$	\$	\$
528	Work Performed on the Great Lakes Including 70 Ton & Over Tug Operator; Assistant Hydraulic Dredge Engineer; Crane or Backhoe Operator; Hydraulic Dredge Leverman or Diver's Tender; Mechanic or Welder.	36.20	18.81	55.01
529	Work Performed on the Great Lakes Including Deck Equipment Operator or Machineryman (Maintains Cranes Over 50 Tons or Backhoes 115,000 Lbs. or More); Tug, Launch or Loader, Dozer or Like Equipment When Operated on a Barge, Breakwater Wall, Slip, Dock or Scow, Deck Machinery.	26.80	18.52	45.32
530	Work Performed on the Great Lakes Including Deck Equipment Operator; Machineryman or Fireman (Operates 4 Units or More or Maintains Cranes 50 Tons or Under or Backhoes 115,000 Lbs. or Under), Deck Hand, Deck Engineer or Assistant Tug Operator; Off Road Trucks - Great Lakes ONLY.	26.80	18.52	45.32

AIRPORT PAVEMENT OR STATE HIGHWAY CONSTRUCTION

Includes all airport projects (excluding buildings) and all projects awarded by the Wisconsin Department of Transportation (excluding buildings).

SKILLED TRADES

CODE	TRADE OR OCCUPATION	Fringe Benefits Must Be Paid On <u>All</u> Hours Worked		
		HOURLY BASIC RATE OF PAY	HOURLY FRINGE BENEFITS	TOTAL
		\$	\$	\$
103	Bricklayer, Blocklayer or Stonemason	32.66	15.92	48.58
105	Carpenter Premium Increase(s): DOT PREMIUM: Pay two times the hourly basic rate on Sunday, New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day & Christmas Day.	33.43	19.31	52.74
107	Cement Finisher Future Increase(s): Add \$1.86 on 6/1/12; Add \$1.87 on 6/1/13; Add \$1.87 on 6/1/14; Add \$1.87 on 6/1/15; Add \$1.75 on 6/1/16. Premium Increase(s): DOT PREMIUMS: 1) Pay two times the hourly basic rate on Sunday, New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day & Christmas Day. 2) Add \$1.40/hr when the Wisconsin Department of Transportation or responsible governing agency requires that work be performed at night under artificial illumination with traffic control and the work is completed after sunset and before sunrise.	29.33	17.03	46.36
109	Electrician	31.64	23.78	55.42
111	Fence Erector	35.62	0.00	35.62
116	Ironworker	31.31	21.54	52.85
118	Line Constructor (Electrical)	35.97	18.08	54.05
124	Painter	27.87	14.39	42.26
125	Pavement Marking Operator	27.87	14.39	42.26
126	Piledriver Premium Increase(s): Add \$.65/hr for Piledriver Loftsmen; Add \$.75/hr for Sheet Piling Loftsmen. DOT PREMIUM: Pay two times the hourly basic rate on Sunday, New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day & Christmas Day.	29.56	24.96	54.52
133	Rofer or Waterproofer	28.85	14.60	43.45
137	Teledata Technician or Installer	24.65	15.17	39.82
143	Tuckpointer, Caulker or Cleaner	34.30	15.47	49.77
144	Underwater Diver (Except on Great Lakes)	36.20	18.81	55.01

Fringe Benefits Must Be Paid On <u>All</u> Hours Worked		HOURLY BASIC RATE OF PAY	HOURLY FRINGE BENEFITS	TOTAL
CODE	TRADE OR OCCUPATION	\$	\$	\$
150	Heavy Equipment Operator - ELECTRICAL LINE CONSTRUCTION ONLY	33.87	16.10	49.97
151	Light Equipment Operator -ELECTRICAL LINE CONSTRUCTION ONLY Premium Increase(s): DOT PREMIUM: Pay two times the hourly basic rate on Sunday, New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day & Christmas Day.	29.64	14.64	44.28
152	Heavy Truck Driver - ELECTRICAL LINE CONSTRUCTION ONLY	25.18	13.07	38.25
153	Light Truck Driver - ELECTRICAL LINE CONSTRUCTION ONLY	23.38	12.48	35.86
154	Groundman - ELECTRICAL LINE CONSTRUCTION ONLY	21.30	10.97	32.27

TRUCK DRIVERS

Fringe Benefits Must Be Paid On <u>All</u> Hours Worked		HOURLY BASIC RATE OF PAY	HOURLY FRINGE BENEFITS	TOTAL
CODE	TRADE OR OCCUPATION	\$	\$	\$
201	Single Axle or Two Axle Future Increase(s): Add \$1.75/hr on 6/1/2012; Add \$1.85/hr on 6/1/2013. Premium Increase(s): DOT PREMIUM: Pay two times the hourly basic rate on Sunday, New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day & Christmas Day.	22.35	16.19	38.54
203	Three or More Axle	24.91	15.63	40.54
204	Articulated, Euclid, Dumptor, Off Road Material Hauler Future Increase(s): Add \$1.75/hr on 6/1/2012; Add \$1.85/hr on 6/1/2013. Premium Increase(s): DOT PREMIUM: Pay two times the hourly basic rate on Sunday, New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day & Christmas Day.	22.50	16.19	38.69
205	Pavement Marking Vehicle	23.84	14.70	38.54
206	Shadow or Pilot Vehicle	24.76	15.35	40.11
207	Truck Mechanic	24.91	15.63	40.54

LABORERS

Fringe Benefits Must Be Paid On <u>All</u> Hours Worked		HOURLY BASIC RATE OF PAY	HOURLY FRINGE BENEFITS	TOTAL
CODE	TRADE OR OCCUPATION	\$	\$	\$
301	General Laborer Future Increase(s): Add \$1.60/hr on 6/1/2012; Add \$1.70/hr on 6/1/2013; Add \$1.60/hr on 6/1/2014. Premium Increase(s): Add \$.15/hr for air tool operator, joint sawer and filler (pavement), vibrator or tamper operator (mechanical hand operated), chain saw operator and demolition burning torch laborer; Add \$.35/hr for bituminous worker (raker and luteman), formsetter (curb, sidewalk and pavement) and strike off man; Add \$.50/hr for line and grade specialist; Add \$.65/hr for blaster and powderman; Add \$2.01/hr for topman; Add \$2.46/hr for bottomman; Add \$3.23/hr for pipelayer. / DOT PREMIUMS: 1) Pay two times the hourly basic rate on Sunday, New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day & Christmas Day. 2) Add \$1.25/hr for work on projects involving temporary traffic control setup, for lane and shoulder closures, when work under artificial illumination conditions is necessary as required by the project provisions (including prep time prior to and/or cleanup after such time period).	24.34	17.85	42.19
302	Asbestos Abatement Worker	22.00	16.86	38.86
303	Landscaper	23.71	15.03	38.74
304	Flagperson or Traffic Control Person Future Increase(s): Add \$1.60/hr on 6/1/2012; Add \$1.70/hr on 6/1/2013; Add \$1.60/hr on 6/1/2014. Premium Increase(s): DOT PREMIUMS: 1) Pay two times the hourly basic rate on Sunday, New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day & Christmas Day. 2) Add \$1.25/hr when the Wisconsin Department of Transportation or responsible governing agency requires that work be performed at night under artificial illumination with traffic control and the work is completed after sunset and before sunrise.	20.83	17.85	38.68
311	Fiber Optic Laborer (Outside, Other Than Concrete Encased)	17.09	14.40	31.49
314	Railroad Track Laborer	17.00	1.06	18.06

**HEAVY EQUIPMENT OPERATORS
AIRPORT PAVEMENT OR STATE HIGHWAY CONSTRUCTION**

Fringe Benefits Must Be Paid On <u>All</u> Hours Worked				
CODE	TRADE OR OCCUPATION	HOURLY BASIC RATE OF PAY	HOURLY FRINGE BENEFITS	TOTAL
		\$	\$	\$
531	Crane, Tower Crane, Pedestal Tower or Derrick, With Boom, Leads &/or Jib Lengths Measuring 176 Ft or Over; Crane, Tower Crane, Pedestal Tower or Derrick, With or Without Attachments, With a Lifting Capacity of Over 100 Tons, Self-Erecting Tower Crane With a Lifting Capacity Of Over 4,000 Lbs., Crane With Boom Dollies; Traveling Crane (Bridge Type). Future Increase(s): Add \$2/hr on 6/1/12; Add \$2/hr on 6/1/13; Add \$1.75/hr on 6/1/14. Premium Increase(s): DOT PREMIUMS: 1) Pay two times the hourly basic rate on Sunday, New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day & Christmas Day. 2) Add \$1.25/hr for work on projects involving temporary traffic control setup, for lane and shoulder closures, when work under artificial illumination conditions is necessary as required by the project provisions (including prep time prior to and/or cleanup after such time period).	34.22	18.90	53.12
532	Backhoe (Track Type) Having a Mfgr.'s Rated Capacity of 130,000 Lbs. or Over; Caisson Rig; Crane, Tower Crane, Portable Tower, Pedestal Tower or Derrick, With Boom, Leads &/or Jib Lengths Measuring 175 Ft or Under; Crane, Tower Crane, Portable Tower, Pedestal Tower or Derrick, With or Without Attachments, With a Lifting Capacity of 100 Tons or Under, Self-Erecting Tower Crane With A Lifting Capacity Of 4,000 Lbs., & Under; Dredge (NOT Performing Work on the Great Lakes); Licensed Boat Pilot (NOT Performing Work on the Great Lakes); Pile Driver. Future Increase(s): Add \$2/hr on 6/1/12; Add \$2/hr on 6/1/13; Add \$1.75/hr on 6/1/14. Premium Increase(s): DOT PREMIUMS: 1) Pay two times the hourly basic rate on Sunday, New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day & Christmas Day. 2) Add \$1.25/hr for work on projects involving temporary traffic control setup, for lane and shoulder closures, when work under artificial illumination conditions is necessary as required by the project provisions (including prep time prior to and/or cleanup after such time period).	33.72	18.90	52.62

Fringe Benefits Must Be Paid On All Hours Worked

<u>CODE</u>	<u>TRADE OR OCCUPATION</u>	<u>HOURLY BASIC RATE OF PAY</u> \$	<u>HOURLY FRINGE BENEFITS</u> \$	<u>TOTAL</u> \$
533	<p>Air Track, Rotary or Percussion Drilling Machine &/or Hammers, Blaster; Asphalt Heater, Planer & Scarifier; Asphalt Milling Machine; Asphalt Screed; Automatic Subgrader (Concrete); Backhoe (Track Type) Having a Mfgr.'s Rated Capacity of Under 130,000 Lbs., Backhoe (Mini, 15,000 Lbs. & Under); Bituminous (Asphalt) Plant & Paver, Screed; Boatmen (NOT Performing Work on the Great Lakes); Boring Machine (Directional, Horizontal or Vertical); Bridge (Bidwell) Paver; Bulldozer or Endloader; Concrete Batch Plant, Batch Hopper; Concrete Breaker (Large, Auto, Vibratory/Sonic, Manual or Remote); Concrete Bump Cutter, Grinder, Planing or Grooving Machine; Concrete Conveyor System; Concrete Laser/Screed; Concrete Paver (Slipform); Concrete Pump, Concrete Conveyor (Rotec or Bidwell Type); Concrete Slipform Placer Curb & Gutter Machine; Concrete Spreader & Distributor; Crane (Carry Deck, Mini) or Truck Mounted Hydraulic Crane (10 Tons or Under); Crane Wlth a Lifting Capacity of 25 Tons or Under; Forestry Equipment, Timbco, Tree Shear, Tub Grinder, Processor; Gradall (Cruz-Aire Type); Grader or Motor Patrol; Grout Pump; Hydro-Blaster (10,000 PSI or Over); Loading Machine (Conveyor); Material or Stack Hoist; Mechanic or Welder; Milling Machine; Post Hole Digger or Driver; Roller (Over 5 Ton); Scraper (Self Propelled or Tractor Drawn) 5 cu yds or More Capacity; Shoulder Widener; Sideboom; Skid Rig; Stabilizing or Concrete Mixer (Self-Propelled or 14S or Over); Straddle Carrier or Travel Lift; Tractor (Scraper, Dozer, Pusher, Loader); Tractor or Truck Mounted Hydraulic Backhoe; Trencher (Wheel Type or Chain Type); Tube Finisher; Tugger (NOT Performing Work on the Great Lakes); Winches & A-Frames.</p> <p>Future Increase(s): Add \$2/hr on 6/1/12; Add \$2/hr on 6/1/13; Add \$1.75/hr on 6/1/14.</p> <p>Premium Increase(s): DOT PREMIUMS: 1) Pay two times the hourly basic rate on Sunday, New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day & Christmas Day. 2) Add \$1.25/hr for work on projects involving temporary traffic control setup, for lane and shoulder closures, when work under artificial illumination conditions is necessary as required by the project provisions (including prep time prior to and/or cleanup after such time period).</p>	33.22	18.90	52.12

Fringe Benefits Must Be Paid On <u>All</u> Hours Worked		HOURLY BASIC RATE OF PAY	HOURLY FRINGE BENEFITS	TOTAL
CODE	TRADE OR OCCUPATION	\$	\$	\$
534	<p>Belting, Burlap, Texturing Machine; Broom or Sweeper; Compactor (Self-Propelled or Tractor Mounted, Towed & Light Equipment); Concrete Finishing Machine (Road Type); Environmental Burner; Farm or Industrial Type Tractor; Fireman (Asphalt Plant, Pile Driver & Derrick NOT Performing Work on the Great Lakes); Forklift; Greaser; Hoist (Tugger, Automatic); Jeep Digger; Joint Sawyer (Multiple Blade); Launch (NOT Performing Work on the Great Lakes); Lift Slab Machine; Mechanical Float; Mulcher; Power Subgrader; Robotic Tool Carrier (With or Without Attachments); Roller (Rubber Tire, 5 Ton or Under); Self Propelled Chip Spreader; Shouldering Machine; Skid Steer Loader (With or Without Attachments); Telehandler; Tining or Curing Machine.</p> <p>Future Increase(s): Add \$2/hr on 6/1/12; Add \$2/hr on 6/1/13; Add \$1.75/hr on 6/1/14.</p> <p>Premium Increase(s): DOT PREMIUMS: 1) Pay two times the hourly basic rate on Sunday, New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day & Christmas Day. 2) Add \$1.25/hr for work on projects involving temporary traffic control setup, for lane and shoulder closures, when work under artificial illumination conditions is necessary as required by the project provisions (including prep time prior to and/or cleanup after such time period).</p>	32.96	18.90	51.86
535	<p>Air Compressor (&/or 400 CFM or Over); Air, Electric or Hydraulic Jacking System; Augers (Vertical & Horizontal); Automatic Belt Conveyor & Surge Bin; Boiler (Temporary Heat); Concrete Proportioning Plant; Crusher, Screening or Wash Plant; Generator (&/or 150 KW or Over); Heaters (Mechanical); High Pressure Utility Locating Machine (Daylighting Machine); Mudjack; Oiler; Prestress Machine; Pug Mill; Pump (3 Inch or Over) or Well Points; Rock, Stone Breaker; Screed (Milling Machine); Stump Chipper; Tank Car Heaters; Vibratory Hammer or Extractor, Power Pack.</p> <p>Future Increase(s): Add \$2/hr on 6/1/12; Add \$2/hr on 6/1/13; Add \$1.75/hr on 6/1/14.</p> <p>Premium Increase(s): DOT PREMIUMS: 1) Pay two times the hourly basic rate on Sunday, New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day & Christmas Day. 2) Add \$1.25/hr for work on projects involving temporary traffic control setup, for lane and shoulder closures, when work under artificial illumination conditions is necessary as required by the project provisions (including prep time prior to and/or cleanup after such time period).</p>	32.67	18.90	51.57
536	Fiber Optic Cable Equipment.	24.39	15.45	39.84
537	Work Performed on the Great Lakes Including Diver; Wet Tender or Hydraulic Dredge Engineer.	36.20	18.81	55.01

Fringe Benefits Must Be Paid On <u>All</u> Hours Worked		HOURLY BASIC RATE OF PAY	HOURLY FRINGE BENEFITS	TOTAL
CODE	TRADE OR OCCUPATION	\$	\$	\$
538	Work Performed on the Great Lakes Including 70 Ton & Over Tug Operator; Assistant Hydraulic Dredge Engineer; Crane or Backhoe Operator; Hydraulic Dredge Leverman or Diver's Tender; Mechanic or Welder.	36.20	18.81	55.01
539	Work Performed on the Great Lakes Including Deck Equipment Operator or Machineryman (Maintains Cranes Over 50 Tons or Backhoes 115,000 Lbs. or More); Tug, Launch or Loader, Dozer or Like Equipment When Operated on a Barge, Breakwater Wall, Slip, Dock or Scow, Deck Machinery.	26.80	18.52	45.32
540	Work Performed on the Great Lakes Including Deck Equipment Operator, Machineryman or Fireman (Operates 4 Units or More or Maintains Cranes 50 Tons or Under or Backhoes 115,000 Lbs. or Under); Deck Hand, Deck Engineer or Assistant Tug Operator; Off Road Trucks-Great Lakes ONLY.	26.80	18.52	45.32

LOCAL STREET OR MISCELLANEOUS PAVING CONSTRUCTION
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Includes roads, streets, alleys, trails, bridges, paths, racetracks, parking lots and driveways (except residential or agricultural), public sidewalks or other similar projects (excluding projects awarded by the Wisconsin Department of Transportation).

SKILLED TRADES

CODE	TRADE OR OCCUPATION	HOURLY BASIC RATE OF PAY	HOURLY FRINGE BENEFITS	TOTAL
		\$	\$	\$
103	Bricklayer, Blocklayer or Stonemason	35.53	15.92	51.45
105	Carpenter	29.06	15.16	44.22
107	Cement Finisher	27.57	16.33	43.90
109	Electrician Future Increase(s): Add \$.50/hr. effective 06/04/2012. Premium Increase(s): DOT PREMIUM: Pay two times the hourly basic rate on Sunday, New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day & Christmas Day.	28.74	17.86	46.60
111	Fence Erector	27.00	0.00	27.00
116	Ironworker	31.31	21.54	52.85
118	Line Constructor (Electrical)	35.97	18.08	54.05
124	Painter	28.47	16.74	45.21
125	Pavement Marking Operator	26.00	0.00	26.00
126	Piledriver	28.11	23.94	52.05
133	Rofer or Waterproofer	28.85	14.60	43.45
137	Teledata Technician or Installer	24.65	15.17	39.82
143	Tuckpointer, Caulker or Cleaner	34.30	15.47	49.77
144	Underwater Diver (Except on Great Lakes)	36.20	18.81	55.01
150	Heavy Equipment Operator - ELECTRICAL LINE CONSTRUCTION ONLY	35.42	12.90	48.32
151	Light Equipment Operator -ELECTRICAL LINE CONSTRUCTION ONLY	28.78	14.42	43.20
152	Heavy Truck Driver - ELECTRICAL LINE CONSTRUCTION ONLY	25.18	13.07	38.25
153	Light Truck Driver - ELECTRICAL LINE CONSTRUCTION ONLY	23.38	12.48	35.86
154	Groundman - ELECTRICAL LINE CONSTRUCTION ONLY	21.30	10.97	32.27

TRUCK DRIVERS

Fringe Benefits Must Be Paid On <u>All</u> Hours Worked		HOURLY BASIC RATE OF PAY	HOURLY FRINGE BENEFITS	TOTAL
CODE	TRADE OR OCCUPATION	\$	\$	\$
201	Single Axle or Two Axle	15.00	0.00	15.00
203	Three or More Axle	20.00	6.00	26.00
204	Articulated, Euclid, Dumptor, Off Road Material Hauler Future Increase(s): Add \$1/hr on 6/3/2012; Add \$1/hr on 6/2/2013.	31.89	17.98	49.87
205	Pavement Marking Vehicle	19.25	10.84	30.09
206	Shadow or Pilot Vehicle	15.00	0.00	15.00
207	Truck Mechanic	20.00	6.00	26.00

LABORERS

Fringe Benefits Must Be Paid On <u>All</u> Hours Worked		HOURLY BASIC RATE OF PAY	HOURLY FRINGE BENEFITS	TOTAL
CODE	TRADE OR OCCUPATION	\$	\$	\$
301	General Laborer	21.73	17.04	38.77
303	Landscaper	22.96	15.37	38.33
304	Flagperson or Traffic Control Person Future Increase(s): Add \$1.60/hr on 6/1/2012; Add \$1.70/hr on 6/1/2013; Add \$1.60/hr on 6/1/2014. Premium Increase(s): DOT PREMIUMS: 1) Pay two times the hourly basic rate on Sunday, New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day & Christmas Day. 2) Add \$1.25/hr when the Wisconsin Department of Transportation or responsible governing agency requires that work be performed at night under artificial illumination with traffic control and the work is completed after sunset and before sunrise.	23.55	13.45	37.00
311	Fiber Optic Laborer (Outside, Other Than Concrete Encased)	17.09	14.40	31.49
314	Railroad Track Laborer	17.00	1.06	18.06

**HEAVY EQUIPMENT OPERATORS
CONCRETE PAVEMENT OR BRIDGE WORK**

Fringe Benefits Must Be Paid On <u>All</u> Hours Worked		HOURLY BASIC RATE OF PAY	HOURLY FRINGE BENEFITS	TOTAL
CODE	TRADE OR OCCUPATION	\$	\$	\$
541	<p>Crane, Tower Crane, Pedestal Tower or Derrick, With or Without Attachments, With a Lifting Capacity of Over 100 Tons, Self-Erecting Tower Crane With a Lifting Capacity Of Over 4,000 Lbs., Crane With Boom Dollies; Crane, Tower Crane, Pedestal Tower or Derrick, With Boom, Leads &/or Jib Lengths Measuring 176 Ft or Over; Master Mechanic.</p> <p>Future Increase(s): Add \$2/hr on 6/1/12; Add \$2/hr on 6/1/13; Add \$1.75/hr on 6/1/14.</p> <p>Premium Increase(s): DOT PREMIUMS: 1) Pay two times the hourly basic rate on Sunday, New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day & Christmas Day. 2) Add \$1.25/hr for work on projects involving temporary traffic control setup, for lane and shoulder closures, when work under artificial illumination conditions is necessary as required by the project provisions (including prep time prior to and/or cleanup after such time period).</p>	34.22	18.90	53.12
542	<p>Backhoe (Track Type) Having a Mfgr.'s Rated Capacity of 130,000 Lbs. or Over; Caisson Rig; Crane, Tower Crane, Portable Tower, Pedestal Tower or Derrick, With or Without Attachments, With a Lifting Capacity of 100 Tons or Under, Self-Erecting Tower Crane With a Lifting Capacity of 4,000 Lbs. & Under; Crane, Tower Crane Portable Tower, Pedestal Tower or Derrick, With Boom, Leads &/or Jib Lengths Measuring 175 Ft or Under; Dredge (NOT Performing Work on the Great Lakes); Licensed Boat Pilot (NOT Performing Work on the Great Lakes); Pile Driver.</p> <p>Future Increase(s): Add \$2/hr on 6/1/12; Add \$2/hr on 6/1/13; Add \$1.75/hr on 6/1/14.</p> <p>Premium Increase(s): DOT PREMIUMS: 1) Pay two times the hourly basic rate on Sunday, New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day & Christmas Day. 2) Add \$1.25/hr for work on projects involving temporary traffic control setup, for lane and shoulder closures, when work under artificial illumination conditions is necessary as required by the project provisions (including prep time prior to and/or cleanup after such time period).</p>	33.72	18.90	52.62

Fringe Benefits Must Be Paid On <u>All</u> Hours Worked		HOURLY BASIC RATE OF PAY	HOURLY FRINGE BENEFITS	TOTAL
CODE	TRADE OR OCCUPATION	\$	\$	\$
543	Air Track, Rotary or Percussion Drilling Machine &/or Hammers, Blaster; Automatic Subgrader (Concrete); Backhoe (Track Type) Having a Mfgr.'s Rated Capacity of Under 130,000 Lbs., Backhoe (Mini, 15,000 Lbs. & Under); Boring Machine (Directional, Horizontal or Vertical); Bridge (Bidwell) Paver; Bulldozer or Endloader; Concrete Batch Plant, Batch Hopper; Concrete Breaker (Large, Auto, Vibratory/Sonic, Manual or Remote); Concrete Bump Cutter, Grinder, Planing or Grooving Machine; Concrete Conveyor System; Concrete Laser/Screed; Concrete Paver (Slipform); Concrete Pump, Concrete Conveyor (Rotec or Bidwell Type); Concrete Slipform Placer Curb & Gutter Machine; Concrete Spreader & Distributor; Crane (Carry Deck, Mini) or Truck Mounted Hydraulic Crane (10 Tons or Under); Crane With a Lifting Capacity of 25 Tons or Under; Forestry Equipment, Timbco, Tree Shear, Tub Grinder, Processor; Gradall (Cruz-Aire Type); Grader or Motor Patrol; Grout Pump; Hydro-Blaster (10,000 PSI or Over); Loading Machine (Conveyor); Manhoist; Material or Stack Hoist; Mechanic or Welder; Milling Machine; Post Hole Digger or Driver; Scraper (Self Propelled or Tractor Drawn) 5 cu yds or More Capacity; Shoulder Widener; Sideboom; Skid Rig; Stabilizing or Concrete Mixer (Self-Propelled or 14S or Over); Straddle Carrier or Travel Lift; Tractor (Scraper, Dozer, Pusher, Loader); Tractor or Truck Mounted Hydraulic Backhoe; Trencher (Wheel Type or Chain Type); Tube Finisher; Tugger (NOT Performing Work on the Great Lakes); Winches & A-Frames.	31.89	18.22	50.11
544	Backfiller; Belting, Burlap, Texturing Machine; Broom or Sweeper; Compactor (Self-Propelled or Tractor Mounted, Towed & Light Equipment); Concrete Finishing Machine (Road Type); Environmental Burner; Farm or Industrial Type Tractor; Fireman (Pile Driver & Derrick NOT Performing Work on the Great Lakes); Forklift; Greaser; Jeep Digger; Joint Sawyer (Multiple Blade); Launch (NOT Performing Work on the Great Lakes); Lift Slab Machine; Mechanical Float; Mulcher; Power Subgrader; Robotic Tool Carrier (With or Without Attachments); Self Propelled Chip Spreader; Shouldering Machine; Skid Steer Loader (With or Without Attachments); Telehandler; Tining or Curing Machine. Future Increase(s): Add \$2/hr on 6/1/12; Add \$2/hr on 6/1/13; Add \$1.75/hr on 6/1/14. Premium Increase(s): DOT PREMIUMS: 1) Pay two times the hourly basic rate on Sunday, New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day & Christmas Day. 2) Add \$1.25/hr for work on projects involving temporary traffic control setup, for lane and shoulder closures, when work under artificial illumination conditions is necessary as required by the project provisions (including prep time prior to and/or cleanup after such time period).	33.22	18.90	52.12

Fringe Benefits Must Be Paid On <u>All</u> Hours Worked		HOURLY BASIC RATE OF PAY	HOURLY FRINGE BENEFITS	TOTAL
CODE	TRADE OR OCCUPATION	\$	\$	\$
545	Air Compressor (&/or 400 CFM or Over); Air, Electric or Hydraulic Jacking System; Automatic Belt Conveyor & Surge Bin; Boiler (Temporary Heat); Concrete Proportioning Plant; Crusher, Screening or Wash Plant; Generator (&/or 150 KW or Over); Heaters (Mechanical); High Pressure Utility Locating Machine (Daylighting Machine); Mudjack; Oiler; Prestress Machine; Pug Mill; Pump (3 Inch or Over) or Well Points; Rock, Stone Breaker; Screed (Milling Machine); Stump Chipper; Tank Car Heaters; Vibratory Hammer or Extractor, Power Pack.	30.42	17.58	48.00
546	Fiber Optic Cable Equipment.	24.39	15.45	39.84
547	Work Performed on the Great Lakes Including Diver; Wet Tender or Hydraulic Dredge Engineer.	36.20	18.81	55.01
548	Work Performed on the Great Lakes Including 70 Ton & Over Tug Operator; Assistant Hydraulic Dredge Engineer; Crane or Backhoe Operator; Hydraulic Dredge Leverman or Diver's Tender; Mechanic or Welder.	36.20	18.81	55.01
549	Work Performed on the Great Lakes Including Deck Equipment Operator or Machineryman (Maintains Cranes Over 50 Tons or Backhoes 115,000 Lbs. or more); Tug, Launch or Loader, Dozer or Like Equipment When Operated on a Barge, Breakwater Wall, Slip, Dock or Scow, Deck Machinery.	26.80	18.52	45.32
550	Work Performed on the Great Lakes Including Deck Equipment Operator; Machineryman or Fireman (Operates 4 Units or More or Maintains Cranes 50 Tons or Under or Backhoes 115,000 Lbs. or Under); Deck Hand, Deck Engineer or Assistant Tug Operator; Off Road Trucks - Great Lakes ONLY.	26.80	18.52	45.32

**HEAVY EQUIPMENT OPERATORS
ASPHALT PAVEMENT OR OTHER WORK**

Fringe Benefits Must Be Paid On <u>All</u> Hours Worked		HOURLY BASIC RATE OF PAY	HOURLY FRINGE BENEFITS	TOTAL
CODE	TRADE OR OCCUPATION	\$	\$	\$
551	Crane, Tower Crane, Pedestal Tower or Derrick, With or Without Attachments, With a Lifting Capacity of Over 100 Tons, Self Erecting Tower Crane With a Lifting Capacity of Over 4,000 Lbs., Crane With Boom Dollies; Crane, Tower Crane, Pedestal Tower or Derrick, With Boom, Leads and/or Jib Lengths Measuring 176 Ft or Over; Master Mechanic.	38.06	18.10	56.16

Fringe Benefits Must Be Paid On All Hours Worked

<u>CODE</u>	<u>TRADE OR OCCUPATION</u>	<u>HOURLY BASIC RATE OF PAY</u> \$	<u>HOURLY FRINGE BENEFITS</u> \$	<u>TOTAL</u> \$
552	<p>Backhoe (Track Type) Having a Mfgr.'s Rated Capacity of 130,000 Lbs. or Over; Caisson Rig; Crane, Tower Crane, Portable Tower, Pedestal Tower or Derrick, With or Without Attachments, With a Lifting Capacity of 100 Tons or Under, Self-Erecting Tower Crane With a Lifting Capacity Of 4,000 Lbs. & Under; Crane, Tower Crane, Portable Tower, Pedestal Tower or Derrick, With Boom, Leads &/or Jib Lengths Measuring 175 Ft or Under; Dredge (NOT Performing Work on the Great Lakes); Licensed Boat Pilot (NOT Performing Work on the Great Lakes); Pile Driver.</p> <p>Future Increase(s): Add \$2/hr on 6/1/12; Add \$2/hr on 6/1/13; Add \$1.75/hr on 6/1/14.</p> <p>Premium Increase(s): DOT PREMIUMS: 1) Pay two times the hourly basic rate on Sunday, New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day & Christmas Day. 2) Add \$1.25/hr for work on projects involving temporary traffic control setup, for lane and shoulder closures, when work under artificial illumination conditions is necessary as required by the project provisions (including prep time prior to and/or cleanup after such time period).</p>	33.72	18.90	52.62
553	<p>Air, Track, Rotary or Percussion Drilling Machine &/or Hammers, Blaster; Asphalt Heater, Planer & Scarifier; Asphalt Milling Machine; Asphalt Screed; Backhoe (Track Type) Having a Mfgr.'s Rated Capacity of Under 130,000 Lbs., Backhoe (Mini, 15,000 Lbs. & Under); Bituminous (Asphalt) Plant & Paver, Screed; Boring Machine (Directional, Horizontal or Vertical); Bulldozer or Endloader; Concrete Breaker (Large, Auto, Vibratory/Sonic, Manual or Remote); Concrete Conveyor System; Concrete Laser/Screed; Concrete Slipform Placer Curb & Gutter Machine; Crane (Carry Deck, Mini) or Truck Mounted Hydraulic Crane (10 Tons or Under); Crane With a Lifting Capacity of 25 Tons or Under; Forestry Equipment, Timbco, Tree Shear, Tub Grinder, Processor; Gradall (Cruz-Aire Type); Grader or Motor Patrol; Hydro-Blaster (10,000 PSI or Over); Loading Machine (Conveyor); Manhoist; Material or Stack Hoist; Mechanic or Welder; Milling Machine; Post Hole Digger or Driver; Railroad Track Rail Leveling Machine, Tie Placer, Extractor, Tamper, Stone Leveler or Rehabilitation Equipment; Roller (Over 5 Ton); Scraper (Self Propelled or Tractor Drawn) 5 cu yds or More Capacity; Shoulder Widener; Sideboom; Skid Rig; Stabilizing or Concrete Mixer (Self-Propelled or 14S or Over); Tractor (Scraper, Dozer, Pusher, Loader); Tractor or Truck Mounted Hydraulic Backhoe; Trencher (Wheel Type or Chain Type); Tube Finisher; Tugger (NOT Performing Work on the Great Lakes); Winches & A-Frames.</p>	31.52	17.50	49.02

Fringe Benefits Must Be Paid On <u>All</u> Hours Worked		HOURLY BASIC RATE OF PAY	HOURLY FRINGE BENEFITS	<u>TOTAL</u>
<u>CODE</u>	<u>TRADE OR OCCUPATION</u>	\$	\$	\$
554	Backfiller; Broom or Sweeper; Compactor (Self-Propelled or Tractor Mounted, Towed & Light Equipment); Concrete Finishing Machine (Road Type); Environmental Burner; Farm or Industrial Type Tractor; Fireman (Asphalt Plant, Pile Driver & Derrick NOT Performing Work on the Great Lakes); Forklift; Greaser; Hoist (Tugger, Automatic); Jeep Digger; Joint Sawyer (Multiple Blade); Launch (NOT Performing Work on the Great Lakes); Lift Slab Machine; Mechanical Float; Mulcher; Power Subgrader; Robotic Tool Carrier (With or Without Attachments); Roller (Rubber Tire, 5 Ton or Under); Self-Propelled Chip Spreader; Shouldering Machine; Skid Steer Loader (With or Without Attachments); Telehandler. Future Increase(s): Add \$2/hr on 6/1/12; Add \$2/hr on 6/1/13; Add \$1.75/hr on 6/1/14.	32.67	18.55	51.22
555	Air Compressor (&/or 400 CFM or Over); Air, Electric or Hydraulic Jacking System; Augers (Vertical & Horizontal); Automatic Belt Conveyor & Surge Bin; Boiler (Temporary Heat); Crusher, Screening or Wash Plant; Generator (&/or 150 KW or Over); Heaters (Mechanical); High Pressure Utility Locating Machine (Daylighting Machine); Mudjack; Oiler; Prestress Machine; Pug Mill; Pump (3 Inch or Over) or Well Points; Rock, Stone Breaker; Screed (Milling Machine); Stump Chipper; Tank Car Heaters; Vibratory Hammer or Extractor, Power Pack. Future Increase(s): Add \$2/hr on 6/1/12; Add \$2/hr on 6/1/13; Add \$1.75/hr on 6/1/14.	32.67	18.55	51.22
556	Fiber Optic Cable Equipment.	24.39	15.45	39.84

RESIDENTIAL OR AGRICULTURAL CONSTRUCTION

Includes single family houses or apartment buildings of no more than four (4) stories in height and all buildings, structures or facilities that are primarily used for agricultural or farming purposes, excluding commercial buildings. For classification purposes, the exterior height of a residential building, in terms of stories, is the primary consideration. All incidental items such as site work, driveways, parking lots, private sidewalks, private septic systems or sewer and water laterals connected to a public system and swimming pools are included within this definition. Residential buildings of five (5) stories and above are NOT included within this definition.

SKILLED TRADES

<u>CODE</u>	<u>TRADE OR OCCUPATION</u>	<u>HOURLY BASIC RATE OF PAY</u>	<u>HOURLY FRINGE BENEFITS</u>	<u>TOTAL</u>
		\$	\$	\$
101	Acoustic Ceiling Tile Installer	27.00	1.16	28.16
102	Boilermaker	31.09	21.87	52.96
103	Bricklayer, Blocklayer or Stonemason	26.22	13.80	40.02
104	Cabinet Installer	26.00	2.33	28.33
105	Carpenter	31.68	7.03	38.71
106	Carpet Layer or Soft Floor Coverer	21.40	6.01	27.41
107	Cement Finisher	28.00	10.10	38.10
108	Drywall Taper or Finisher Future Increase(s): Add \$2.20/hr on 6/1/2012	28.97	17.74	46.71
109	Electrician	31.10	6.01	37.11
110	Elevator Constructor	43.79	25.48	69.27
111	Fence Erector	17.64	4.66	22.30
112	Fire Sprinkler Fitter	36.39	16.97	53.36
113	Glazier	36.23	8.04	44.27
114	Heat or Frost Insulator	29.04	19.73	48.77
115	Insulator (Batt or Blown)	11.00	2.51	13.51
116	Ironworker	23.05	4.06	27.11
117	Lather	28.15	15.14	43.29
119	Marble Finisher	31.16	16.27	47.43
120	Marble Mason	35.53	15.92	51.45
121	Metal Building Erector	15.19	2.00	17.19
123	Overhead Door Installer	23.00	8.00	31.00
124	Painter	23.00	2.81	25.81

Fringe Benefits Must Be Paid On <u>All</u> Hours Worked		HOURLY BASIC RATE OF PAY	HOURLY FRINGE BENEFITS	TOTAL
CODE	TRADE OR OCCUPATION	\$	\$	\$
125	Pavement Marking Operator	26.00	0.00	26.00
129	Plasterer	30.36	7.15	37.51
130	Plumber	37.42	17.92	55.34
132	Refrigeration Mechanic	25.00	0.51	25.51
133	Rofer or Waterproofor Future Increase(s): Add \$.50/hr. effective 06/01/2012	29.40	15.05	44.45
134	Sheet Metal Worker	28.15	15.14	43.29
135	Steamfitter	32.59	11.05	43.64
137	Teledata Technician or Installer	19.23	5.32	24.55
138	Temperature Control Installer	22.00	2.64	24.64
139	Terrazzo Finisher	18.00	5.35	23.35
140	Terrazzo Mechanic	31.16	16.27	47.43
141	Tile Finisher	23.96	15.50	39.46
142	Tile Setter	27.00	1.91	28.91
143	Tuckpointer, Caulker or Cleaner	32.50	1.62	34.12
146	Well Driller or Pump Installer	27.60	0.00	27.60
147	Siding Installer	16.00	0.00	16.00

TRUCK DRIVERS

Fringe Benefits Must Be Paid On <u>All</u> Hours Worked		HOURLY BASIC RATE OF PAY	HOURLY FRINGE BENEFITS	TOTAL
CODE	TRADE OR OCCUPATION	\$	\$	\$
201	Single Axle or Two Axle	16.25	2.25	18.50
203	Three or More Axle	17.00	7.63	24.63
205	Pavement Marking Vehicle	19.25	10.84	30.09
207	Truck Mechanic	19.00	1.75	20.75

LABORERS

Fringe Benefits Must Be Paid On <u>All</u> Hours Worked		HOURLY BASIC RATE OF PAY	HOURLY FRINGE BENEFITS	TOTAL
CODE	TRADE OR OCCUPATION	\$	\$	\$
301	General Laborer	17.50	6.16	23.66
302	Asbestos Abatement Worker	17.00	2.21	19.21
303	Landscaper	11.00	2.07	13.07
311	Fiber Optic Laborer (Outside, Other Than Concrete Encased)	17.09	14.40	31.49

**HEAVY EQUIPMENT OPERATORS
RESIDENTIAL OR AGRICULTURAL CONSTRUCTION**

Fringe Benefits Must Be Paid On <u>All</u> Hours Worked		HOURLY BASIC RATE OF PAY	HOURLY FRINGE BENEFITS	TOTAL
CODE	TRADE OR OCCUPATION	\$	\$	\$
557	Asphalt Heater, Planer & Scarifier; Asphalt Milling Machine; Asphalt Screed; Backhoe (Track Type); Backhoe (Mini, 15,000 Lbs. & Under); Bituminous (Asphalt) Plant & Paver, Screed; Boring Machine (Directional, Horizontal or Vertical); Bulldozer or Endloader; Concrete Breaker (Large, Auto, Vibratory/Sonic, Manual or Remote); Concrete Bump Cutter, Grinder, Planing or Grooving Machine; Concrete Conveyor System; Concrete Laser/Screed; Concrete Paver (Slipform); Concrete Pump, Concrete Conveyor (Rotec or Bidwell Type); Concrete Slipform Placer Curb & Gutter Machine; Concrete Spreader & Distributor; Crane (Carry Deck, Mini) or Truck Mounted Hydraulic Crane (10 Tons or Under); Crane With a Lifting Capacity of 25 Tons or Under; Crane, Shovel, Dragline, Clamshells; Forestry Equipment, Timberco, Tree Shear, Tub Grinder, Processor; Grader or Motor Patrol; Grout Pump; Hydro-Blaster (10,000 PSI or Over); Loading Machine (Conveyor); Manhoist; Material or Stack Hoist; Mechanic or Welder; Milling Machine; Roller (Over 5 Ton); Scraper (Self Propelled or Tractor Drawn) 5 cu yds or More Capacity; Shoulder Widener; Skid Rig; Stabilizing or Concrete Mixer (Self-Propelled or 14S or Over); Tractor (Scraper, Dozer, Pusher, Loader); Tractor or Truck Mounted Hydraulic Backhoe; Tractor or Truck Mounted Hydraulic Crane (10 Tons or Under); Trencher (Wheel Type or Chain Type); Winches & A-Frames.	32.56	10.76	43.32
558	Air Compressor (&/or 400 CFM or Over); Air, Electric or Hydraulic Jacking System; Backfiller; Belting, Burlap, Texturing Machine; Boiler (Temporary Heat); Broom or Sweeper; Compactor (Self-Propelled or Tractor Mounted, Towed & Light Equipment); Concrete Finishing Machine (Road Type); Farm or Industrial Type Tractor; Forklift; Generator (&/or 150 KW or Over); Heaters (Mechanical); High Pressure Utility Locating Machine (Daylighting Machine); Jeep Digger; Lift Slab Machine; Mulcher; Oiler; Post Hole Digger or Driver; Power Subgrader; Pump (3 Inch or Over) or Well Points; Robotic Tool Carrier (With or Without Attachments); Rock, Stone Breaker; Roller (Rubber Tire, 5 Tons or Under); Screed (Milling Machine); Self Propelled Chip Spreader; Shouldering Machine; Skid Steer Loader (With or Without Attachments); Stump Chipper; Telehandler; Vibratory Hammer or Extractor, Power Pack.	17.40	0.44	17.84

***** END OF RATES *****

SECTION 00850: DRAWING SCHEDULE

The following listed drawings accompany and form a part of the project contract documents along with this project manual and generally illustrate the nature of the work.

See Section 00870 for additional drawings which are included within this project manual.

<u>Sheet No.</u>	<u>Title</u>
	<u>Title Drawings</u>
G001	General Project Cover Sheet
	<u>Mechanical/Electrical Drawings</u>
M001	Mechanical/Electrical Symbols and Abbreviations
M201	First Floor Mechanical/Electrical Plans
M202	Mechanical/Electrical Roof Plans
M800	Mechanical/Electrical Schedules and Details

SECTION 01010: SUMMARY OF WORK:1. SCOPE:A. Index:

1. Scope
2. Project Description
3. Work by Others
4. Scheduling of Work

2. PROJECT DESCRIPTION:

A. In general, the project includes the replacement of four (4) 15 - 20 year old 17 ton packaged rooftop heating, cooling and ventilation units above restaurant space within the parking structure. Work to include the following:

1. Removal of existing rooftop units.
2. Partial removal of existing natural gas piping to existing rooftop units.
3. Partial removal of existing power wiring feeds to existing rooftop units and one existing roof exhaust fan.
4. Installation of new adaptor curbs (transition curb between existing roof curb and new rooftop unit).
5. Installation of new roof top units.
6. Installation of new power wiring feeds to new rooftop units and existing roof exhaust fan unit.
7. Installation of new natural gas piping to new rooftop units.
8. Rearrangement of existing roof walk pavers around new rooftop units.
9. Vertical extension of two (2) existing domestic water heater gas vents.

B. Construction Bid Unit Pricing Descriptions

1. The existing roof top units contain electrical and control wiring that use roof penetrations to route the wiring from the lower levels. The new roof top units require new control wiring and the extension of existing power wiring that will also penetrate the roof. If possible the contractor should reuse the existing roof penetrations for the new wiring to the roof top units as detailed in the drawings as base bid. The transition from the existing curb to the new adaptor will limit the available space for the conduits to rise vertically through the roof and to the roof top unit. The contractor may need to relocate the roof penetrations for additional clearance from the curb adaptor. The contractor must provide unit pricing (per penetration) to the owner as a part of their bid to relocate the roof penetrations 25" to the west including the pricing to repair the existing penetration. The existing wiring penetration must be repaired to match the existing roofing system making it water proof.

C. DPW Parking Operation will occupy the site during construction. The contractor is required to coordinate all construction with DPW Parking, to minimize impact to parking operations and to ensure the safety of City employees, the public and property.

D. Examine Documents and Visit Site:

1. Before submitting a bid proposal, bidders should carefully examine the drawings and specifications; visit the site of work; fully inform themselves as to all existing conditions

and limitations, including those of labor; and shall include in the bid proposal a sum sufficient to cover the cost of all items contemplated by the construction documents.

2. Each sub-bidder further represents that he has inspected the site of the proposed work to ascertain any obstacles that might be encountered and other matters and conditions relevant to this work.
 3. The nature of the work required demands thorough review of all drawings and the project manual, and diligent and careful site inspection by all prospective sub-bidders as a means of determining the extent of work and conditions under which the work is to be performed.
 4. Additional charges will not be as considered for work which, prior to bidding, could reasonably be inferred as appropriate by examination of the drawings and specifications, visiting the site, and closely reviewing the work as indicated above. No representations as to subsurface conditions are made.
3. WORK BY OTHERS:
- A. (TAB) Testing, Adjusting and Balancing by other under a separate contract with the City.
4. SCHEDULING OF WORK:
- A. The contractor shall provide a construction schedule which includes all phases of construction, indicating the anticipated start and completion times for each of those phases. The contractor shall provide that complete schedule at the Pre-Construction Meeting arranged by the City.
 - B. All work, unless otherwise specifically approved, is to be done during normal working hours.

SECTION 01210: PROJECT MEETINGS1. SCOPE:A. Index:

1. Scope
2. Pre-Construction Meeting
3. Progress Meetings

2. PRE-CONSTRUCTION MEETING:

- A. Soon after the award of the contract and prior to the start of construction, the contractor shall attend a pre-construction conference with representatives of the City.
- B. The contractor shall have at the meeting responsible representatives from subcontractors who are to perform major work on the project.
- C. The purpose of the meeting is to discuss in detail the plans and specifications. The discussion shall include:
 1. Schedule
 2. Equipment
 3. Material Storage
 4. Traffic Control
 5. Inspection Requirements
 6. Protection Procedures for the structure, adjacent facilities, environment, and personnel.
 7. Hours of Work
- D. The contractor shall submit the construction schedule to the architect/engineer at this meeting and a listing of subcontractors and their work. The contractor shall describe, in detail, when each portion of the work is expected to be accomplished. The subcontractors shall participate in the discussion. The architect/engineer will serve to interpret the contract documents should such questions arise.
- E. Any other questions that the contractor or his subcontractors have about the work or its scheduling shall be raised at these meetings.
- F. Requirements for contract administration and construction operations will be defined for participants.
- G. The architect/engineer will determine time, date, and place of the meeting.

3. PROGRESS MEETINGS:

- A. Bi-weekly meetings will be held for the purpose of coordinating and expediting the work.
- B. Attendance at project meetings by the contractor is mandatory. These meetings shall also be attended by representatives of each subcontractor who is either working at the site or is affected by work being done at the site. The contractor shall submit an updated construction schedule at these meetings and a short narrative should be written, describing the cause of any delays and intended action to remedy these delays.

01210/2

- C. Contractors shall give a verbal report of progress on the project, discuss the work schedule for the coming period, and present all conflicts, discrepancies, or other difficulties for resolution.

SECTION 01300: SUBMITTALS/PERMITS

1. SCOPE:

A. Index:

1. Scope
2. Submittals
3. Permits
4. Inspection

2. SUBMITTALS:

A. Comply with the requirements of the General Conditions and as follows:

1. Forward Submittals not more than 20 calendar days after the Notice to Proceed date. No work, as indicated on any shop drawing, samples, hardware list, etc., shall be started until those submittals have been reviewed and work authorized.
2. All submittals must be thoroughly reviewed by the prime contractor for conformance to contract documents, prior to submission to the City, or its agents, for review. Shop drawings and catalog information shall be stamped "Reviewed By" and signed by the contractor's reviewer. The prime contractor shall review all subcontractor submittals prior to submittal to the City for compliance with contract documents and to coordinate all work.
3. Include with each submittal a transmittal letter signed and dated by the prime contractor containing the following:
 - a. Name of Contractor
 - b. Name of Project
 - c. List of Submittals
 - d. Name of Manufacturer or Supplier
 - e. Additional information as required for the items being provided.

B. Shop Drawings, Catalog Information, Calculations, and Samples:

1. Shop Drawings: Submit one blue/black line print review. The City will notify the contractor in writing and return one copy marked "REVIEWED - NO EXCEPTIONS TAKEN" with minor or no notations. The City will also notify the contractor in writing and return one copy, along with comments, when the drawings are marked either "REJECTED" or "REVISE AND RESUBMIT". For those shop drawings, the contractor will be responsible for resubmitting a new print.
2. Catalog Information and Calculations: Submit four copies for City's record and additional numbers of copies required for the contractor's purpose. The City will notify the contractor in writing and return the contractor's copies, with or without notation,

marked either "REVIEWED - NO EXCEPTIONS TAKEN", "REVISE AND RESUBMIT", OR "REJECTED". Catalog information or calculations marked "REVISE AND RESUBMIT" or "REJECTED" must be resubmitted in the same quantities as originally required.

3. Samples: Submit two samples of requested materials for the City's records and additional samples, if desired, to be returned to the contractor. The City will notify the contractor in writing, whether the samples are approved or rejected. If they are rejected, new samples must be resubmitted as originally required.
 4. Corrections or comments made on the submittals during the review do not relieve the contractor from compliance with requirements of the contract documents. The check is only for review of general conformance with the design concept of the project and general compliance with the information given in the contract documents. Contractors are responsible for conforming and correlating all quantities and dimensions; selecting fabrication processes and techniques of construction; coordinating their work with that of all other trades; and performing their work in a safe manner.
- C. "Or Equal": Whenever the words "or equal" or similar term is used, it shall mean as determined by the Commissioner of Public Works or agent. All drawings, data and bulletins necessary to make an "or equal" determination shall be submitted to the Facilities Manager of Facilities Development and Management Section. Such review shall apply to design only and shall in no way relieve the contractor from the responsibilities as outlined in Item 2B above. Evaluation of "or equal" products will be made at the time of shop drawing submission. Any change required in design and coordination between all contractors, subcontractors, or trades due to the use of "or equal" materials shall become the contractor's responsibility. Any costs for detailed engineering reviews and/or any costs to incorporate "or equal" products will be borne by the contractor.
3. PERMITS:
 - A. The City of Milwaukee will provide the general building and occupancy permits.
 - B. Contractors shall obtain, from the City of Milwaukee Department of City Development and/or other government or private agencies, all special permits as may be necessary in their work.
 - C. Contractors shall obtain all permits to occupy or work in the public way as may be necessary for their work.
 - D. Contractors shall notify the City and/or appropriate utilities when making utility connections as part of the project.
 4. INSPECTION:
 - A. Facilities Development and Management Section will provide daily inspection to verify compliance with contract documents, identify contractors and crews on the job, verify compliance with contract conditions (MWSBE, residency, wage requirements), and record job progress and conditions.

- B. Contractors shall arrange with the Department of Neighborhood Services/Construction Trades Division and permit issuing agencies for all code compliance inspections as required by all permits including, but not limited to, the general building and all special permits issued by that agency.
- C. Contractors shall arrange with the appropriate City agency for compliance inspections, as required, for all permits including, but not limited to, curb and pavement cuts and patches, and public way occupancy and utility connections.

SECTION 01500: JOB SITE UTILITIES, FACILITIES, AND SECURITY

1. SCOPE:

A. Index:

1. Scope
2. Building Security
3. Temporary or Trial Usage
4. Occupancy During Construction
5. Temporary hoists, Lifts
6. Temporary Ladders, Scaffolds
7. Electrical Power
8. Water
9. Toilet Facilities
10. Parking
11. Barricades and Signage

2. BUILDING SECURITY:

A. General:

The Downtown Complex is open to the public from 8:00 AM until 4:45 PM, Monday through Friday, excluding holidays. Since most contracted work takes place outside normal business hours, it is essential that contractors and their City agents understand and abide by security policy.

Outlying buildings are not generally open to the public. Contracted work in these buildings can take place at any time. It is essential that contractors and their City agents understand and abide by security policy.

Rev 10/07

B. Scope:

At the beginning of any project, a copy of this policy and procedure statement will be added to the project manual for bid consideration and shall be distributed at the Pre-Construction Meeting. All City agents/officials responsible for engaging contractors, all contractors, and all subcontractors shall be held responsible for following the procedures.

C. City Agents/Officials:

1. Any City agents/officials who commission outside contractors to work in any of the facilities managed by Buildings and Fleet Services shall provide the following information no less than twenty-four (24) hours in advance of the work:

- a. The names of any contract or subcontract employees who will be present in the facilities (for the purpose of designing badges appropriate to their work area):

Green – Zeidler Municipal Building, 841 North Broadway
Red – City Hall, 200 East Wells Street
Yellow – 809 North Broadway
Gold – Any outlying buildings

These names must be listed on a sign-in sheet available in the Zeidler Municipal Building, Room 602, DPW Facilities Dev. & Management. City shall

be responsible to ensure the sheet and badges are transported to the appropriate location where the work is to be completed (City Hall Information Center for the Downtown Complex, for outlying buildings to the designated Facility Manager) before work is to begin.

- b. A list of keys and/or access cards required for access only to the areas necessary for work involved in the project. The keys and card will be received from the Security Manager or his designee and signed out to the City agents/officials responsible for the contracted work. The City employee will take the keys and/or access cards to the City Hall Information Center or the person responsible for controlling access in the outlying building where they shall be logged under the name of the contractor's company. When a project is complete, the City agents/officials must retrieve the keys/cards and return them to Facilities Development and Management Section support staff in Room 602 of the Zeidler Municipal Building.

D. Contractors:

- 1. Contractors shall abide by City security policy and procedures at all times during the scope of their participation in a project. Failure to comply will result in the contracted employee being escorted from the premises and the resulting lost time and expense shall be deducted from the contractor's invoice or penalties of \$50.00 per occurrence as determined by the contracting City agent/official.
 - a. All access should be provided in advance through the City agent/official. Contractors shall enter and exit only through those doors designated by the City (the Market Street entrance to City Hall and the doors established by the person responsible for access at outlying buildings). All other exterior doors are locked and alarmed and are not to be used as delivery points unless the City agent/official has been provided 24 hour notification to provide additional security coverage at that point while the delivery is in progress.
 - b. All of the contractor's employees and all of the employees of any of his subcontractors shall wear at all times while on the site, in a clearly visible location, an identification card. The identification card is to have a minimum 1" x 1" color photo of the head and shoulders. The photo is to have been taken no more than one year previously. The card is to be laminated with clear plastic and is to contain the company name, employee's name, and the employee's signature, and is to be furnished by the contractor or respective subcontractor.

E. Key or Key Card Access: Effective October 1, 2004 - The following policy has been established to maintain control of City Property and to ensure the physical protection of the City Hall Complex. signing out access cards and/or keys from the Information Center will be following the steps below.

- 1) Sign in on the sheet assigned to the project you are working on and pull that sheet and provide it to the Operator noting that you will need to sign out City property to access the building.
- 2) Provide the Operator your driver's license as collateral for the return of City property.
- 3) Sign out the property in the sign out book as per current policy.

- 4) The Operator will file your driver's license until such time as you sign in and return the City property at which time your license will be returned.
- 5) Sign out at the end of your workday on the sign out sheet.
- 6) Under NO circumstances will keys or cards be disbursed without the user signing for the property and providing the City Hall Operator their driver's license as collateral.
- 7) In the event that keys or cards are not returned daily the contractor in question will have a deduct (security violation) **\$50.00** penalty for each occurrence.as per the contract. Individuals who loose or fail to return keys will be responsible for the cost of re-keying to the City.
- 8) Contractors shall not ask custodians or mechanics to unlock doors. In the rare case where access is not provided, the City Hall Operator may be contacted to assist in providing access. The contractor should be prepared to allow searches of equipment when leaving, and should remain only in the areas designated on the sign-in sheets.

F. Dock Access: If the contractor requires use of the loading dock in Upper Parking, 24 hour advance notice shall be given to the City agent/official to make arrangements to provide additional security coverage while the delivery is in progress. The contractor or subcontractor shall meet the delivery driver and take delivery at that point. At no time shall a driver be allowed in the facilities without following the access procedure stated above.

G. Outlying Building Access:

- 1) If after normal business hours work is required in the outlying buildings, all subcontractors and trades will arrange appropriate security measures and lock-up procedures with the contractor in writing. Any work completed at night shall be left "open" for City inspection of the work. The contractor shall notify the City agent/official 24 hours in advance of after-hours work in writing, indicating the type of work to be done and the security measures to be taken by the contractor.
- 2) The contractor shall provide plywood door and window closures during construction to secure the structure from weather and damage from vandalism. The contractor is responsible to maintain the security of the space where they are working during construction.
- 3) If proper notification is not provided to the contractor, the subcontractor or trades shall be liable for any subsequent damage/vandalism/inspection cost, etc., due to lack of security/inspection coordination.
- 4) Use of City materials is strictly prohibited unless pre-arranged through the City employee contact.
- 5) At no time shall any interior doors that control access or exterior doors be propped open.

3. TEMPORARY OR TRIAL USAGE:

The owner shall have the right to make temporary or trial usage of any mechanical device, machinery, apparatus, equipment, work, material or construction supplied under contract before final completion or

acceptance of the work, and the same shall not be construed as evidence of acceptance of the work by the owner.

4. OCCUPANCY DURING CONSTRUCTION:

The owner will occupy the premises while work is in progress. Contractor is to coordinate his work as to not interfere with the owner's operation or compromise building security.

5. TEMPORARY HOISTS, LIFTS:

Contractors and subcontractors requiring hoists or lifts shall provide their own and remove upon completion of work.

6. TEMPORARY LADDERS, SCAFFOLDS:

A. Contractors and subcontractors requiring scaffolds, chutes, and ladders shall provide their own and remove them upon completion of work.

B. Each contractor shall furnish and maintain equipment such as fixed ladders, chutes, and the like as required for proper execution of their work.

7. ELECTRICAL POWER:

A. Contractor may use existing outlets for power. Contractor is to supply his own extension cords. All current used will be provided and paid by the City of Milwaukee.

B. OSHA regulations require that employers use either ground fault circuit interrupters or an assured equipment grounding conductor problem in addition to any other regulations for equipment grounding conductors.

8. WATER:

Contractor may use existing hose bibs for water. Contractor is to supply his own hoses. Contractor's hoses shall be leak free and contractor is to regulate the flow to limit it to project related use. The cost of the water will be paid for by the City.

9. TOILET FACILITIES:

Contractor may use existing toilet facilities in the building but will then be responsible to ensure that the facility is kept in a sanitary condition.

10. PARKING:

Contractor is responsible for parking of vehicles. No parking areas will be provided by the City.

11. BARRICADES AND SIGNAGE:

Contractor is to provide barricades and signage as required by OSHA and City/State Codes for their work.

SECTION 01505: CONSTRUCTION WASTE MANAGEMENT

PART 1 - GENERAL

1.1 SCOPE:

- A. This section specifies requirements for salvaging, recycling and disposing of construction waste for purposes of protecting the environment and reducing project cost.

Requirements include the following:

1. Developing a Construction Waste Management Plan including waste management goals and provisions for waste reduction and recycling.
2. Implementing, monitoring and documenting the waste management plan.
3. Incorporating special programs.
4. Evaluating construction waste management.

1.2 RELATED DOCUMENTS AND SECTIONS:

- A. Drawings and general provisions of the Contract, including General Conditions and other Division 1 Specification Sections, apply to this Section.
- B. Related documents include the following
1. Section 01010 "Summary of Work"
 2. Section 01300 "Submittal & Permits"
 3. Section 001500 "Utilities, Facilities, and Security" for environmental-protection measures during construction.

1.3 PRECONSTRUCTION MEETING:

- A. After award of Contract and prior to the commencement of the Work, schedule and conduct a meeting with the Owner and Architect to discuss the proposed Construction Waste Management Plan and to develop a mutual understanding regarding details of environmental protection.

1.4 CONSTRUCTION WASTE MANAGEMENT PLAN:

- A. Construction Waste Management Plan
1. The purpose of the Construction Waste Management Plan is to identify construction waste reduction goals, identify targeted materials, and explain specific waste reduction actions to be taken, by whom, and when.
 2. The Contractor shall develop a Construction Waste Management Plan for this Project within 15 working days after Contract award or prior to any waste removal. The Owner and the Architect will furnish the Contractor with information that will assist in the development of the Construction Waste Management Plan. Submit the Construction Waste Management Plan (include document/report form) to the Architect for approval prior to implementing the Plan.
- B. Progress Documentation: Document solid waste disposal and diversion. Include the date of removal, type of waste removed, quantity by weight and volume, final destination and use (recycled, reused or landfilled), and net cost or income.
1. Document on the Form acceptable to the Owner and Architect.

2. With each Application for Payment, submit updated documentation identifying solid waste disposal and diversion.
 3. With each Application for Payment, submit manifests, weight tickets, receipts and invoices identifying the Project and construction waste material.
- C. Record Submittals: Submit the following:
1. Summary of solid waste disposal and diversion. Submit on form acceptable to the Owner and Architect.
 2. End-of-Project recycling rates and landfill rates demonstrating the percentage of construction waste that was recycled or reused.

1.5 WASTE MANAGEMENT GOALS:

- A. Develop Construction Waste Management Plan that results in end-of-Project rates for the reuse/recycling of **50%** percent by weight or volume of total waste generated by the Project. Record the total construction waste reduction goal on the Construction Waste Management Plan Form.
- B. Reduce: The Project shall generate the least amount of waste and methods shall be used that minimize waste due to error, poor planning, breakage, mishandling, contamination, or similar factors. Promote the resourceful use of materials to the greatest extent possible.
- C. Reuse: The Contractor and Subcontractors shall reuse materials to the greatest extent possible. Reuse includes the following:
 1. Salvage reusable materials for resale, for reuse on this Project, or for storage for use on future projects.
 2. Return reusable items (e.g., pallets or unused products) to the material suppliers.
- D. Recycle: As many of the waste materials not able to be eliminated in the first place or salvaged for reuse shall be recycled. Waste disposal in landfills shall be minimized to greatest extent possible.

1.6 MATERIALS HANDLING AND SORTING:

- A. Handling:
 1. Materials that are contaminated prior to placing in collection containers shall be properly cleaned. Deliver materials free of dirt, adhesives, solvents, petroleum contamination, and other substances deleterious to recycling processes.
 2. Cover materials with tarps and keep truckloads level so as to prevent spillage.
 3. Arrange for collection by or delivery to the appropriate recycling or reuse facility.
 4. Hazardous Waste and Hazardous Materials: Handle in accordance with applicable regulations. If encountered, such waste and materials shall be abated under separate contract.
- B. The following sorting methods are acceptable:
 1. Sorting recyclable materials at the Project site and transporting them to recycling markets directly from the Project site.
 2. Employing haulers who make use of a materials-recovery facility or a transfer station where recyclable materials are sorted from the waste and recycled before disposing of the remainder. If using a hauler or recycling facility to sort out recyclables, verify that the hauler sorts out all construction waste loads and is not limited to those that are not acceptable at the landfill. Also, verify that the hauler or recycling facility recycles at least three types of materials.

1.7 WASTE MANAGEMENT PLAN IMPLEMENTATION:

- A. The Contractor shall designate a party (or parties) who shall be responsible for instructing construction personnel and overseeing and documenting results of the Construction Waste Management Plan.
- B. Distribution: The Contractor shall distribute copies of the Construction Waste Management Plan to the Project Foreman, each Subcontractor, the Owner, and the Architect.
- C. Instruction: The Contractor shall provide on-site instruction regarding appropriate separation, handling, and recycling, salvage, reuse, and return methods to be used by all construction personnel at the appropriate phases of the Project.
- D. Separation Facilities: The Contractor shall lay out and identify a specific area on the Project site to facilitate separation of materials for recycling, salvage, reuse, and return. Recycling and waste bin areas shall be kept neat and clean, and clearly marked to avoid contamination of materials. Materials for recycling include concrete, non-fibrous wallboard, paper, clean corrugated cardboard (no pizza boxes), non-treated wood, metals (steel, aluminum and copper), and glass bottles (no windows). Provide separate containers, preferably near the job trailer, with smaller containers located at convenient places throughout the job site. Empty smaller containers into larger containers every night or when full. Cover outdoor containers to keep out rain, snow, and wind-driven debris. Lock containers whenever site is not in use to prevent illegal dumping.
- E. Hazardous Waste: Hazardous waste shall be separated, stored, and disposed of according to applicable regulations.
- F. Application for Payments: With each Application for Payment, the Contractor shall submit a Summary of Waste generated by the Project. Failure to submit this information shall render the Application for Payment void, thereby delaying the Progress Payment. The Summary of Waste shall contain the following information:
 - 1. The amount (in tons and/or cubic yards) of material landfilled from the Project, the identity of the landfill, and the related disposal cost. Include corresponding manifests, weight tickets, receipts, and invoices.
 - 2. For each material recycled from the Project, the amount (in tons and/or cubic yards), the date removed from the Project site, the receiving party, the transportation cost, the amount of any money paid or received for the recycled or salvaged material, and the net total cost or savings of recycling. Include corresponding manifests, weight tickets, receipts, and invoices.
- G. Implementing the Plan: The Contractor shall designate a party (or parties) responsible for implementing the Construction Waste Management Plan. This party (or parties) shall explain to Contractor's and Subcontractor's construction personnel, the Plan's goals and methods for achieving those goals.

1.8 SPECIAL PROGRAMS:

- A. The Contractor shall be responsible for final implementation of programs involving tax credits, rebates, or similar incentives related to recycling, if applicable to the Project. Revenues or other savings obtained for recycling or returns shall accrue to the Contractor.
- B. The Contractor shall be responsible for obtaining information packets related to the special programs prior to commencing Work.
- C. The Contractor shall document work methods, recycled materials, etc., as required for the tax credits, rebates, or other savings described above.

01505/4

END OF SECTION

SECTION 01600: MATERIALS AND EQUIPMENT1. SCOPE:A. Index:

1. Scope
2. Materials
3. Equipment
4. Hazardous Material Requirements
5. Material Storage
6. Protection
7. Revisions

2. MATERIALS:

- A. Furnish materials of the type, qualities, and characteristics specified. The specification of a trade name and catalog number is intended to establish quality, type, character, and operating characteristics of the material required. Materials by other manufacturers of equal specifications will be accepted, excepting as may be specifically stated otherwise.
- B. Materials shall be delivered adequately protected, in merchantable condition, and in original unbroken packages if normally packaged. They shall be stored and handled so as to protect and maintain their merchantable condition.
- C. The Commissioner of Public Works or his representative shall have the right to reject material not in compliance with the project manual, as well as damaged material, and the contractor shall remove such material from the construction site when and as directed.

3. EQUIPMENT:

- A. Internal combustion engine and compressor shall be equipped with mufflers to reduce noise to a minimum and shall not be operated in enclosed areas without adequate ventilation.
- B. All materials and work procedures used shall be in accordance with all air pollution control regulations in effect at the work site.

4. HAZARDOUS MATERIAL REQUIREMENTS:

- A. The requirements set forth in the OSHA Hazard Communication Standard, 29CFR19101.1200, U.S. Environmental Protection Agency (EPA), and Wisconsin Department of Natural Resources in the Wisconsin Administrative Code NR600, shall be met by each on-site contractor.

1. Material Safety Data Sheets (M.S.D.S.):

- a. All contractors, which may/may not include the City of Milwaukee, shall provide the M.S.D.S. for all hazardous chemicals to which any person may be exposed at the work site.
- b. A master list will be kept in the office of the Project Supervisor/Construction Manager and updated as materials are delivered.

2. Container Labeling:

- a. Each container of hazardous material at the work site shall be clearly labeled with:
 - (1) Identity of the hazardous chemical(s).
 - (2) Appropriate hazard warning(s).
 - (3) Name and address of the manufacturer.
 - B. The City of Milwaukee reserves the right to stop the work of a contractor if compliance with OSHA regulations is inadequate. Work will not proceed until all applicable safety and health procedures are implemented by the contractor.
5. MATERIAL STORAGE:
- A. The storage areas shall be kept in good order and free of all rubbish and debris.
 - B. Coordinate the delivery and storage of all materials and equipment with the Facilities Development and Management Section Project Inspector.
 - C. Designate receiving/storage areas for incoming products so that they are delivered according to installation schedule and placed convenient to work area in order to minimize waste due to excessive materials handling and misapplication.
 - D. Store and protect products in accordance with manufacturers' instructions.
 - E. Store with seals and labels intact and legible.
 - F. Store sensitive products in weather tight, climate controlled, enclosures in an environment favorable to product.
 - G. For exterior storage of fabricated products, place on sloped supports above ground.
 - H. Cover products subject to deterioration with impervious sheet covering. Provide ventilation to prevent condensation and degradation of products.
 - I. Prevent contact with material that may cause corrosion, discoloration, or staining.
 - J. Provide equipment and personnel to store products by methods to prevent soiling, disfigurement, or damage.
 - K. Arrange storage of products to permit access for inspection. Periodically inspect to verify products are undamaged and are maintained in acceptable condition.
6. PROTECTION:
- A. The premises and the work shall be adequately protected from damage from the commencement of work to the date of final acceptance.
 - B. All construction work and traffic shall remain within the construction area.
 - C. All damage shall be corrected or repaired by the contractor or contractors causing same at his or their own expense.

D. All open pipes, pipe threads, fittings, and insulation must be protected during construction.

7. REVISIONS:

The right is reserved to make modifications to a reasonable extent as building conditions may require, or as may be required to conform to code rulings, or manufacturer's standards without extra cost to the City.

SECTION 01700: CLEANING AND PROJECT CLOSE-OUT

1. SCOPE:

A. Index:

1. Scope
2. General
3. Safety Cleaning
4. Progress Cleaning
5. Disposal
6. Final Cleaning
7. Charges
8. Record Drawings
9. Operating Instructions and Maintenance Manuals
10. Guarantees

2. GENERAL:

Article 2.5.4 of the General Requirements of City of Milwaukee Department of Public Works shall be supplemented as specified hereinafter.

3. SAFETY CLEANING:

Safety cleaning: Each contractor is responsible for safety cleaning, which includes but is not limited to the following:

- A. Keep work areas, passageways, ramps, stairs, free of debris and scrap.
- B. Form and scrap lumber shall have nails withdrawn or bent over and lumber shall be stacked or removed.
- C. Remove spills of oil, grease, or other liquids immediately or sprinkle with sand.
- D. Hazardous material shall be handled in accordance with Section 01600. Each container of hazardous material at the work site shall be clearly labeled with:
 - a. Identity of the hazardous chemical(s).
 - b. Appropriate hazard warning(s).

4. PROGRESS CLEANING:

- A. Prime Contractor and subcontractor shall remove his rubbish and debris from building site promptly upon its accumulation, and prior to the contractor's regular Friday general clean up. Contractor shall perform broom cleaning of all appropriate surfaces each Friday afternoon.
- B. Combustible waste shall be stored in fire resistive containers and disposed of regularly.
- C. Oily, flammable or hazardous wastes such as caustics, acids, harmful dusts, etc., shall be stored in appropriate covered containers.

5. DISPOSAL:

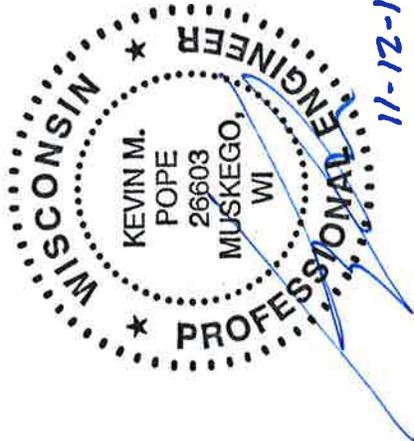
- A. No burning of rubbish or debris will be allowed at site. No rubbish shall be thrown through opening or from heights without proper protection. Where dust will be generated or flying debris is likely to occur, provide dust tight chutes or other means to control dust.
 - B. Containers: Contractor shall provide mobile industrial type waste containers in the number and size required, placed at adequate locations to handle debris or provide other methods of disposing of debris.
 - C. Oil, flammable or hazardous wastes such as, but not limited to, caustics, acids, harmful dusts, etc., shall be placed in properly marked containers as necessary and disposed of at a site designed for such wastes.
6. FINAL CLEANING:
- A. Immediately prior to substantial completion.
 - B. Contractors shall expedite or perform thorough cleaning, sweeping, washing and polishing of work to remove from work and equipment provided under his contract, all foreign matter, spots and soil, so as to put all such work and equipment, including finishes, in a complete and finished condition ready for acceptance and use intended.
 - C. The contractor is responsible for final sweeping and dusting not covered by other subcontractors. This general cleaning shall include all areas and floors of the building, including the site outside the building.
7. CHARGES:
- A. If prime contractors do not remove rubbish or clean building as specified above, owner reserves right to have work done by others at contractor's expense.
 - B. Employees of the owner who are required to clean up any rubbish or to sweep any floors will record all hours involved to complete such work. The cost incurred by the owner for this special cleaning and sweep-up work shall be charged against the contract price of the contractor as determined by owner.
8. RECORD DRAWINGS:
- A. At the completion of work and prior to final payment, the mechanical and electrical contractors shall provide Facilities Development and Management Section with three (3) marked up sets of prints showing all changes or variations from contract drawings, and not specified on change order drawings theretofore issued. Contractors providing buried or concealed piping, conduit, or similar items shall locate such items by dimensions and elevations.
 - B. Other contractors shall provide one (1) marked up set of prints showing all changes or variations from contract drawings.
 - C. Drawings shall show complete layout of revised piping, equipment, etc., as actually installed.
9. OPERATING INSTRUCTIONS AND MAINTENANCE MANUALS:
- A. The contractor shall, upon completion of all work, furnish the necessary skilled labor to instruct City personnel in the operation, adjustment, and maintenance of all equipment furnished.
 - B. At termination of work, the contractor shall submit maintenance and operating manuals

presenting full details of care and maintenance and operation of mechanical and electrical equipment of every nature. See specific requirements in relevant sections as applicable.

- C. The manual shall include manufacturer's instructions for maintenance and operation and shall be completely indexed, including the spare parts list. See specific requirements in relevant sections.
- D. Submit three (3) final copies in hard bound cover and one (1) electronic copy (pdf) to Facilities Development and Management Section.
- E. The contractor shall allow for a four (4) hour training session for City maintenance personnel on all equipment and controls installed under this contract.

10. GUARANTEES:

- A. Each contractor shall guarantee to replace or repair promptly at his own expense, as directed by the Commissioner of Public Works or his agent, all workmanship or materials in which defects may develop within one (1) year from the date of final acceptance of his work. This guarantee includes all damage done to the City due to faulty equipment, poor installation or poor construction.
- B. Guarantee periods other than the one year time period are indicated in specific specification sections.



11-12-12

SECTION 070150.91 ROOFING RESTORATION

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes the following:
 - 1. Roof flashing/patching at new HVAC units.
 - a. Removal of existing electrical conduit penetration and patching of the roof membrane.
 - b. Flashing of new conduit penetrations.
 - 2. Protection of existing roofing system that is not patched or reroofed.
- B. Related Sections include the following:
 - 1. Division 23 Sections for HVAC equipment installation.
 - 2. Division 26 Sections for Electrical installations.

1.2 MATERIALS OWNERSHIP

- A. Except for items or materials indicated to be reused, reinstalled, or otherwise indicated to remain Owner's property, demolished materials shall become Contractor's property and shall be removed from Project site.

1.3 DEFINITIONS

- A. Roofing Terminology: Refer to ASTM D 1079 and glossary in NRCA's "The NRCA Roofing and Waterproofing Manual" for definition of terms related to roofing work in this Section.
- B. Existing Membrane Roofing System: Adhered EPDM roofing membrane, and components and accessories between deck and roofing membrane.
- C. Existing to Remain: Existing items of construction that are not indicated to be removed.

1.4 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Fastener pull-out test report.
- C. Photographs or Videotape: Show existing conditions of adjoining construction and site improvements, including exterior and interior finish surfaces, that might be misconstrued as having been damaged by reroofing operations. Submit before Work begins.
- D. Qualification Data: For Installer including certificate that Installer is approved by warrantor of existing roofing system.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: Installer of new membrane roofing and patching system approved by warrantor of existing roofing system to work on existing roofing.
- B. Regulatory Requirements: Comply with governing EPA notification regulations before beginning membrane roofing removal. Comply with hauling and disposal regulations of authorities having jurisdiction.

1.6 PROJECT CONDITIONS

- A. Owner will occupy portions of building immediately below work area. Conduct roof patching so Owner's operations will not be disrupted. Provide Owner with not less than 72 hours' notice of activities that may affect Owner's operations.
 - 1. Coordinate work activities daily with Owner so Owner can place protective dust or water leakage covers over sensitive equipment or furnishings, shut down HVAC and fire-alarm or -detection equipment if needed, and evacuate occupants from below the work area if desired.
- B. Protect building to be roof patched, existing roofing, equipment, adjacent buildings, walkways, site improvements, exterior plantings, and landscaping from damage or soiling from reroofing/patching operations. If any existing items as noted above are damaged by this contractor, this contractor shall have damaged repaired to original conditions
- C. Maintain access to existing walkways, corridors, and other adjacent occupied or used facilities.
- D. Owner assumes no responsibility for condition of areas to be re-roofed.
 - 1. Conditions existing at time of inspection for bidding will be maintained by Owner as far as practical.
- E. Weather Limitations: Proceed with roofing patching preparation only when existing and forecasted weather conditions permit Work to proceed without water entering into existing roofing system or building.
- F. Hazardous Materials: It is not expected that hazardous materials such as asbestos-containing materials will be encountered in the Work.
 - 1. If materials suspected of containing hazardous materials are encountered, do not disturb; immediately notify Architect and Owner. Hazardous materials will be removed by Owner under a separate contract.

1.7 WARRANTY

- A. Existing Warranties: Remove, replace, patch, flash and repair materials and surfaces cut or damaged during roofing work, by methods and with materials so as not to void existing roofing system warranty. Notify warrantor before proceeding.
 - 1. Notify warrantor of existing roofing system on completion of roof patching, and obtain documentation verifying that existing roofing system has been inspected and warranty remains in effect. Submit documentation at Project closeout.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Use roofing materials matching existing ballasted EPDM membrane roofing system materials, unless otherwise indicated.

2.2 ROOF INSULATION (TO MATCH EXISTING)

- A. Extruded Polystyrene: Closed-cell polystyrene, ASTM C578, Type IV, $k = 0.20$, factory tapered.
- B. Polyisocyanurate Foam Board: Closed cell polyisocyanurate foam core with laminated black glass reinforced mat facer complying with ASTM C 1289.
 - 1. Density: 2.0 pcf per ASTM D1622.
 - 2. Compressive Strength: 25 psi minimum per ASTM D1621 Procedure A.
 - 3. Moisture Vapor Transmission: 1.0 perms maximum.
 - 4. Thickness: Provide thickness and slope to match existing.
 - 5. R-Value: 5.6 design stabilized R-value according to RIC/TIMA Bulletin No. 101.

- C. Recovery Board: Minimum 1/2 inch thick wood fiberboard with R-value of 1.4 per inch based on ASTM C-518 or C-177 at 75 degrees F mean temperature.
 - 1. Water Absorption: 7 percent maximum.
 - 2. Flame Spread: 275 per ASTM E84.
 - 3. Tensile Strength parallel to surface: 150 avg. min. psi.
- D. Insulation – General:
 - 1. Factory taper insulation to provide smooth incline of slopes as shown on drawings.
 - a. Factory miter valleys and corners
 - 2. Multiple Layers: Furnish in not less than 2 layers.

2.3 ADHERED SINGLE PLY MEMBRANE ROOFING

- A. Type and Manufacturer:
 - 1. RubberGard adhered single ply membrane roofing by Firestone Building Products.
- B. Other Acceptable Manufacturers:
 - 1. Carlisle SynTec Systems.
 - 2. Versico Versiguard.
 - 3. Gen Corp Genflex.
 - 4. SPM by Johns Manville.
- C. Sheet Membrane: Minimum 0.060 inch thick compounded elastomeric membrane, largest sheet size possible as determined by membrane manufacturer.
- D. Flashing: Minimum 0.060 inch thick uncured EPDM membrane. Provide longest pieces of flashing practicable.
- E. Bonding adhesive, splice wash solvent splicing cement, lap sealant, water cut-off mastic, prefabricated pipe seals, seam tape, nite seal and pourable sealer: As recommended by sheet roofing manufacturer.
- F. Splice Wash: Clear splice wash or splice primer wash.

2.4 MEMBRANE FASTENERS

- A. Fasteners: Corrosion-resistant, as recommended by manufacturer, of type, length and strength required for intended use.
- B. Insulation Plates: Corrosion-resistant AZ55 Galvalume steel, as recommended by manufacturer.
- C. Coated screws of sufficient length to penetrate minimum one inch into wood or masonry substrate.
- D. Termination Bar: 1.3 inch by 0.10 inch thick aluminum bar with integral caulk ledge.

2.5 AUXILIARY REROOFING MATERIALS

- A. General: Auxiliary reroofing preparation materials recommended by roofing system manufacturer for intended use and compatible with components of existing membrane roofing system.
- B. Fasteners: Capped head, factory-coated steel fasteners, listed in FMG's "Approval Guide."

PART 3 - EXECUTION

3.1 PREPARATION

- A. Protect existing membrane roofing system that is indicated not to be patched.

1. Loosely lay 1-inch- minimum thick, molded expanded polystyrene (MEPS) insulation over the roofing membrane in areas indicated. Loosely lay 15/32-inch plywood or OSB panels over MEPS. Extend MEPS past edges of plywood or OSB panels a minimum of 1 inch.
 2. Limit traffic and material storage to areas of existing roofing membrane that have been protected.
 3. Maintain temporary protection and leave in place until replacement roofing has been completed.
- B. Coordinate with Owner to shut down air intake equipment in the vicinity of the Work. Cover air intake louvers before proceeding with roof patching work that could affect indoor air quality or activate smoke detectors in the ductwork.
- C. During cutting/patching/flashing operations, have sufficient and suitable materials on-site to facilitate rapid installation of temporary protection in the event of unexpected rain.
- D. Maintain roof drains in functioning condition to ensure roof drainage at end of each workday. Prevent debris from entering or blocking roof drains and conductors. Use roof-drain plugs specifically designed for this purpose. Remove roof-drain plugs at end of each workday, when no work is taking place, or when rain is forecast.

3.2 ROOF CUTTING AND PATCHING

- A. General: Coordinate with Division 15 for opening schedule and final opening sizes.
- B. Remove existing abandoned flashing system components down to the deck.
- C. Remove fasteners from deck or cut fasteners off slightly above deck surface.

3.3 DECK PREPARATION

- A. Inspect deck after partial tear-off of membrane roofing system.
 1. Verify that concrete substrate is visibly dry and free of moisture. Test for capillary moisture by plastic sheet method according to ASTM D 4263. Do not proceed with roofing work if moisture condenses under the plastic sheet.
- B. If deck surface is not suitable for receiving new roofing, or if structural integrity of deck is suspect, immediately notify Architect. Do not proceed with installation until directed by Architect.

3.4 INSPECTION OF EXISTING DECK

- A. Immediately after removal of selected portions of existing membrane roofing system, and inspection and repair, if needed, of deck, fill in the tear-off areas to match existing membrane roofing system construction.
 1. Provide temporary protection during installation of new curbs.

3.5 ROOFING INSTALLATION

- A. General Responsibility: Perform no work in conflict with, contrary to, or below standards established by roofing or membrane materials manufacturer. After starting work, roofer is responsible for complete water integrity of membranes, checking work installed on roof and other membranes, and for properly applied membrane. Therefore roofer shall:
 1. Not apply membranes or other work under conditions which are not proper and in best recommended practices, including surfaces or weather.
 2. Review drawings and specification requirements and establish control and test procedures to insure compliance.
 3. Exercise care to insure adequate quantities of materials are used.
 4. Maintain competent foreman continuously supervising work, with authority to discard unsuitable materials or remove unsatisfactory workmen.

5. Supervise installation of and be responsible for seeing that drains, curbs and other work are properly set and roof is not damaged; make roof and flashing repairs as necessary.

3.6 ROOF INSULATION

- A. Loosely lay roof insulation with joints staggered. Stagger joints between layers, minimum of 2 layers. Insulation joints shall be 1/4 inch or less in width. Neatly cut and fit insulation around roof penetrations and projections. Install only dry insulation and only as much insulation as can be covered same day with membrane.
- B. Install tapered insulation around roof drains to provide proper slope for drainage.
- C. Fiberboard Roof Insulation: Place immediately under roofing membrane with joints staggered from insulation below.
- D. Secure insulation boards with fasteners and insulation plates to roof deck with, minimum 1/2 inch fastener penetration through deck using minimum of 16 fasteners per 4 foot by 8 foot board and with additional fasteners at perimeter and corners as required by FM 1-90.

3.7 WOOD NAILERS

- A. Wood nailer height shall match total thickness height of insulation being used and shall be installed with 1/8 inch gap between each length of wood nailer.
- B. Fasten wood nailers to deck or wall at maximum 16 inches on center to resist force of 200 pounds per foot in any direction.
- C. Where nailers are required to be flush at point of contact with roofing membrane, taper wood nailers.

3.8 MEMBRANE INSTALLATION

- A. Loosely lay field membrane sheets over substrate without stretching and allow to relax 30 minutes before bonding, splicing or attachment. Lap sides and ends of adjoining sheets minimum of 3 inches.
- B. Evenly fold each sheet back on itself so as to expose underside. Apply bonding adhesive evenly to both substrate and membrane. Apply in sequence to allow equal drying time for both exposed membrane and substrate. Allow to dry until such time when adhesive will not stick or string when touched by dry finger. Starting at fold of sheet, slowly roll coated membrane onto coated substrate evenly in order to prevent wrinkles. Compress with stiff push broom to assure full contact.
- C. As protection, install additional layer of roof membrane material under roof pavers.

3.9 LAP SPLICE

- A. After membrane sheet has been positioned to provide minimum overlaps as specified, top sheet at overlap shall be folded back approximately 10 to 12 inches to allow for cleaning of membrane surfaces to be spliced. Clean mating surfaces with clear splice wash or splice primer wash and allow to dry.
- B. Evenly apply splice adhesive at manufacturer's recommended rate.
- C. Allow adhesive to dry until it does not stick or string when touched by dry finger. Roll top sheet towards lap area until two surfaces begin to meet, and then allow top sheet to fall freely onto bottom sheet so that stretching or wrinkling of membrane is prevented. Apply hand pressure along entire length of splice. Roll entire lap with hard rubber roller, applying firm and even pressure.
- D. Prime edge of completed seam with brush application of splice adhesive, and apply continuous bead of lap sealant along edge.

3.10 FLASHING

- A. Install flashing at roof penetrations at new electrical conduit feed, using longest flashing pieces possible. Flashing shall extend vertically minimum of 8 inches.
 - 1. Complete splice between flashing and roof membrane before bonding or attaching flashing to vertical surfaces.
 - 2. Install flashing at round penetrations, pipes, and conduits.
 - 3. .

3.11 FIELD QUALITY CONTROL

- A. Final Roof Inspection: Arrange for roofing system manufacturer's technical personnel to inspect roofing installation on completion and submit report to Architect.
- B. Repair or remove and replace components of roofing system where test results or inspections indicate that they do not comply with specified requirements.
- C. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

3.12 DISPOSAL

- A. Collect and place demolished materials in containers. Promptly dispose of demolished materials. Do not allow demolished materials to accumulate on-site.
 - 1. Storage or sale of demolished items or materials on-site will not be permitted.
- B. Transport demolished materials off Owner's property and legally dispose of them.

END OF SECTION

SECTION 230500 COMMON WORK RESULTS FOR HVAC

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Piping materials and installation instructions common to most piping systems.
 - 2. HVAC demolition.
 - 3. Equipment installation requirements common to equipment sections.
 - 4. Supports and anchorages.

1.3 BASIS-OF-DESIGN

- A. Equipment manufacturers listed on the equipment schedules are the basis-of-design. Manufacturers listed in the specification other than the basis-of design manufacture are acceptable substitutions. Equipment schedules are on the drawings. Refer to specifications for unscheduled equipment.

1.4 DEFINITIONS

- A. Finished Spaces: Spaces other than mechanical and electrical equipment rooms, furred spaces, pipe and duct chases, unheated spaces immediately below roof, spaces above ceilings, unexcavated spaces, crawlspaces, and tunnels.
- B. Exposed, Interior Installations: Exposed to view indoors. Examples include finished occupied spaces and mechanical equipment rooms.
- C. Exposed, Exterior Installations: Exposed to view outdoors or subject to outdoor ambient temperatures and weather conditions. Examples include rooftop locations.
- D. Concealed, Interior Installations: Concealed from view and protected from physical contact by building occupants. Examples include above ceilings and chases.
- E. Concealed, Exterior Installations: Concealed from view and protected from weather conditions and physical contact by building occupants but subject to outdoor ambient temperatures. Examples include installations within unheated shelters.
- F. The following are industry abbreviations for rubber materials:
 - 1. EPDM: Ethylene-propylene-diene terpolymer rubber.
 - 2. NBR: Acrylonitrile-butadiene rubber.

1.5 SUBMITTALS

- A. Equipment startup reports.
 - 1. Reports will indicate equipment was started and tested according to the manufactures recommendations and is operating as specified. Included test data.
- B. Pre-demolition test reports.

1.6 QUALITY ASSURANCE

- A. Comply with ASHRAE Guideline 4 – 2008 Preparation of operating and maintenance documentation for building systems.
- B. Steel Support Welding: Qualify processes and operators according to AWS D1.1, "Structural Welding Code--Steel."
- C. Steel Pipe Welding: Qualify processes and operators according to ASME Boiler and Pressure Vessel Code: Section IX, "Welding and Brazing Qualifications."
 - 1. Comply with provisions in ASME B31 Series, "Code for Pressure Piping."
 - 2. Certify that each welder has passed AWS qualification tests for welding processes involved and that certification is current.
- D. Electrical Characteristics for HVAC Equipment: Equipment of higher electrical characteristics may be furnished provided such proposed equipment is approved in writing and connecting electrical services, circuit breakers, and conduit sizes are appropriately modified. If minimum energy ratings or efficiencies are specified, equipment shall comply with requirements.

1.7 GUIDELINES, CODES AND STANDARDS

- A. Refer to the most recently published edition for references to guidelines, and standards (examples: ASHRAE, NFPA, AWWA, ASTM) unless a specific edition is listed.
- B. Installation and materials shall comply with applicable national, state, and local codes and ordinances.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Deliver pipes and tubes with factory-applied end caps. Maintain end caps through shipping, storage, and handling to prevent pipe end damage and to prevent entrance of dirt, debris, and moisture.
- B. Materials and equipment stored on site shall have a protective covering; open ends on equipment connections and ducts shall be covered. Duct liner shall be encapsulated.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. In other Part 2 articles where subparagraph titles below introduce lists, the following requirements apply for product selection:
 - 1. Manufacturers: Subject to compliance with requirements, provide products by the manufacturers specified.

2.2 PIPE, TUBE, AND FITTINGS

- A. Refer to individual Division 23 piping Sections for pipe, tube, and fitting materials and joining methods.
- B. Pipe Threads: ASME B1.20.1 for factory-threaded pipe and pipe fittings.

2.3 JOINING MATERIALS

- A. Refer to individual Division 23 piping Sections for special joining materials not listed below.
- B. Solder Filler Metals: ASTM B 32, lead-free alloys. Include water-flushable flux according to ASTM B 813.

PART 3 EXECUTION

3.1 HVAC DEMOLITION

- A. Refer to Division 01 Section "Cutting and Patching" for general demolition requirements and procedures.
- B. Coordinate with owner and schedule disconnection and removal of equipment to minimize disruption to building users operation. Schedule of all work to be approved by owner prior to start of work.
- C. Disconnect, demolish, and remove HVAC systems, equipment, and components indicated to be removed.
 - 1. Piping to Be Removed: Remove portion of piping indicated to be removed and cap or plug remaining piping with same or compatible piping material.
 - 2. Equipment to Be Removed: Disconnect and cap services and remove equipment.
- D. If pipe or equipment to remain is damaged in appearance or is unserviceable, remove damaged or unserviceable portions and replace with new products of equal capacity and quality.

3.2 PIPING SYSTEMS - COMMON REQUIREMENTS

- A. Install piping according to the following requirements and Division 23 Sections specifying piping systems.
- B. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated unless deviations to layout are approved on Coordination Drawings.
- C. Install piping at right angles or parallel to equipment sides and building walls. Diagonal runs are prohibited unless specifically indicated otherwise.
- D. Install piping to permit valve servicing.
- E. Install piping free of sags and bends.
- F. Install fittings for changes in direction and branch connections.
- G. Verify final equipment locations for roughing-in.
- H. Refer to equipment specifications in other Sections of these Specifications for roughing-in requirements.

3.3 PIPING JOINT CONSTRUCTION

- A. Join pipe and fittings according to the following requirements and Division 23 Sections specifying piping systems.
- B. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.
- C. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.
- D. Soldered Joints: Apply ASTM B 813, water-flushable flux, unless otherwise indicated, to tube end. Construct joints according to ASTM B 828 or CDA's "Copper Tube Handbook," using lead-free solder alloy complying with ASTM B 32.
- E. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:

1. Apply appropriate tape or thread compound to external pipe threads unless dry seal threading is specified.
2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.

3.4 PIPING CONNECTIONS

- A. Make connections according to the following, unless otherwise indicated:
 1. Install unions, in steel piping NPS 2 and smaller, adjacent to each valve and at final connection to each piece of equipment.

3.5 EQUIPMENT INSTALLATION - COMMON REQUIREMENTS

- A. Install HVAC equipment according to the equipment manufacturer's installation instructions and as indicated on the drawings. Resolve conflicting instructions, with the architect before mounting equipment.
- B. Install equipment to allow maximum possible headroom unless specific mounting heights are indicated.
- C. Install equipment level and plumb, parallel and perpendicular to other building systems and components in exposed interior spaces, unless otherwise indicated.
- D. Install HVAC equipment to facilitate service, maintenance, and repair or replacement of components. Connect equipment for ease of disconnecting, with minimum interference to other installations.
- E. Refer to equipment shop drawings for rough in locations; do not scale drawings.

3.6 PAINTING

- A. Damage and Touchup: Repair marred and damaged factory-painted finishes with materials and procedures to match original factory finish.

END OF SECTION

SECTION 230513 COMMON MOTOR REQUIREMENTS FOR HVAC EQUIPMENT

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes general requirements for single-phase and polyphase, general-purpose, horizontal, small and medium, squirrel-cage induction motors for use on ac power systems up to 600 V and installed at equipment manufacturer's factory or shipped separately by equipment manufacturer for field installation.

1.3 COORDINATION

- A. Coordinate features of motors, installed units, and accessory devices to be compatible with the following:
 - 1. Motor controllers.
 - 2. Torque, speed, and horsepower requirements of the load.
 - 3. Ratings and characteristics of supply circuit and required control sequence.
 - 4. Ambient and environmental conditions of installation location.

PART 2 PRODUCTS

2.1 GENERAL MOTOR REQUIREMENTS

- A. Comply with requirements in this Section except when stricter requirements are specified in HVAC equipment schedules or Sections.
- B. Comply with current NEMA MG 1 unless otherwise indicated.

2.2 MOTOR CHARACTERISTICS

- A. Duty: Continuous duty at ambient temperature of 40 deg C and at altitude of 3300 feet above sea level.
- B. Capacity and Torque Characteristics: Sufficient to start, accelerate, and operate connected loads at designated speeds, at installed altitude and environment, with indicated operating sequence, and without exceeding nameplate ratings or considering service factor.

2.3 POLYPHASE MOTORS

- A. Description: NEMA MG 1-2006, Design B, medium induction motor.
- B. Efficiency: Premium Efficiency, as defined in NEMA MG 1-2006.
- C. Service Factor: 1.15.
- D. Rotor: Random-wound, squirrel cage.
- E. Bearings: Re-greasable, shielded, antifriction ball bearings suitable for radial and thrust loading.
- F. Temperature Rise: Match insulation rating.

- G. Insulation: Class F.
- H. Code Letter Designation:
 - 1. Motors 15 HP and Larger: NEMA starting Code F or Code G.
 - 2. Motors Smaller than 15 HP: Manufacturer's standard starting characteristic.
- I. Enclosure Material: Cast iron for motor frame sizes [324T] and larger; rolled steel for motor frame sizes smaller than [324T].
- J. Shaft: Grounded

2.4 SINGLE-PHASE MOTORS

- A. Motors larger than 1/20 hp shall be one of the following, to suit starting torque and requirements of specific motor application:
 - 1. Permanent-split capacitor.
 - 2. Split phase.
 - 3. Capacitor start, inductor run.
 - 4. Capacitor start, capacitor run.
- B. Bearings: Prelubricated, antifriction ball bearings or sleeve bearings suitable for radial and thrust loading.
- C. Motors 1/20 HP and Smaller: Shaded-pole type.
- D. Thermal Protection: Internal protection to automatically open power supply circuit to motor when winding temperature exceeds a safe value calibrated to temperature rating of motor insulation. Thermal-protection device shall automatically reset when motor temperature returns to normal range.

END OF SECTION

SECTION 230593 TESTING, ADJUSTING, AND BALANCING FOR HVAC

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Balancing Air Systems:
 - a. Constant-volume air systems.
 - 2. Reporting results of activities and procedures specified in this Section.

1.3 DEFINITIONS

- A. Adjust: To regulate fluid flow rate and air patterns at the terminal equipment, such as to reduce fan speed or adjust a damper.
- B. Balance: To proportion flows within the distribution system, including sub mains, branches, and terminals, according to indicated quantities.
- C. Barrier or Boundary: Construction, either vertical or horizontal, such as walls, floors, and ceilings that are designed and constructed to restrict the movement of airflow, smoke, odors, and other pollutants.
- D. Draft: A current of air, when referring to localized effect caused by one or more factors of high air velocity, low ambient temperature, or direction of airflow, whereby more heat is withdrawn from a person's skin than is normally dissipated.
- E. Procedure: An approach to and execution of a sequence of work operations to yield repeatable results.
- F. Report Forms: Test data sheets for recording test data in logical order.
- G. System Effect: A phenomenon that can create undesired or unpredicted conditions that cause reduced capacities in all or part of a system.
- H. System Effect Factors: Allowances used to calculate a reduction of the performance ratings of a fan when installed under conditions different from those presented when the fan was performance tested.
- I. TAB: Testing, adjusting, and balancing.
- J. Terminal: A point where the controlled medium, such as fluid or energy, enters or leaves the distribution system.
- K. Test: A procedure to determine quantitative performance of systems or equipment.
- L. Testing, Adjusting, and Balancing (TAB) Firm: The entity responsible for performing and reporting TAB procedures.
- M. AABC: Associated Air Balance Council.
- N. NEBB: National Environmental Balancing Bureau.

- O. TAB: Testing, adjusting, and balancing.
- P. TABB: Testing, Adjusting, and Balancing Bureau.
- Q. TAB Specialist: An entity engaged to perform TAB Work.

1.4 SUBMITTALS

- A. Qualification Data: Within 15 days of Contractor's Notice to Proceed, submit documentation that the TAB contractor and this Project's TAB team members meet the qualifications specified in "Quality Assurance" Article.
- B. Contract Documents Examination Report: Within 15 days of Contractor's Notice to Proceed, submit the Contract Documents review report as specified in Part 3.
- C. Strategies and Procedures Plan: Within 30 days of Contractor's Notice to Proceed, submit TAB strategies and step-by-step procedures as specified in "Preparation" Article.
- D. Certified TAB Reports: Submit two copies of reports prepared, as specified in this Section, on approved forms certified by TAB firm.
- E. Sample Report Forms: Submit two sets of sample TAB report forms.
- F. Warranties specified in this Section.

1.5 QUALITY ASSURANCE

- A. TAB Contractor Qualifications: Engage a TAB entity certified by either AABC or NEBB.
 - 1. TAB Technician: Employee of the TAB contractor and who is certified by AABC, NEBB, or TABB as a TAB technician.
- B. TAB Report Forms: Use standard forms from AABC's "National Standards for Testing and Balancing Heating, Ventilating, and Air Conditioning Systems." or NEBB's "Procedural Standards for Testing, Adjusting, and Balancing of Environmental Systems.
- C. Instrumentation Type, Quantity, and Accuracy: As described in AABC's "National Standards for Testing and Balancing Heating, Ventilating, and Air Conditioning Systems or NEBB's " Procedural Standards for Testing, Adjusting, and Balancing of Environmental Systems, "Section II, " Required Instrumentation for NEBB Certification."
- D. Instrumentation Calibration: Calibrate instruments at least every six months or more frequently if required by instrument manufacturer.
 - 1. Keep an updated record of instrument calibration that indicates date of calibration and the name of party performing instrument calibration.
- E. ASHRAE Compliance: Applicable requirements in ASHRAE 62.1, Section 7.2.2 - "Air Balancing."
- F. ASHRAE/IESNA Compliance: Applicable requirements in ASHRAE/IESNA 90.1, Section 6.7.2.3 - "System Balancing."

1.6 PROJECT CONDITIONS

- A. Full Owner Occupancy: Owner will occupy the site and existing building during entire TAB period. Cooperate with Owner during TAB operations to minimize conflicts with Owner's operations.

1.7 COORDINATION

- A. Coordinate the efforts of factory-authorized service representatives for systems and equipment, HVAC controls installers, and other mechanics to operate HVAC systems and equipment to support and assist TAB activities.

- B. Notice: Provide seven days' advance notice for each test. Include scheduled test dates and times.
- C. Coordinate with owner and schedule testing and balancing work to minimize disruption to building users operation. Schedule of all work to be approved by owner prior to start of work.
- D.

PART 2 PRODUCTS (Not Applicable)

PART 3 EXECUTION

3.1 EXAMINATION

- A. Examine the Contract Documents to become familiar with Project requirements and to discover conditions in systems' designs that may preclude proper TAB of systems and equipment.
- B. Examine the approved submittals for HVAC systems and equipment.
- C. Examine design data including HVAC system descriptions, statements of design assumptions for environmental conditions and systems' output, and statements of philosophies and assumptions about HVAC system and equipment controls.
- D. Examine equipment performance data including fan curves.
 - 1. Relate performance data to Project conditions and requirements, including system effects that can create undesired or unpredicted conditions that cause reduced capacities in all or part of a system.
 - 2. Calculate system-effect factors to reduce performance ratings of HVAC equipment when installed under conditions different from the conditions used to rate equipment performance. To calculate system effects for air systems, use tables and charts found in AMCA 201, "Fans and Systems," or in SMACNA's "HVAC Systems - Duct Design." Compare results with the design data and installed conditions.
- E. Examine system and equipment installations and verify that field quality-control testing, cleaning, and adjusting specified in individual Sections have been performed.
- F. Examine test reports specified in individual system and equipment Sections.
- G. Examine HVAC equipment and filters and verify that bearings are greased, belts are aligned and tight, and equipment with functioning controls is ready for operation.
- H. Examine operating safety interlocks and controls on HVAC equipment.
- I. Report deficiencies discovered before and during performance of TAB procedures. Observe and record system reactions to changes in conditions. Record default set points if different from indicated values.

3.2 PREPARATION

- A. Prepare a TAB plan that includes strategies and step-by-step procedures.
- B. Complete system-readiness checks and prepare reports. Verify the following:
 - 1. Permanent electrical-power wiring is complete.
 - 2. Automatic temperature-control systems are operational.

3.3 GENERAL PROCEDURES FOR TESTING AND BALANCING

- A. Perform testing and balancing procedures on each system according to the procedures contained in AABC's "National Standards for Total System Balance" or NEBB's "Procedural Standards for Testing, Adjusting, and Balancing of Environmental Systems" and in this Section.
 - 1. Comply with requirements in ASHRAE 62.1, Section 7.2.2 - "Air Balancing."
- B. Take and report testing and balancing measurements in inch-pound (IP) units.

3.4 GENERAL PROCEDURES FOR BALANCING AIR SYSTEMS

- A. Prepare test reports for fans. Obtain manufacturer's outlet factors and recommended testing procedures. Crosscheck the summation of required outlet volumes with required fan volumes.
- B. Locate start-stop and disconnect switches, electrical interlocks, and motor starters.
- C. Verify that motor starters are equipped with properly sized thermal protection.
- D. Check dampers for proper position to achieve desired airflow path.
- E. Check for airflow blockages.
- F. Check condensate drains for proper connections and functioning.
- G. Check for proper sealing of air-handling-unit components.

3.5 PROCEDURES FOR CONSTANT-VOLUME AIR SYSTEMS

- A. Adjust fans to deliver total indicated airflows within the maximum allowable fan speed listed by fan manufacturer.
 - 1. Measure total airflow.
 - a. Where sufficient space in ducts is unavailable for Pitot-tube traverse measurements, measure airflow at terminal outlets and inlets and calculate the total airflow.
 - 2. Measure fan static pressures as follows to determine actual static pressure:
 - a. Measure outlet static pressure as far downstream from the fan as practical and upstream from restrictions in ducts such as elbows and transitions.
 - b. Measure static pressure directly at the fan outlet or through the flexible connection.
 - c. Measure inlet static pressure of single-inlet fans in the inlet duct as near the fan as possible, upstream from the flexible connection, and downstream from duct restrictions.
 - d. Measure inlet static pressure of double-inlet fans through the wall of the plenum that houses the fan.
 - 3. Measure static pressure across each component that makes up an air-handling unit, rooftop unit, and other air-handling and -treating equipment.
 - a. Report the cleanliness status of filters and the time static pressures are measured.
 - 4. Obtain approval from Architect for adjustment of fan speed higher or lower than indicated speed. Comply with requirements in HVAC Sections for air-handling units for adjustment of fans, belts, and pulley sizes to achieve indicated air-handling-unit performance.
 - 5. Do not make fan-speed adjustments that result in motor overload. Consult equipment manufacturers about fan-speed safety factors. Modulate dampers and measure fan-motor amperage to ensure that no overload will occur. Measure amperage in full-cooling, full-heating, economizer, and any other operating mode to determine the maximum required brake horsepower.

3.6 PROCEDURES FOR MOTORS

- A. Motors, 1/2 HP and Larger: Test at final balanced conditions and record the following data:
 - 1. Manufacturer's name, model number, and serial number.
 - 2. Motor horsepower rating.
 - 3. Motor rpm.
 - 4. Efficiency rating.

5. Nameplate and measured voltage, each phase.
 6. Nameplate and measured amperage, each phase.
 7. Starter thermal-protection-element rating.
- B. Motors Driven by Variable-Frequency Controllers: Test for proper operation at speeds varying from minimum to maximum. Test the manual bypass of the controller to prove proper operation. Record observations including name of controller manufacturer, model number, serial number, and nameplate data.

3.7 PROCEDURES FOR CONDENSING UNITS

- A. Verify proper rotation of fans.
- B. Measure entering- and leaving-air temperatures.
- C. Record compressor data.

3.8 PROCEDURES FOR HEAT-TRANSFER COILS

- A. Measure, adjust, and record the following data for each refrigerant coil:
1. Dry-bulb temperature of entering and leaving air.
 2. Wet-bulb temperature of entering and leaving air.
 3. Airflow.
 4. Air pressure drop.
 5. Refrigerant suction pressure and temperature.

3.9 PROCEDURES FOR TEMPERATURE MEASUREMENTS

- A. During TAB, report the need for adjustment in temperature regulation within the automatic temperature-control system.
- B. Measure indoor wet- and dry-bulb temperatures every other hour for a period of two successive eight-hour days, in each separately controlled zone, to prove correctness of final temperature settings. Measure when the building or zone is occupied.
- C. Measure outside-air, wet- and dry-bulb temperatures.

3.10 TOLERANCES

- A. Set HVAC system's air flow rates and water flow rates within the following tolerances:
1. Supply, Return, and Exhaust Fans and Equipment with Fans: Plus 5 to plus 10 percent.

3.11 REPORTING

- A. Initial Construction-Phase Report: Based on examination of the Contract Documents as specified in "Examination" Article, prepare a report on the adequacy of design for systems' balancing devices. Recommend changes and additions to systems' balancing devices to facilitate proper performance measuring and balancing. Recommend changes and additions to HVAC systems and general construction to allow access for performance measuring and balancing devices.
- B. Status Reports: As work progress prepare progress reports to describe completed procedures, procedures in progress, and scheduled procedures. Include a list of deficiencies and problems found in systems being tested and balanced. Prepare a separate report for each system and each building floor for systems serving multiple floors.

3.12 FINAL REPORT

- A. General: Prepare a certified written report; tabulate and divide the report into separate sections for tested systems and balanced systems.

1. Include a certification sheet at the front of the report's binder, signed and sealed by the certified testing and balancing engineer.
 2. Include a list of instruments used for procedures, along with proof of calibration.
- B. Final Report Contents: In addition to certified field-report data, include the following:
1. Fan curves.
 2. Manufacturers' test data.
 3. Field test reports prepared by system and equipment installers.
 4. Other information relative to equipment performance; do not include Shop Drawings and product data.
- C. General Report Data: In addition to form titles and entries, include the following data:
1. Title page.
 2. Name and address of the TAB contractor.
 3. Project name.
 4. Project location.
 5. Architect's name and address.
 6. Engineer's name and address.
 7. Contractor's name and address.
 8. Report date.
 9. Signature of TAB supervisor who certifies the report.
 10. Nomenclature sheets for each item of equipment.
 11. Notes to explain why certain final data in the body of reports vary from indicated values.
 12. Test conditions for fan performance forms including the following:
 - a. Settings for outdoor-, return-, and exhaust-air dampers.
 - b. Conditions of filters.
 - c. Cooling coil, wet- and dry-bulb conditions.
 - d. Fan drive settings including settings and percentage of maximum pitch diameter.
 - e. Settings for supply-air, static-pressure controller.
 - f. Other system operating conditions that affect performance.
- D. Gas- and Oil-Fired Heat Apparatus Test Reports: In addition to manufacturer's factory startup equipment reports, include the following:
1. Unit Data:
 - a. System identification.
 - b. Location.
 - c. Make and type.
 - d. Model number and unit size.
 - e. Manufacturer's serial number.
 - f. Fuel type in input data.
 - g. Output capacity in Btuh.
 - h. Ignition type.
 - i. Burner-control types.
 - j. Motor horsepower and rpm.
 - k. Motor volts, phase, and hertz.
 - l. Motor full-load amperage and service factor.
 - m. Sheave make, size in inches, and bore.
 - n. Sheave dimensions, center-to-center, and amount of adjustments in inches.
 2. Test Data (Indicated and Actual Values):
 - a. Total airflow rate in cfm.
 - b. Entering-air temperature in degrees F.
 - c. Leaving-air temperature in degrees F.
 - d. Air temperature differential in degrees F.
 - e. Entering-air static pressure in inches w.g.
 - f. Leaving-air static pressure in inches w.g.
 - g. Air static-pressure differential in inches w.g.
 - h. Low-fire fuel input in Btuh.
 - i. High-fire fuel input in Btuh.

- j. Manifold pressure in psig.
 - k. High-temperature-limit setting in degrees F.
 - l. Operating set point in Btuh.
 - m. Motor voltage at each connection.
 - n. Motor amperage for each phase.
 - o. Heating value of fuel in Btuh.
- E. Fan Test Reports: For supply, return, and exhaust fans, include the following:
1. Fan Data:
 - a. System identification.
 - b. Location.
 - c. Make and type.
 - d. Model number and size.
 - e. Manufacturer's serial number.
 - f. Arrangement and class.
 - g. Sheave make, size in inches, and bore.
 - h. Sheave dimensions, center-to-center, and amount of adjustments in inches.
 2. Motor Data:
 - a. Make and frame type and size.
 - b. Horsepower and rpm.
 - c. Volts, phase, and hertz.
 - d. Full-load amperage and service factor.
 - e. Sheave make, size in inches, and bore.
 - f. Sheave dimensions, center-to-center, and amount of adjustments in inches.
 - g. Number of belts, make, and size.
 3. Test Data (Indicated and Actual Values):
 - a. Total airflow rate in cfm.
 - b. Total system static pressure in inches w.g.
 - c. Fan rpm.
 - d. Discharge static pressure in inches w.g.
 - e. Suction static pressure in inches w.g.
- F. Compressor and Condenser Reports: For refrigerant side of unitary systems, stand-alone refrigerant compressors, air-cooled condensing units, or water-cooled condensing units, include the following:
1. Unit Data:
 - a. Unit identification.
 - b. Location.
 - c. Unit make and model number.
 - d. Compressor make.
 - e. Compressor model and serial numbers.
 - f. Refrigerant weight in lb (kg).
 - g. Low ambient temperature cutoff in degrees F.
 2. Test Data (Indicated and Actual Values):
 - a. Inlet-duct static pressure in inches w.g.
 - b. Outlet-duct static pressure in inches w.g.
 - c. Entering-air, dry-bulb temperature in degrees F.
 - d. Leaving-air, dry-bulb temperature in degrees F.
 - e. Condenser entering-water temperature in degrees F.
 - f. Condenser leaving-water temperature in degrees F.
 - g. Condenser-water temperature differential in degrees F.
 - h. Condenser entering-water pressure in feet of head or psig.
 - i. Condenser leaving-water pressure in feet of head or psig.
 - j. Condenser-water pressure differential in feet of head or psig.
 - k. Control settings.
 - l. Unloader set points.
 - m. Low-pressure-cutout set point in psig.
 - n. High-pressure-cutout set point in psig.

- o. Suction pressure in psig.
- p. Suction temperature in degrees F.
- q. Condenser refrigerant pressure in psig.
- r. Condenser refrigerant temperature in degrees F.
- s. Oil pressure in psig.
- t. Oil temperature in degrees F.
- u. Voltage at each connection.
- v. Amperage for each phase.
- w. Kilowatt input.
- x. Crankcase heater kilowatt.
- y. Number of fans.
- z. Condenser fan rpm.
- aa. Condenser fan airflow rate in cfm.
- bb. Condenser fan motor make, frame size, rpm, and horsepower.
- cc. Condenser fan motor voltage at each connection.
- dd. Condenser fan motor amperage for each phase.

3.13 INSPECTIONS

- A. Inspection:
 - 1. After testing and balancing are complete, operate each system and randomly check measurements to verify that the system is operating according to the final test and balance readings documented in the final report.
 - 2. Check the following for each system:
 - a. Measure room temperature at each thermostat/temperature sensor. Compare the reading to the set point.
 - b. Note deviations from the Contract Documents in the final report.
 - B. Prepare test and inspection reports.
 - C. Within 90 days of completing TAB, perform additional TAB to verify that balanced conditions are being maintained throughout and to correct unusual conditions.
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SECTION 231123 FACILITY NATURAL-GAS PIPING

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Pipes, tubes, and fittings.
 - 2. Piping and tubing joining materials.
 - 3. Valves.

1.3 DEFINITIONS

- A. Finished Spaces: Spaces other than mechanical and electrical equipment rooms, furred spaces, pipe and duct shafts, unheated spaces immediately below roof, spaces above ceilings, unexcavated spaces, crawlspaces, and tunnels.
- B. Exposed, Interior Installations: Exposed to view indoors. Examples include finished occupied spaces and mechanical equipment rooms.
- C. Exposed, Exterior Installations: Exposed to view outdoors or subject to outdoor ambient temperatures and weather conditions. Examples include rooftop locations.
- D. Low Pressure Gas System (LPG): Systems that operate at pressures not exceeding 14-inches water column.

1.4 PERFORMANCE REQUIREMENTS

- A. Minimum Operating-Pressure Ratings:
 - 1. Piping and Valves: 125 psig minimum unless otherwise indicated.
- B. Natural-Gas System Pressures within Buildings: Two pressure ranges. Primary pressure is more than 0.5 psig but not more than 2 psig, and is reduced to secondary pressure of 0.5 psig or less.

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of the following:
 - 1. Piping specialties.
 - 2. Valves. Include pressure rating, capacity, settings, and electrical connection data of selected models.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver pipes and tubes with factory-applied end caps. Maintain end caps through shipping, storage, and handling to prevent pipe end damage and to prevent entrance of dirt, debris, and moisture.

1.7 PROJECT CONDITIONS

- A. Interruption of Existing Natural-Gas Service: Do not interrupt natural-gas service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide purging and startup of natural-gas supply according to requirements indicated:
 - 1. Notify Owner no fewer than two days in advance of proposed interruption of natural-gas service.
 - 2. Do not proceed with interruption of natural-gas service without Owner's written permission.
- B. Coordinate with owner and schedule installation of new gas piping to minimize disruption to building users operation. Schedule of all work to be approved by owner prior to start of work.

PART 2 PRODUCTS

2.1 PIPES, TUBES, AND FITTINGS

- A. Steel Pipe: ASTM A 53/A 53M, black steel, Schedule 40, Type E or S, Grade B.
 - 1. Malleable-Iron Threaded Fittings: ASME B16.3, Class 150, standard pattern.
 - 2. Unions: ASME B16.39, Class 150, malleable iron with brass-to-iron seat, ground joint, and threaded ends.

2.2 JOINING MATERIALS

- A. Joint Compound and Tape: Suitable for natural gas.

2.3 MANUAL GAS SHUTOFF VALVES

- A. General Requirements for Metallic Valves, NPS 2 and Smaller: Comply with ASME B16.33.
 - 1. CWP Rating: 125 psig.
 - 2. Threaded Ends: Comply with ASME B1.20.1.
 - 3. Listing: Listed and labeled by an NRTL acceptable to authorities having jurisdiction for valves 1 inch and smaller.
 - 4. Service: Suitable for natural-gas service with "WOG" indicated on valve body.
- B. Two-Piece, Full-Port, Bronze Ball Valves with Bronze Trim: MSS SP-110.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. BrassCraft Manufacturing Company; a Masco company. (www.brasscraft.com)
 - b. Conbraco Industries, Incorporated; Apollo Division (www.apollovalves.com)
 - c. Lyall, R. W. & Company, Incorporated (www.rwlyall.com)
 - d. McDonald, A. Y. Mfg. Co. (www.aymcdonald.com)
 - 2. Body: Bronze, complying with ASTM B 584.
 - 3. Ball: Chrome-plated bronze.
 - 4. Stem: Bronze; blowout proof.
 - 5. Seats: Reinforced TFE; blowout proof.
 - 6. Packing: Threaded-body pack nut design with adjustable-stem packing.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Examine roughing-in for natural-gas piping system to verify actual locations of piping connections before equipment installation.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Close equipment shutoff valves before turning off natural gas to premises or piping section.
- B. Inspect natural-gas piping according to the International Fuel Gas Code to determine that natural-gas utilization devices are turned off in piping section affected.
- C. Comply with the International Fuel Gas Code requirements for prevention of accidental ignition.

3.3 OUTDOOR PIPING INSTALLATION

- A. Comply with the International Fuel Gas Code for installation and purging of natural-gas piping.
- B. Install fittings for changes in direction and branch connections.

3.4 VALVE INSTALLATION

- A. Install manual gas shutoff valve for each gas appliance.

3.5 PIPING JOINT CONSTRUCTION

- A. Ream ends of pipes and tubes and remove burrs.
- B. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.
- C. Threaded Joints:
 - 1. Thread pipe with tapered pipe threads complying with ASME B1.20.1.
 - 2. Cut threads full and clean using sharp dies.
 - 3. Ream threaded pipe ends to remove burrs and restore full inside diameter of pipe.
 - 4. Apply appropriate tape or thread compound to external pipe threads unless Dryseal threading is specified.
 - 5. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.

3.6 CONNECTIONS

- A. Connect piping to appliances using manual gas shutoff valves and unions. Install valve within 72 inches of each gas-fired appliance and equipment. Install union between valve and appliances or equipment.
- B. Sediment Traps: Install tee fitting with capped nipple in bottom to form drip, as close as practical to inlet of each appliance.

3.7 FIELD QUALITY CONTROL

- A. Perform tests and inspections.
- B. Tests and Inspections:
 - 1. Test, inspect, and purge natural gas according to the International Fuel Gas Code and authorities having jurisdiction.
- C. Natural-gas piping will be considered defective if it does not pass tests and inspections.
- D. Prepare test and inspection reports.

3.8 OUTDOOR PIPING SCHEDULE

- A. Aboveground natural-gas piping shall be one of the following:
 - 1. Steel pipe with malleable-iron fittings and threaded joints.

3.9 ABOVEGROUND MANUAL GAS SHUTOFF VALVE SCHEDULE

- A. Valves in branch piping for single appliance shall be the following:
1. Two-piece, full-port, bronze ball valves with bronze trim.

END OF SECTION

SECTION 232113 HYDRONIC PIPING

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes pipe and fitting materials and joining methods for the following:
 - 1. Condensate-drain piping.

PART 2 PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Hydronic piping components and installation shall be capable of withstanding the following minimum working pressure and temperature unless otherwise indicated:
 - 1. Condensate-Drain Piping: 150 degrees F.

2.2 COPPER TUBE AND FITTINGS

- A. Manufacturers: Subject to compliance with requirements, provide copper tubing and fittings manufactured by one of the following:
 - a. Cambridge-Lee Industries Incorporated.
 - b. Cerro Flow Products Incorporated.
 - c. Mueller Industries Incorporated.
 - d. Nibco Incorporated
- B. DWV Copper Tubing: ASTM B 306, Type DWV.

2.3 JOINING MATERIALS

- A. Solder Filler Metals: ASTM B 32, lead-free alloys. Include water-flushable flux according to ASTM B 813.

PART 3 EXECUTION

3.1 PIPING APPLICATIONS

- A. Condensate-Drain Piping: Type DWV, drawn-temper copper tubing, wrought-copper fittings, and soldered joints.

3.2 PIPING INSTALLATIONS

- A. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicate piping locations and arrangements if such were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated unless deviations to layout are approved on Coordination Drawings.
- B. Install fittings for changes in direction and branch connections.

- C. Select system components with pressure rating equal to or greater than system operating pressure.
- D. Install drain traps for each condensate drain pan for cooling coils in roof top air handling units.
 - 1. For roof-mounted equipment, provide drain traps with vented water seal and a turned-down elbow to discharge on the roof.

3.3 PIPE JOINT CONSTRUCTION

- A. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.
- B. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.
- C. Soldered Joints: Apply ASTM B 813, water-flushable flux, unless otherwise indicated, to tube end. Construct joints according to ASTM B 828 or CDA's "Copper Tube Handbook," using lead-free solder alloy complying with ASTM B 32.

END OF SECTION

**SECTION 235100
BREECHINGS, CHIMNEYS, AND STACKS**

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Field-fabricated metal chimneys.

1.3 SUBMITTALS

- A. Product Data: For the following:
 - 1. Metal breechings and chimneys.

1.4 QUALITY ASSURANCE

- A. Source Limitations: Obtain listed system components through one source from a single manufacturer.

PART 2 PRODUCTS

2.1 FIELD-FABRICATED METAL BREECHINGS AND CHIMNEYS

- A. Fabricate freestanding chimneys according to SMACNA's "Guide for Steel Stack Design and Construction."
- B. Fabricate chimneys and vent connectors from galvanized steel, complying with NFPA 211 for minimum metal thickness.
 - 1. Equal to or Less Than 6 Inches in Diameter: 0.019 inch.
 - 2. Up to 10 Inches in Diameter: 0.024 inch.
 - 3. Up to 16 Inches in Diameter: 0.029 inch.
 - 4. Larger Than Above: 0.056 inch.
- C. Fabricate chimney vent rain caps from galvanized steel of thickness as vent material.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Examine areas and conditions for compliance with requirements for installation tolerances and other conditions affecting performance of work.
 - 1. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 APPLICATION

- A. Field-Fabricated Metal Breechings and Chimneys: Water heaters.

3.3 INSTALLATION OF UNLISTED, FIELD-FABRICATED BREECHINGS AND CHIMNEYS

- A. Suspend breechings and chimneys independent of their appliance connections.
- B. Install, support, and restrain according to seismic requirements.
- C. Align breechings at connections, with smooth internal surface and a maximum **1/8-inch** misalignment tolerance.
- D. Lap joints in direction of flow.
- E. Support breechings and chimneys from building structure with bolts, concrete inserts, steel expansion anchors, welded studs, C-clamps, or beam clamps according to manufacturer's written instructions.

3.4 CLEANING

- A. After completing system installation, including outlet fittings and devices, inspect exposed finish. Remove burrs, dirt, and construction debris and repair damaged finishes.
- B. Clean breechings internally, during and after installation, to remove dust and debris. Clean external surfaces to remove welding slag and mill film. Grind welds smooth and apply touchup finish to match factory or shop finish.

END OF SECTION

SECTION 237413
PACKAGED, OUTDOOR, CENTRAL-STATION AIR-HANDLING UNITS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes packaged, outdoor, central-station air-handling units (rooftop units) with the following components and accessories:
 - 1. Direct-expansion cooling.
 - 2. Gas furnace.
 - 3. Economizer outdoor- and return-air damper section.
 - 4. Roof curbs.
- B. Related Sections: The following Sections contain requirements that relate to this Section:
 - 1. Division 23 Section "Common Motor Requirements for HVAC Equipment".
- C. Products furnished, but not installed, under this Section include roof curbs for rooftop air conditioners.

1.3 DEFINITIONS

- A. DDC: Direct-digital controls.
- B. ECM: Electrically commutated motor.
- C. Outdoor-Air Refrigerant Coil: Refrigerant coil in the outdoor-air stream to reject heat during cooling operations and to absorb heat during heating operations. "Outdoor air" is defined as the air outside the building or taken from outdoors and not previously circulated through the system.
- D. Outdoor-Air Refrigerant-Coil Fan: The outdoor-air refrigerant-coil fan in RTU's. "Outdoor air" is defined as the air outside the building or taken from outdoors and not previously circulated through the system.
- E. RTU: Rooftop unit. As used in this Section, this abbreviation means packaged outdoor, central-station air-handling units. This abbreviation is used regardless of whether the unit is mounted on the roof or on a concrete base on ground.
- F. Supply-Air Fan: The fan providing supply air to conditioned space. "Supply air" is defined as the air entering a space from air-conditioning, heating, or ventilating apparatus.
- G. Supply-Air Refrigerant Coil: Refrigerant coil in the supply-air stream to absorb heat (provide cooling) during cooling operations and to reject heat (provide heating) during heating operations. "Supply air" is defined as the air entering a space from air-conditioning, heating, or ventilating apparatus.

1.4 SUBMITTALS

- A. Product Data: Include manufacturer's technical data for each model indicated, including rated capacities, dimensions, required clearances, characteristics, furnished specialties, and accessories.

- B. Shop Drawings: Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection. Prepare the following by or under the supervision of a qualified professional engineer:
 - 1. Detail mounting, securing, and flashing of roof curb to roof structure. Indicate coordinating requirements with roof membrane system.
 - 2. Wiring Diagrams: Power, signal, and control wiring.
- C. Field quality-control test reports.
- D. Operation and Maintenance Data: For rooftop air conditioners to include in emergency, operation, and maintenance manuals.
- E. Warranties: Special warranties specified in this Section.
- F. Startup Reports: Indicate results of startup and testing requirements. Submit copies of checklists.

1.5 QUALITY ASSURANCE

- A. Product Options: Drawings indicate size, profiles, and dimensional requirements of rooftop air conditioners and are based on the specific system indicated. Refer to Division 1 Section "Product Requirements."
- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- C. Fabricate and label refrigeration system to comply with ASHRAE 15, "Safety Code for Mechanical Refrigeration."
- D. Energy-Efficiency Ratio: Equal to or greater than prescribed by ASHRAE 90.1, "Energy Efficient Design of New Buildings except Low-Rise Residential Buildings."
- E. Coefficient of Performance: Equal to or greater than prescribed by ASHRAE 90.1, "Energy Efficient Design of New Buildings except Low-Rise Residential Buildings."
- F. Comply with NFPA 54 for gas-fired furnace section.
- G. ARI Certification: Units shall be ARI certified and listed.
- H. ARI Compliance for Units with Capacities Less Than 135,000 Btuh: Rate rooftop air-conditioner capacity according to ARI 210/240, "Unitary Air-Conditioning and Air-Source Heat Pump Equipment."
 - 1. Sound Power Level Ratings: Comply with ARI 270, "Sound Rating of Outdoor Unitary Equipment."
- I. ARI Compliance for Units with Capacities 135,000 Btuh and More: Rate rooftop air-conditioner capacity according to ARI 340/360, "Commercial and Industrial Unitary Air-Conditioning and Heat Pump Equipment."
 - 1. Sound Power Level Ratings: Comply with ARI 270, "Sound Rating of Outdoor Unitary Equipment."

1.6 COORDINATION

- A. Coordinate with owner and schedule installation of new packaged, outdoor, central station air handling units to minimize disruption to building users operation. Schedule of all work to be approved by owner prior to start of work.
- B. Coordinate size, location, and installation of rooftop air-conditioner manufacturer's roof curbs and equipment supports with existing curbs.
- C. Coordinate with size and location of existing roof openings.

- D. Coordinate electrical power requirements with existing electrical power feeds.
- E. Coordinate interface requirements for HVAC Instrumentation and Control system.
- F. Coordinate natural gas requirements with existing gas piping.

1.7 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to replace, parts and labor with no cost to the owner, components of rooftop air conditioners that fail in materials or workmanship within specified warranty period.
 - 1. Warranty Period for Compressors: Manufacturer's standard, but not less than five years from date of Substantial Completion.
 - 2. Warranty Period for Heat Exchangers: Manufacturer's standard, but not less than 10 years from date of Substantial Completion.
 - 3. Warranty Period for Solid-State Ignition Modules: Manufacturer's standard, but not less than five years from date of Substantial Completion.
 - 4. Warranty Period for Control Boards: Manufacturer's standard, but not less than five years from date of Substantial Completion.
 - 5. Warranty Period for Electronic Thermostats: Manufacturer's standard, but not less than ten years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. In other Part 2 articles where subparagraph titles below introduce lists, the following requirements apply for product selection:
 - 1. Manufacturers: Subject to compliance with requirements, provide products by the manufacturers specified.

2.2 ROOFTOP AIR CONDITIONERS 7-1/2 TO 20 TONS

- A. Manufacturers:
 - 1. AAON, Incorporated
 - 2. Carrier Corporation
 - 3. McQuay International.
 - 4. Trane Company (The); North American Commercial Group.
 - 5. YORK International Corporation.
- B. Description: Factory assembled and tested; designed for exterior installation; consisting of compressor, indoor and outside refrigerant coils, indoor fan and outside coil fan, refrigeration and temperature controls, filters, and dampers.
- C. Casing: Galvanized-steel construction with enamel paint finish, Hinged access doors with neoprene gaskets for inspection and access to internal parts, minimum 1-inch-thick thermal insulation, knockouts for electrical and piping connections, exterior condensate drain connection, and lifting lugs.
- D. Indoor Fan: Forward curved, centrifugal, belt driven with fixed motor sheaves, grease-lubricated ball bearings, variable speed drive, and motor.
- E. Outside Coil Fan: Propeller type, directly driven by permanently lubricated motor.
- F. Refrigerant Coils: Aluminum-plate fin and seamless copper tube in steel casing with equalizing-type vertical distributor.

- G. Compressor(s): Hermetic scroll compressors with integral vibration isolators, internal over current and over temperature protection, internal pressure relief, and crankcase heater(s). Refer to the schedule for number of compressors required.
- H. Refrigeration System:
 - 1. Compressor(s).
 - 2. Outside coil and fan.
 - 3. Indoor coil and fan.
 - 4. Check valves.
 - 5. Expansion valves with replaceable thermostatic elements.
 - 6. Refrigerant dryers.
 - 7. High-pressure switches.
 - 8. Low-pressure switches.
 - 9. Independent refrigerant circuits.
 - 10. Brass service valves installed in discharge and liquid lines.
 - 11. Charge of refrigerant.
- I. Filters: UL rated Class I, MERV 8, 2-inch-thick, pleated fiberglass, and throwaway filters in filter rack.
- J. Heat Exchanger: Stainless steel construction for natural-gas-fired forced draft burners with the following controls:
 - 1. Modulating gas valve with 5:1 turndown ratio.
 - 2. Manual gas shutoff.
 - 3. Direct-spark pilot ignition.
 - 4. Electronic flame sensor.
 - 5. Induced-draft blower.
 - 6. Flame rollout switch.
 - 7. Low limit switch.
- K. Economizer: Return- and outside-air dampers with neoprene seals, outside-air filter, and hood.
 - 1. Damper Motor: Fully modulating spring return with adjustable minimum position.
 - 2. Control: Electronic-control system uses mixed-air temperature and selects between outside-air and return-air enthalpy to adjust mixing dampers.
- L. Power Connection: Provide for single connection of power to unit with control-circuit transformer with built-in circuit breaker and 120v convenience outlet. Refer to Division-26 for the unit-mounted disconnect switch.
- M. Unit Controls: Solid-state control board and components contain at least the following features:
 - 1. Indoor fan on/off delay.
 - 2. Default control to ensure proper operation after power interruption.
 - 3. Service relay output.
 - 4. Unit diagnostics and diagnostic code storage.
 - 5. Field-adjustable control parameters.
 - 6. Economizer control.
 - 7. Minimum compressor run time.
 - 8. Night setback mode.
 - 9. Smoke alarm with smoke detector installed supply and return air.
 - 10. Low-refrigerant pressure control.
 - 11. Digital display of outside temperature, supply-air temperature, return-air temperature, economizer damper position, indoor-air quality, and control parameters.
- N. Thermostat: Programmable, electronic; with heating setback and cooling setup with seven-day programming; and the following:
 - 1. Touch sensitive keyboard.
 - 2. Automatic switching.
 - 3. Degrees F readout.
 - 4. Heating temperature set point

5. Cooling temperature set point
 6. LED indicators.
 7. Hour/day programming.
 8. Manual override capability.
 9. Time and operational mode readout.
 10. Status indicator.
 11. Battery backup.
 12. Manual switch Heat/cool/auto
 13. Manual fan switch on/off/auto
 14. Dirty-filter switch.
- O. Optional Accessories:
1. Power exhaust fan: propeller or centrifugal type.
 2. Vertical gas vent extension.

2.3 ROOF CURBS

- A. Manufacturer's insulated retrofit adaptor curb designed for installation on top of existing roof curb for matching connection of supply and return duct connections on new unit to supply and return duct connections up through existing curb. Standard construction, insulated and having corrosive protective coating. Construction will be in accordance with NRCA Standards.
1. Roof Curb Height: Maximum 18-inches above top of existing curb.

2.4 MOTORS

- A. General requirements for motors are specified in Division 23 Section "Common Motor Requirements For HVAC Equipment".
- B. Motor Sizes: Minimum size as indicated; if not indicated, large enough so driven load will not require motor to operate in service factor range above 1.0.
- C. Controllers, electrical devices, and wiring are specified in Division 26 Sections.

2.5 SOURCE QUALITY CONTROL

- A. Sound-Power Level Ratings: Comply with AMCA 301, "Methods for Calculating Fan Sound Ratings from Laboratory Test Data." Factory test fans according to AMCA 300, "Reverberant Room Method for Sound Testing of Fans." Label fans with the AMCA-Certified Ratings Seal.
- B. Fan Performance Ratings: Establish flow rate, pressure, power, air density, speed of rotation, and efficiency by factory tests and ratings according to AMCA 210, "Laboratory Methods of Testing Fans for Rating."
- C. Fan Balancing: Fans shall be factory balanced and AMCA Certified to meet ANSI S2.19 grade G6.3 requirements. Filter-in vibration measurements shall not exceed 0.15 in/second peak at the fan RPM.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install units' level and plumb, maintaining manufacturer's recommended clearances.
- B. Curb Support: Install retrofit adaptor curb on existing roof curb, level and secure, according to manufacturer's instructions.

3.2 CONNECTIONS

- A. Piping installation requirements are specified in other Division 23 Sections. Drawings indicate general arrangement of piping, fittings, and specialties.
- B. Install piping adjacent to machine to allow service and maintenance.
 - 1. Gas Piping: Comply with applicable requirements in Division 23 Section "Facility Natural-Gas Piping" Connect gas piping to burner, full size of gas train inlet, and connect with union and shutoff valve with sufficient clearance for burner removal and service.
 - 2. Cooling Coil Condensate Drain Piping: Install trap and extend condensate drain to discharge on roof.
- C. Electrical System Connections: Comply with applicable requirements in Division 26 Sections for power wiring, switches, and motor controls.
 - 1. Install new control wiring between remote wall mounted programmable thermostat and unit control wiring connections.
- D. Ground equipment according to Division 26 Section "Grounding and Bonding."
- E. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

3.3 FIELD QUALITY CONTROL

- A. Manufacturer's Field Service: Engage a factory service representative to inspect, test, and adjust field-assembled components and equipment installation, including connections, and to assist in field-testing. Report results in writing.
- B. Perform the following field quality-control tests and inspections and prepare test reports:
 - 1. After installing rooftop air conditioners and after electrical circuitry has been energized, test units for compliance with requirements.
 - 2. Inspect for and remove shipping bolts, blocks, and tie-down straps.
 - 3. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation.
 - 4. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- C. Remove malfunctioning units, replace with new units, and retest as specified above.

3.4 STARTUP SERVICE

- A. Engage a factory service representative to perform startup service. The service representative shall be trained at the factory for startup service.
- B. Complete installation and startup checks according to manufacturer's written instructions and do the following:
 - 1. Inspect for visible damage to unit casing.
 - 2. Inspect for visible damage to furnace combustion chamber.
 - 3. Inspect for visible damage to compressor, air-cooled outside coil, and fans.
 - 4. Inspect internal insulation.
 - 5. Verify that labels are clearly visible.
 - 6. Verify that clearances have been provided for servicing.
 - 7. Verify that controls are connected and operable.
 - 8. Verify that filters are installed.
 - 9. Verify that unit controls meet specified requirements.
 - 10. Clean outside coil and inspect for construction debris.
 - 11. Clean furnace flue and inspect for construction debris.
 - 12. Connect and purge gas line.

13. Adjust vibration isolators.
14. Inspect operation of barometric dampers.
15. Lubricate bearings on fan.
16. Inspect fan-wheel rotation for movement in correct direction without vibration and binding.
17. Adjust fan belts to proper alignment and tension.
18. Start unit according to manufacturer's written instructions.
 - a. Start refrigeration system in summer only.
 - b. Complete startup sheets and attach copy with Contractor's startup report.
19. Inspect and record performance of interlocks and protective devices; verify sequences.
20. Operate unit for an initial period as recommended or required by manufacturer.
21. Perform the following operations for both minimum and maximum firing and adjust burner for peak efficiency. Adjust pilot to stable flame.
 - a. Measure gas pressure on manifold.
 - b. Measure combustion-air temperature at inlet to combustion chamber.
 - c. Measure flue-gas temperature at furnace discharge.
 - d. Perform flue-gas analysis. Measure and record flue-gas carbon dioxide and oxygen concentration.
 - e. Measure supply-air temperature and volume when burner is at maximum firing rate and when burner is off. Calculate useful heat to supply air.
22. Adjust and inspect high-temperature limits.
23. Adjust and inspect low-temperature limits.
24. Inspect outside-air dampers for proper stroke and interlock with return-air dampers.
25. Start refrigeration system and measure and record the following:
 - a. Coil leaving-air, dry- and wet-bulb temperatures.
 - b. Coil entering-air, dry- and wet-bulb temperatures.
 - c. Outside-air, dry-bulb temperature.
 - d. Outside-air-coil, discharge-air, dry-bulb temperature.
26. Inspect controls for correct sequencing of heating, mixing dampers, refrigeration, and normal and emergency shutdown.
27. Measure and record the following minimum and maximum airflows. Plot fan volumes on fan curve.
 - a. Supply-air volume.
 - b. Return-air volume.
 - c. Relief-air volume.
 - d. Outside-air intake volume.
28. Simulate maximum cooling demand and inspect the following:
 - a. Compressor refrigerant suction and hot-gas pressures.
 - b. Short circuiting of air through outside coil or from outside coil to outside-air intake.
29. Verify operation of remote panel, including pilot-light operation and failure modes. Inspect the following:
 - a. High-limit heat exchanger.
 - b. Low-limit heat exchanger.
 - c. Warm-up for morning cycle.
 - d. Economizer to limited outside-air changeover.
 - e. Alarms.
30. After startup and performance testing, change filters, vacuum heat exchanger and cooling and outside coils, lubricate bearings, adjust belt tension, and inspect operation of power vents.

3.5 ADJUSTING

- A. Adjust initial temperature and humidity set points.
- B. Set field-adjustable switches and circuit-breaker trip ranges as indicated.

3.6 DEMONSTRATION

- A. Engage a factory service representative to train Owner's maintenance personnel to adjust, operate, and maintain rooftop air conditioners. Refer to Division 1 Section "Closeout Procedures."

END OF SECTION

**SECTION 260500
COMMON WORK RESULTS FOR ELECTRICAL**

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
1. Electrical equipment coordination and installation.
 2. Common electrical installation requirements.
 3. Demolition.
 4. Cutting and patching for electrical construction.
 5. Touchup painting.
 6. Disposition of existing materials and equipment.
 7. Electric Service Outage and Energizations.

1.2 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- B. Comply with NFPA 70.
- C. Comply with Federal, State and City Code requirements.

1.3 COORDINATION

1. Core drilling through post-tensioned slab: The existing post-tensioned slabs contain post-tensioned tendons that must not be damaged or broken. No nailing, drilling, cutting or other disruption to the slab is allowed without prior written approval by the structural engineer. Contractor shall positively locate the existing tendons and submit to the structural engineer for approval a written procedure, including plans showing existing tendon locations and proposed disruption of the slab.
- B. Coordinate electrical testing of electrical, and mechanical items, so equipment and systems that are functionally interdependent are tested to demonstrate successful interoperability. Document results of said testing.

1.4 EQUIPMENT REQUIRING ELECTRICAL SERVICE

- A. Review all specification sections and drawings for equipment requiring electrical service. Provide service to and make connections to all such equipment requiring electrical service.
- B. Drawings indicate design loads, voltages and corresponding control equipment, feeders, and over-current devices. If equipment actually furnished have loads other than those indicated on the drawings or specified herein, control equipment, feeders, and overcurrent devices shall be adjusted in size accordingly at no additional cost to the owner. Such adjustment shall be subject to the review of the Engineer.
- C. Incidental items not indicated on Drawing or mentioned in Specifications but that can legitimately and reasonably be inferred to belong to the Work or be necessary in good practice to provide complete system, shall be furnished and installed though not itemized here in detail.

1.5 MECHANICAL SYSTEMS INTERFACE

- A. All control wiring for heating, ventilating and air conditioning systems shall be installed under Division 23. Review Division 23 specifications and shop drawings for control systems to assure compatibility between equipment furnished under Division 23 and wiring furnished under Division 26.
- B. Power wiring to all motors, motor controllers and between motors and controllers shall be provided in Division 26.

1.6 SITE INVESTIGATION

- A. Prior to submitting bids of the project, visit the site of the work to become aware of existing conditions which may affect the cost of the project. Where work under this project requires extension, relocation, reconnections or modifications to existing equipment or systems, the existing equipment or systems shall be restored to their original condition, with the exception of the work under this contract, before the completion of this project. Existing systems and conditions which are not detailed on the drawings must still be restored to their original condition.

PART 2 PRODUCTS

2.1 NOT USED

PART 3 EXECUTION

3.0 COMMON REQUIREMENTS FOR ELECTRICAL INSTALLATION

- A. Comply with NECA 1.
- B. Equipment: Install to facilitate service, maintenance, and repair or replacement of components of both electrical equipment and other nearby installations. Connect in such a way as to facilitate future disconnecting with minimum interference with other items in the vicinity.
- C. Materials and Components: Install level, plumb, and parallel and perpendicular to other building systems and components, unless otherwise indicated.

3.1 FIRESTOPPING

- A. Apply firestopping to penetrations of fire-rated floor and wall assemblies for electrical installations to restore original fire-resistance rating of assembly. Provide only approved firestopping assemblies.

3.2 DEMOLITION

- A. Protect existing electrical equipment and installations indicated to remain. If damaged or disturbed in the course of the Work, remove damaged portions and install new products of equal capacity, quality, and functionality.
- B. Reroute circuits as required to serve equipment not in the demolition area.
- C. Accessible Work: Remove exposed electrical equipment and installations, indicated to be demolished, in their entirety.
- D. Abandoned Work: Cut and remove buried raceway and wiring, indicated to be abandoned in place, 2 inches (50 mm) below the surface of adjacent construction. Cap raceways and patch surface to match existing finish.
- E. Remove demolished material from Project site.

- F. Remove, store, clean, reinstall, reconnect, and make operational components indicated for relocation.
- G. All material and equipment which is noted or required by the owner to be salvaged and which is not scheduled to be reused or relocated shall be carefully removed and shall be delivered to the owner and stored where directed on the site.

3.3 CUTTING AND PATCHING

- A. Cut, channel, chase, and drill floors, walls, partitions, ceilings, and other surfaces required to permit electrical installations. Perform cutting by skilled mechanics of trades involved.
- B. Repair and refinish disturbed finish materials and other surfaces to match adjacent undisturbed surfaces. Install new fireproofing where existing firestopping has been disturbed. Repair and refinish materials and other surfaces by skilled mechanics of trades involved.

3.4 FIELD QUALITY CONTROL

- A. Inspect installed components for damage and faulty work, including the following:
 - 1. Firestopping.
 - 2. Electrical demolition.
 - 3. Cutting and patching for electrical construction.
 - 4. Touchup painting.

3.5 REFINISHING AND TOUCHUP PAINTING

- 1. Clean damaged and disturbed areas and apply primer, intermediate, and finish coats to suit the degree of damage at each location.
- 2. Follow paint manufacturer's written instructions for surface preparation and for timing and application of successive coats.
- 3. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.
- 4. Repair damage to PVC or paint finishes with matching touchup coating recommended by manufacturer.

3.6 CLEANING AND PROTECTION

- A. On completion of installation, including outlets, fittings, and devices, inspect exposed finish. Remove burrs, dirt, paint spots, and construction debris.
- B. Protect equipment and installations and maintain conditions to ensure that coatings, finishes, and cabinets are without damage or deterioration at time of Substantial Completion.

3.7 LABELING AND IDENTIFICATION FOR ELECTRICAL SYSTEMS

- A. Using permanent marker, legibly label each system junction box on the face of cover in exposed construction. Include panel source and voltage.
- B. Identification: Provide a printed self-adhesive label indicating panel and circuit number at the receptacle locations. Adhere to cover face inside weatherproof cover. Provide engrave nameplates at motor starters and disconnects.

3.8 ELECTRIC SERVICE OUTAGE AND ENERGIZATIONS

- A. Outages shall be requested in writing and scheduled with the Owner. All work shall be done to minimize down time and inconvenience.

END OF SECTION

SECTION 260519
LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
1. Building wires and cables rated 600 V and less.
 2. Connectors, splices, and terminations rated 600 V and less.

PART 2 PRODUCTS

2.1 CONDUCTORS AND CABLES

- A. Manufacturers: Subject to compliance with requirements, provide products by the following:

Alcan Products Corporation; Alcan Cable Division.

2. Alpha Wire.
 3. Belden Inc.
 4. Encore Wire Corporation.
 5. General Cable Technologies Corporation.
 6. Southwire Incorporated.
- B. Copper Conductors: Comply with NEMA WC 70/ICEA S-95-658.
- C. Conductor Insulation: Comply with NEMA WC 70/ICEA S-95-658 for Type THHN-2-THWN-2.

2.2 CONNECTORS AND SPLICES

- A. Manufacturers: Subject to compliance with requirements, provide products by the following:

AFC Cable Systems, Inc.

2. Gardner Bender.
 3. Hubbell Power Systems, Inc.
 4. Ideal Industries, Inc.
 5. IlSCO; a branch of Bardes Corporation.
 6. NSi Industries LLC.
 7. O-Z/Gedney; a brand of the EGS Electrical Group.
 8. 3M; Electrical Markets Division.
 9. Tyco Electronics.
- B. Description: Factory-fabricated connectors and splices of size, ampacity rating, material, type, and class for application and service indicated.

2.3 SYSTEM DESCRIPTION

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. Comply with NFPA 70.

PART 3 EXECUTION

3.1 CONDUCTOR MATERIAL APPLICATIONS

- A. Feeders: Stranded Copper, THWN/THHN in conduit.
- B. Branch Circuits: Stranded Copper. THWN/THHN in conduit.

3.2 INSTALLATION OF CONDUCTORS AND CABLES

- A. Conceal cables in finished walls, ceilings, and floors unless otherwise indicated.
- B. Complete raceway installation between conductor and cable termination points according to Section 260533 "Raceways and Boxes for Electrical Systems" prior to pulling conductors and cables.
- C. Use manufacturer-approved pulling compound or lubricant where necessary; compound used must not deteriorate conductor or insulation. Do not exceed manufacturer's recommended maximum pulling tensions and sidewall pressure values.
- D. Use pulling means, including fish tape, cable, rope, and basket-weave wire/cable grips, that will not damage cables or raceway.
- E. Install exposed cables parallel and perpendicular to surfaces of exposed structural members, and follow surface contours where possible.
- F. Support cables according to Section 260529 "Hangers and Supports for Electrical Systems."
- G. Conductor size shall be a minimum of No. 12 AWG.

3.3 CONNECTIONS

- A. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A-486B.
- B. Make splices, terminations, and taps that are compatible with conductor material].
- C. Stranded conductors shall have termination device crimped onto conductors prior to connection to outlet devices.

3.4 SLEEVE AND SLEEVE-SEAL INSTALLATION FOR ELECTRICAL PENETRATIONS

- A. Install sleeves and sleeve seals at penetrations of exterior floor and wall assemblies. Comply with requirements in Section 260544 "Sleeves and Sleeve Seals for Electrical Raceways and Cabling."

3.5 FIRESTOPPING

- A. Apply firestopping to electrical penetrations of fire-rated floor and wall assemblies to restore original fire-resistance rating of assembly."

3.6 FIELD QUALITY CONTROL

- A. Perform the following tests and inspections:
 - 1. After installing conductors and cables and before electrical circuitry has been energized, test feeder conductors for compliance with requirements.
 - 2. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.
 - 3. Test existing RTU feeder cable for insulation integrity and wiring continuity prior to energization.
 - 4. After energization verify correct phase rotation at motors.

- B. Test and Inspection Reports: Prepare a written report to record the following:
 - 1. Procedures used.
 - 2. Results that comply with requirements.
 - 3. Results that do not comply with requirements and corrective action taken to achieve compliance with requirements.
- C. Cables will be considered defective if they do not pass tests and inspections.

END OF SECTION

SECTION 260526
GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

- A. Section includes grounding and bonding systems and equipment.
- B. Field quality-control reports.

PART 2 PRODUCTS

2.1 SYSTEM DESCRIPTION

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. Comply with UL 467 for grounding and bonding materials and equipment.
- C. Provide grounding of all equipment comprising a permanent bonding together of all metallic, non-current carrying parts of the electrical system such as raceways, boxes, equipment enclosures and motor frames. Provide grounding conductors in all flexible conduit lengths.

2.2 CONDUCTORS

- A. Insulated Conductors: Copper or tinned-copper wire or cable insulated for 600 V unless otherwise required by applicable Code or authorities having jurisdiction.
- B. Bare Copper Conductors:
 - 1. Solid Conductors: ASTM B 3.
 - 2. Stranded Conductors: ASTM B 8.
 - 3. Tinned Conductors: ASTM B 33.

2.3 CONNECTORS

- A. Listed and labeled by an NRTL acceptable to authorities having jurisdiction for applications in which used and for specific types, sizes, and combinations of conductors and other items connected.

PART 3 EXECUTION

3.1 APPLICATIONS

- A. Conductors: Install solid conductor for No. 8 AWG and smaller, and stranded conductors for No. 6 AWG and larger unless otherwise indicated.

3.2 EQUIPMENT GROUNDING

- A. Install insulated equipment grounding conductors with the following items, in addition to those required by NFPA 70:
 - 1. Feeders and branch circuits.
 - 2. Receptacle circuits.
 - 3. Single-phase motor and appliance branch circuits.
 - 4. Three-phase motor and appliance branch circuits.
 - 5. Flexible raceway runs.

END OF SECTION

**SECTION 260529
HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS**

PART 1 GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Hangers and supports for electrical equipment and systems.
 - 2. Roof curbs and penetrations.

1.2 QUALITY ASSURANCE

- A. Comply with NFPA 70.

1.3 COORDINATION

- A. Coordinate installation of roof curbs, equipment supports, and roof penetrations.

1.4 PERFORMANCE REQUIREMENTS

- A. General Performance: Roof accessories shall withstand exposure to weather and resist thermally induced movement without failure, rattling, leaking, or fastener disengagement due to defective manufacture, fabrication, installation, or other defects in construction.

1.5 SUBMITTALS

- A. Product Data: For each type of roof accessory indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.
- B. Shop Drawings: For roof accessories. Include plans, elevations, keyed details, and attachments to other work. Indicate dimensions, loadings, and special conditions. Distinguish between plant- and field-assembled work.

PART 2 PRODUCTS

2.1 SUPPORT, ANCHORAGE, AND ATTACHMENT COMPONENTS

- A. Steel Slotted Support Systems: Comply with MFMA-4, factory-fabricated components for field assembly.

Manufacturers: Subject to compliance with requirements, provide products by one of the following:

- a. Allied Tube & Conduit.
- b. Cooper B-Line, Inc.; a division of Cooper Industries.
- c. ERICO International Corporation.
- d. GS Metals Corp.
- e. Thomas & Betts Corporation.
- f. Unistrut; Tyco International, Ltd.
- g. Wesanco, Inc.
- 2. Metallic Coatings: Hot-dip galvanized after fabrication and applied according to MFMA-4.
- 3. Nonmetallic Coatings: Manufacturer's standard PVC, polyurethane, or polyester coating applied according to MFMA-4.
- 4. Painted Coatings: Manufacturer's standard painted coating applied according to MFMA-4.
- 5. Channel Dimensions: Selected for applicable load criteria.

- B. Raceway and Cable Supports: As described in NECA 1 and NECA 101.
- C. Conduit and Cable Support Devices: Steel hangers, clamps, and associated fittings, designed for types and sizes of raceway or cable to be supported.
- D. Mounting, Anchoring, and Attachment Components: Items for fastening electrical items or their supports to building surfaces include the following:
 - 1. Mechanical-Expansion Anchors: Insert-wedge-type, [zinc-coated] [stainless] steel, for use in hardened portland cement concrete with tension, shear, and pullout capacities appropriate for supported loads and building materials in which used.

Manufacturers: Subject to compliance with requirements, provide products by one of the following:

- 1) Cooper B-Line, Inc.; a division of Cooper Industries.
- 2) Empire Tool and Manufacturing Co., Inc.
- 3) Hilti Inc.
- 4) ITW Ramset/Red Head; a division of Illinois Tool Works, Inc.
- 5) MKT Fastening, LLC.
- 6) <Insert manufacturer's name>.
- 2. Clamps for Attachment to Steel Structural Elements: MSS SP-58, type suitable for attached structural element.
- 3. Through Bolts: Structural type, hex head, and high strength. Comply with ASTM A 325.
- 4. Toggle Bolts: All-steel springhead type.
- 5. Hanger Rods: Threaded steel.

PART 3 EXECUTION

3.1 APPLICATION

- A. Comply with NECA 1 and NECA 101 for application of hangers and supports for electrical equipment and systems except if requirements in this Section are stricter.

3.2 SUPPORT INSTALLATION

- A. Comply with NECA 1 and NECA 101 for installation requirements
- B. Provide support of all electrical work through the use of hanger rods, clamps, structural framing, and fastening devices. Provide vibration isolation in all supporting hardware for vibrating equipment.
- C. Mounting and Anchorage of Surface-Mounted Equipment and Components: Anchor and fasten electrical items and their supports to building structural elements by the following methods unless otherwise indicated by code:
 - 1. To Wood: Fasten with lag screws or through bolts.
 - 2. To Masonry: Approved toggle-type bolts on hollow masonry units and expansion anchor fasteners on solid masonry units.
 - 3. To Existing Concrete: Expansion anchor fasteners.
 - 4. To Steel: [Welded threaded studs complying with AWS D1.1/D1.1M, with lock washers and nuts] [Beam clamps (MSS Type 19, 21, 23, 25, or 27) complying with MSS SP-69] [Spring-tension clamps].
 - 5. To Light Steel: Sheet metal screws.
 - 6. Outdoors: standoff panels to allow drainage behind equipment.
- D. Drill holes for expansion anchors in concrete at locations and to depths that avoid reinforcing bars.

3.3 ROOF EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, to verify actual locations, dimensions, and other conditions affecting performance of the Work.
- B. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and securely anchored.
- C. Verify dimensions of roof openings for roof accessories.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.4 ROOF CURB AND PENETRATION INSTALLATION

- A. General: Install roof accessories according to manufacturer's written instructions.
 - 1. Install equipment supports level, plumb, true to line and elevation, and without warping, jogs in alignment, excessive oil canning, buckling, or tool marks.
 - 2. Anchor equipment supports securely in place so they are capable of resisting indicated loads.
 - 3. Use fasteners, separators, sealants, and other miscellaneous items as required to complete installation of roof accessories and fit them to substrates.
 - 4. Flash equipment supports into roofing system for a weather tight installation.

END OF SECTION

**SECTION 260533
RACEWAYS AND BOXES FOR ELECTRICAL SYSTEMS**

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
1. Metal conduits, tubing, and fittings.
 2. Boxes, enclosures, and cabinets.

1.2 INFORMATIONAL SUBMITTALS

PART 2 PRODUCTS

2.0 METAL CONDUITS, TUBING, AND FITTINGS

Manufacturers: Subject to compliance with requirements, provide products by the following:

1. AFC Cable Systems, Inc.
 2. Allied Tube & Conduit; a Tyco International Ltd. Co.
 3. Anamet Electrical, Inc.
 4. Electri-Flex Company.
 5. O-Z/Gedney; a brand of EGS Electrical Group.
 6. Picoma Industries, a subsidiary of Mueller Water Products, Inc.
 7. Republic Conduit.
 8. Robroy Industries.
 9. Southwire Company.
 10. Thomas & Betts Corporation.
 11. Western Tube and Conduit Corporation.
 12. Wheatland Tube Company; a division of John Maneely Company.
- B. Listing and Labeling: Metal conduits, tubing, conduit bodies and fittings shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- C. GRC: Comply with ANSI C80.1 and UL 6.
- D. IMC: Comply with ANSI C80.6 and UL 1242.
- E. EMT: Comply with ANSI C80.3 and UL 797.
- F. LFMC: Flexible steel conduit with PVC jacket and complying with UL 360.
- G. Fittings for Metal Conduit: Comply with NEMA FB 1 and UL 514B.
1. Conduit Fittings for Hazardous (Classified) Locations: Comply with UL 886 and NFPA 70.
 2. Fittings for EMT:
 - a. Material: Steel.
 - b. Type: compression.
- H. Joint Compound for IMC, or GRC: Approved, as defined in NFPA 70, by authorities having jurisdiction for use in conduit assemblies, and compounded for use to lubricate and protect threaded conduit joints from corrosion and to enhance their conductivity.

2.1 BOXES, ENCLOSURES, AND CABINETS

Manufacturers: Subject to compliance with requirements, provide products by the following:

1. Adalet.
 2. Cooper Technologies Company; Cooper Crouse-Hinds.
 3. EGS/Appleton Electric.
 4. Erickson Electrical Equipment Company.
 5. FSR Inc.
 6. Hoffman; a Pentair company.
 7. Hubbell Incorporated; Killark Division.
 8. Kraloy.
 9. Milbank Manufacturing Co.
 10. Mono-Systems, Inc.
 11. O-Z/Gedney; a brand of EGS Electrical Group.
 12. RACO; a Hubbell Company.
 13. Robroy Industries.
 14. Spring City Electrical Manufacturing Company.
 15. Stahlin Non-Metallic Enclosures; a division of Robroy Industries.
 16. Thomas & Betts Corporation.
 17. Wiremold / Legrand.
- B. General Requirements for Boxes, Enclosures, and Cabinets: Boxes, enclosures, and cabinets installed in wet locations shall be listed for use in wet locations.
- C. Sheet Metal Outlet and Device Boxes: Comply with NEMA OS 1 and UL 514A.
- D. Cast-Metal Outlet and Device Boxes: Comply with NEMA FB 1, ferrous alloy, Type FD, with gasketed cover.
- E. Small Sheet Metal Pull and Junction Boxes: NEMA OS 1.
- F. Device Box Dimensions: 4 inches square by 2-1/8 inches deep (100 mm square by 60 mm deep).
- G. Gangable boxes are prohibited.

PART 3 EXECUTION

3.1 RACEWAY APPLICATION

- A. Outdoors: Apply raceway products as specified below unless otherwise indicated:
1. Exposed Conduit: GRC or IMC.
 2. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): LFMC.
 3. Boxes and Enclosures, Aboveground: NEMA 250, Type 3R.
- B. Indoors: Apply raceway products as specified below unless otherwise indicated:
1. Exposed, Not Subject to Physical Damage: EMT.
 2. Concealed in Ceilings and Interior Walls and Partitions: EMT.
 3. Damp or Wet Locations: GRC.
 4. Boxes and Enclosures: NEMA 250, Type 1, except use NEMA 250, Type 4 in institutional and commercial kitchens and damp or wet locations.
- C. Minimum Raceway Size: 1/2-inch (16-mm) trade size.
- D. Raceway Fittings: Compatible with raceways and suitable for use and location.
1. Rigid and Intermediate Steel Conduit: Use threaded rigid steel conduit fittings unless otherwise indicated. Comply with NEMA FB 2.10.
 2. .

3. EMT: Use setscrew or compression, steel fittings. Comply with NEMA FB 2.10.
4. Flexible Conduit: Use only fittings listed for use with flexible conduit. Comply with NEMA FB 2.20.

3.2 INSTALLATION

- A. Comply with NECA 1 and NECA 101 for installation requirements except where requirements on Drawings or in this article are stricter. Comply with NECA 102 for aluminum conduits. Comply with NFPA 70 limitations for types of raceways allowed in specific occupancies and number of floors.
- B. Complete raceway installation before starting conductor installation.
- C. Comply with requirements in Section 260529 "Hangers and Supports for Electrical Systems" for hangers and supports.
- D. Arrange stub-ups so curved portions of bends are not visible above finished slab.
- E. Install no more than the equivalent of three 90-degree bends in any conduit run except for control wiring conduits, for which fewer bends are allowed. Support within 12 inches (300 mm) of changes in direction.
- F. Conceal conduit and EMT within finished walls, ceilings, and floors unless otherwise indicated. Install conduits parallel or perpendicular to building lines.
- G. Support conduit within 12 inches (300 mm) of enclosures to which attached.
- H. Raceways Within 1 ½" of Roof Deck:
 1. All raceway shall be installed further from 1 ½" of roof deck or raceway shall be RMC or IMC.
- I. Stub-ups to Above Recessed Ceilings:
 1. Use EMT, IMC, or RMC for raceways.
 2. Use a conduit bushing or insulated fitting to terminate stub-ups not terminated in hubs or in an enclosure.
- J. Threaded Conduit Joints, Exposed to Wet, Damp, Corrosive, or Outdoor Conditions: Apply listed compound to threads of raceway and fittings before making up joints. Follow compound manufacturer's written instructions.
- K. Coat field-cut threads on PVC-coated raceway with a corrosion-preventing conductive compound prior to assembly.
- L. Raceway Terminations at Locations Subject to Moisture or Vibration: Use insulating bushings to protect conductors including conductors smaller than No. 4 AWG.
- M. Terminate threaded conduits into threaded hubs or with locknuts on inside and outside of boxes or cabinets. Install bushings on conduits up to 1-1/4-inch (35mm) trade size and insulated throat metal bushings on 1-1/2-inch (41-mm) trade size and larger conduits terminated with locknuts. Install insulated throat metal grounding bushings on service conduits.
- N. Install raceways square to the enclosure and terminate at enclosures with locknuts. Install locknuts hand tight plus 1/4 turn more.
- O. Do not rely on locknuts to penetrate nonconductive coatings on enclosures. Remove coatings in the locknut area prior to assembling conduit to enclosure to assure a continuous ground path.
- P. Cut conduit perpendicular to the length. For conduits 2-inch (53-mm) trade size and larger, use roll cutter or a guide to make cut straight and perpendicular to the length.
- Q. Install pull wires in empty raceways. Use polypropylene or monofilament plastic line with not less than 200-lb (90-kg) tensile strength. Leave at least 12 inches (300 mm) of slack at each end of pull wire. Cap underground raceways designated as spare above grade alongside raceways in use.

- R. Surface Raceways:
1. Install surface raceway with a minimum 2-inch (50-mm) radius control at bend points.
 2. Secure surface raceway with screws or other anchor-type devices at intervals not exceeding 48 inches (1200 mm) and with no less than two supports per straight raceway section. Support surface raceway according to manufacturer's written instructions. Tape and glue are not acceptable support methods.
- S. Install raceway sealing fittings at accessible locations according to NFPA 70 and fill them with listed sealing compound. For concealed raceways, install each fitting in a flush steel box with a blank cover plate having a finish similar to that of adjacent plates or surfaces. Install raceway sealing fittings according to NFPA 70.
- T. Install devices to seal raceway interiors at accessible locations. Locate seals so no fittings or boxes are between the seal and the following changes of environments. Seal the interior of all raceways at the following points:
1. Where conduits pass from warm to cold locations, such as boundaries of refrigerated spaces.
 2. Where an underground service raceway enters a building or structure.
 3. Where otherwise required by NFPA 70.
- U. Flexible Conduit Connections: Comply with NEMA RV 3. Use a maximum of 72 inches (1830 mm) of flexible conduit for equipment subject to vibration, noise transmission, or movement; and for transformers and motors.
1. Use LFMC in damp or wet locations subject to severe physical damage.
 2. Use LFMC in damp or wet locations not subject to severe physical damage.
- V. Fasten junction and pull boxes to or support from building structure. Do not support boxes by conduits.
- W. Minimum box size to be two gang.

3.3 FIRESTOPPING

- A. Install firestopping at penetrations of fire-rated floor and wall assemblies. Utilize firestopping assemblies listed for the application.

3.4 PROTECTION

- A. Protect coatings, finishes, and cabinets from damage and deterioration.
1. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.
 2. Repair damage to PVC coatings or paint finishes with matching touchup coating recommended by manufacturer.

END OF SECTION

SECTION 262726 WIRING DEVICES

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Receptacles, receptacles with integral GFCI, and associated device plates.
 - 2. Weather-resistant receptacles.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers' Names: Shortened versions (shown in parentheses) of the following manufacturers' names are used in other Part 2 articles:

Cooper Wiring Devices; Division of Cooper Industries, Inc. (Cooper).

- 2. Hubbell Incorporated; Wiring Device-Kellems (Hubbell).
- 3. Leviton Mfg. Company Inc. (Leviton).
- 4. Pass & Seymour/Legrand (Pass & Seymour).

2.2 GENERAL WIRING-DEVICE REQUIREMENTS

- A. Wiring Devices, Components, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. Comply with NFPA 70.
- C. Devices that are manufactured for use with modular plug-in connectors may be substituted under the following conditions:
 - 1. Connectors shall comply with UL 2459 and shall be made with stranding building wire.
 - 2. Devices shall comply with the requirements in this Section.

2.3 GFCI RECEPTACLES

- A. General Description:
 - 1. Straight blade, non-feed-through type.
 - 2. Comply with NEMA WD 1, NEMA WD 6, UL 498, UL 943 Class A, and FS W-C-596.
 - 3. Include indicator light that shows when the GFCI has malfunctioned and no longer provides proper GFCI protection.
- B. Duplex GFCI Convenience Receptacles, 125 V, 20 A:

Products: Subject to compliance with requirements, provide the following:

Cooper; VGF20.

- b. Hubbell; GFR5352L.
- c. Pass & Seymour; 2095.
- d. Leviton; 7590.
- e. <Insert manufacturer's name; catalog number(s)>.

2.4 WALL PLATES

- A. Wet-Location, Weatherproof Cover Plates: NEMA 250, complying with Type 3R, weather-resistant, die-cast aluminum with lockable cover.

2.5 FINISHES

- A. Device Color:
 - 1. Wiring Devices Connected to Normal Power System: Ivory unless otherwise indicated or required by NFPA 70 or device listing.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Comply with NECA 1, including mounting heights listed in that standard, unless otherwise indicated.
- B. Conductors:
 - 1. Do not strip insulation from conductors until right before they are spliced or terminated on devices.
 - 2. Strip insulation evenly around the conductor using tools designed for the purpose. Avoid scoring or nicking of solid wire or cutting strands from stranded wire.
 - 3. The length of free conductors at outlets for devices shall meet provisions of NFPA 70, Article 300, without pigtails.
 - 4. Existing Conductors:
 - a. Cut back and pigtail, or replace all damaged conductors.
 - b. Straighten conductors that remain and remove corrosion and foreign matter.
 - c. Pigtailing existing conductors is permitted, provided the outlet box is large enough.
- C. Device Installation:
 - 1. Connect devices to branch circuits using pigtails that are not less than 6 inches (152 mm) in length.

3.2 FIELD QUALITY CONTROL

- A. Verify correct polarity, ground continuity and correct operation of GFCI trip and reset.

END OF SECTION

**SECTION 262816
ENCLOSED SWITCHES AND CIRCUIT BREAKERS**

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
1. Molded-case circuit breakers (MCCBs).
 2. Enclosures.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of enclosed switch, circuit breaker, accessory, and component indicated. Include dimensioned elevations, sections, weights, and manufacturers' technical data on features, performance, electrical characteristics, ratings, accessories, and finishes.
1. Enclosure types and details for types other than NEMA 250, Type 1.
 2. Current and voltage ratings.
 3. Short-circuit current ratings (interrupting and withstand, as appropriate).
 4. Detail features, characteristics, ratings, and factory settings of individual overcurrent protective devices, accessories, and auxiliary components.

1.3 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For enclosed switches and circuit include the following:
1. Manufacturer's written instructions for testing and adjusting enclosed switches and circuit breakers.

1.4 PROJECT CONDITIONS

- A. Environmental Limitations: Rate equipment for continuous operation under the following conditions unless otherwise indicated:
1. Ambient Temperature: Not less than minus 22 deg F (minus 30 deg C) and not exceeding 104 deg F (40 deg C).
 2. Altitude: Not exceeding 6600 feet (2010 m).
- B. Interruption of Existing Electric Service: Do not interrupt electric service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary electric service according to requirements indicated:
1. Notify Owner no fewer than seven days in advance of proposed interruption of electric service.
 2. Indicate method of providing temporary electric service.
 3. Do not proceed with interruption of electric service without Owner's written permission.
 4. Comply with NFPA 70E.

1.5 COORDINATION

- A. Coordinate layout and installation of switches, circuit breakers, and components with equipment served and adjacent surfaces. Maintain required workspace clearances and required clearances for equipment access doors and panels.

PART 2 PRODUCTS

2.1 MOLDED-CASE CIRCUIT BREAKERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

2. General Electric Company; GE Consumer & Industrial - Electrical Distribution.
 3. Square D; a brand of Schneider Electric.
- B. General Requirements: Comply with UL 489, NEMA AB 1, and NEMA AB 3, with interrupting capacity to comply with available fault currents.
- C. Thermal-Magnetic Circuit Breakers: Inverse time-current element for low-level overloads and instantaneous magnetic trip element for short circuits.
- D. Features and Accessories:
1. Standard frame sizes, trip ratings, and number of poles.
 2. Lugs: Mechanical] type, suitable for number, size, trip ratings, and conductor material.
 3. Application Listing: Appropriate for application;

2.2 ENCLOSURES

- A. Enclosed Switches and Circuit Breakers: NEMA AB 1, NEMA KS 1, NEMA 250, and UL 50, to comply with environmental conditions at installed location.
1. Indoor, Dry and Clean Locations: NEMA 250, [Type 1] <Insert type>.
 2. Outdoor Locations: NEMA 250, Type 3R.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Examine elements and surfaces to receive enclosed switches and circuit breakers for compliance with installation tolerances and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Install individual wall-mounted switches and circuit breakers with tops at uniform height unless otherwise indicated.
- B. Comply with NECA 1.

3.3 FIELD QUALITY CONTROL

- A. Perform tests and inspections.
- B. Acceptance Testing Preparation:
1. Test insulation resistance for each enclosed switch and circuit breaker, component, connecting supply, feeder, and control circuit.
 2. Test continuity of each circuit.
- C. Tests and Inspections:
1. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.
 2. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.
 3. Test and adjust controls, remote monitoring, and safeties. Replace damaged and malfunctioning controls and equipment.
- D. Enclosed switches and circuit breakers will be considered defective if they do not pass tests and inspections.

- E. Prepare test and inspection reports, including a certified report that identifies enclosed switches and circuit breakers and that describes scanning results. Include notation of deficiencies detected, remedial action taken, and observations after remedial action.

3.4 ADJUSTING

- A. Adjust moving parts and operable components to function smoothly, and lubricate as recommended by manufacturer.

END OF SECTION