Wayne-Westland Community School District

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END OF SECTION

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	Not Applicable

END OF SECTION

SECTION 00 11 16
INVITATION TO BID

PART 1 - GENERAL

1.01 WORK INCLUDED: SERVER, SAN AND DATA CENTER UPGRADES

A. Wayne-Westland Community School District (Owner) is seeking bids for Server, SAN and Data Center associated equipment, installation and integration services. Proposed systems shall be configured and installed to service Owner's classrooms across multiple instructional facilities, and as described herein.

B. Project: SERVER, SAN AND DATA CENTER UPGRADES

C. Owner: Wayne-Westland Community School District
36745 Marquette
Westland, Michigan 48185

D. Designer: Communications by Design, Inc.

E. Sites of Work:

1. William D. Ford Career-Technical Center
36455 Marquette
Westland, Michigan 48185

2. Wayne Memorial High School
3001 4th Street
Wayne, Michigan 48184

1.02 GENERAL DESCRIPTION OF PROJECT SEQUENCE

A. Sequences and dates specified herein are for information only and indicate the plan and intent of the Owner. Actual dates shall be established based on final award of project.

B. Sequence of operations shall be established by the Contractor within the guidelines established by the Owner as required to meet schedules.

C. Schedule:

1. Request for Bid Distributed: November 13, 2026

2. Pre-Bid Meeting: December 2, 2026, at 1:30pm

3. Intent to Bids Due: December 4, 2026, by 5:00pm

4. Question and Clarification Deadline: December 4, 2026, by 5:00pm

5. Public Bids Due: December 16, 2026, at 1:30pm

1.03 TYPES OF BIDS

A. Bids shall be submitted in total and with required detail for each item bid and as is required herein, and include all portions of the work identified for the individual bid package as specified herein. Bids shall be made on unaltered bid forms as included herein. Bidder shall fill in all blank spaces and the bid shall be signed by a legal officer or agent authorized to bind the bidder to a contract.

1.04 PRE-BID CONFERENCE

A. A pre-bid conference will be held. A discussion of the project and review of bid documents will be followed by a site review and an opportunity to ask questions. Attendance is highly encouraged for all contractors interested in bidding on any components or portions of this project. Attendance at the pre-bid conference will be a factor considered during evaluation of bids.

B. Pre-bid Conference: December 2, 2026, at 1:30pm

C. Bid Opening Location: Wayne-Westland Community Schools
36745 Marquette
Westland, Michigan 48185

1.05 TIME AND PLACE OF BID RECEPTION

A. Physically sealed bids for the base bid work will be received at the district office and read aloud at a public opening. Bids arriving after the appointed time as determined by the Owner's representative conducting the public opening, shall be returned unopened. Bids will be accepted beginning forty-eight (48) hours prior to the appointed opening time provided they are in sealed packages and addressed as specified herein.

B. Bid Receipt Deadline: December 16, 2026, at 1:30pm

C. Bid Opening Location: Wayne-Westland Community School District
36745 Marquette
Westland, Michigan 48185

D. Faxed or electronically delivered bids will not be accepted.

1.06 EXAMINATION AND PROCUREMENT OF DOCUMENTS

A. Specifications and any relevant Drawings may be obtained from the Technology Designer. Contractors may obtain copies by documented request to Communications by Design, Attn: Rebecca Szilagy. Requests may be made by:

1. Writing – 4101 Sparks Drive Grand Rapids, Michigan 49546

2. Email – rszilagy@cbdconsulting.com

1.07 BID SECURITY

A. Bid security equal to five percent (5%) of the total bid amount, must accompany each base bid in accordance with the Instruction to Bidders.

B. Bid security shall be either a Bid Bond issued by a company licensed in the State of Michigan to furnish bid security or Certified Check made payable to the Owner.

1.08 PERFORMANCE BOND COVERAGE

A. Selected Contractor(s) will be required to provide a performance bond and payment bond in an amount equal to one hundred percent (100%) of the bid amount including any accepted alternates at the Owner's discretion. Such bonds shall be issued by surety licensed by the State of Michigan and acceptable to the Owner.

1.09 UNIVERSAL SERVICE FUND (USF) CONDITIONS

A. IDENTIFICATION NUMBER – the service provider's USF Service Provider Identification Number (SPIN) must be current and included in the Bid. Direct all questions regarding the USF requirements in this document to the Universal Service Administrative Company (USAC), Schools and Libraries Division (SLD) at (888) 203-8100.

B. FUNDING REQUESTS (FY27 E-rate) - The specified products and/or services are to be provided for FY27 (April 1, 2027-June 30, 2027) and qualify for universal service discounts under the FY27 universal service support mechanism, E-rate.

C. UNIVERSAL SERVICE DISCOUNTS – The service provider contract may be conditional upon the Owner receiving universal service discounts under the FY27 universal service support mechanism, E-rate. The Owner reserves the unrestricted right to change the contract amount by adding to, and/or reducing the amount of services and/or products in order to meet budget requirements in the event the level of universal service discounts is changed. Any such adjustments to the contract amount will be taken prior to the start of the specific work being adjusted or eliminated on a given building and/or project.

D. UNIVERSAL SERVICE DISCOUNT IMPLEMENTATION – The Owner reserves the unrestricted right to specify the filing option for the universal service discount for each product and/or service offered within the Bid: Billed Entity Applicant Reimbursement (BEAR) or Service Provider Invoice (SPI).

E. ELIGIBLE PRODUCTS AND SERVICES – The USF eligible products and/or services identified on the USAC FY27 (2026-2027) Eligible Services List, which is incorporated herein by reference, must be identified separately from any and all "ineligible" products and/or services in the Bid. Bidder shall note eligibility of items on required Schedule of Values form(s).

F. FUNDING AVAILABILITY – Owner may or may not elect to proceed with project in whole or, or in part based on multiple possible sources of funding. Approval of E-rate funding will not be the sole criteria for Owner approval to proceed with any/all/some implementation activity on or after April 1, 2027.

1.10 MICHIGAN PREVAILING WAGE REQUIREMENT

A. Project shall comply with Michigan Prevailing Wage Laws as applicable. See Appendix B for applicable Waye County Wage Survey results.

B. See Appendix C for copy of current Michigan Prevailing Wage Job Classifications as provided by THE STATE OF MICHIGAN DEPARTMENT OF LABOR AND ECONOMIC OPPORTUNITY as form WHD9820 for anticipated work for project(s).

C. Contractor shall comply with applicable reporting and certifications.

D. Contractor shall be registered with Michigan Dept of Labor and Economic Opportunity and shall provide copy of current registration verification letter.

1.11 OWNER'S RIGHT TO REJECT BIDS

A. The Owner reserves the right to reject any and/or all bids. The Owner reserves the right to accept a bid, or portion thereof by issuance of a valid purchase order within ninety (90) calendar days following the bid opening. No bids may be withdrawn during this time without the specific approval of the Owner.

B. Withdrawal of any Bids after the opening time without specific approval by Owner may result in forfeiture of required bid security by Bidder.

1.12 DEFINITIONS

A. "Owner" is intended to mean Wayne Westland Community School District, a general powers school district.

B. For purposes of this project, the terms “Architect”, “Engineer” and “Designer” are used synonymously to refer to Communications by Design, Inc., a Michigan Corporation.

C. The term “Bidder” refers to any organization properly and accurately submitting a complete “Intent to Bid Form” prior to the required time specified herein and subsequently properly submitting completed set of bid documents as specified herein.

D. The term “Contractor” herein is a reference to the firm(s) eventually selected by the Owner to provide the intended system(s), or any portion thereof, and fulfill the terms of the contract.

E. The term Contract is a reference to the collective set of documents, drawings, diagrams, Owner’s Purchase Order, Addenda and all other materials as provided for herein defining arrangement between Owner and Contractor.

F. The term Addenda (or Addendum) are that portion of the Contract consisting of modifications, amendments, deletions or substitutions to the contract documents issued prior to the execution of the Contract.

END OF SECTION

SECTION 00 40 00
BID FORMS

Intent to Bid Form

Complete and submit the following form if you have interest or intend to submit a Bid for this project. Unaltered and completed forms must be received on or before 5:00 PM on December 2, 2026. Only bidders returning a completed "Intent to Bid Form" will be notified of required addenda.

Company Information

Name: _____

Address Line1: _____

Address Line2: _____

City, State and Zip Code _____

Primary Contact Information

Name: _____

Phone No.: _____

Fax. No.: _____

E-Mail Address: _____

Portions of the bid for which you will be responding:

- ☐ Section 26 33 53 – Uninterruptible Power Supplies
- ☐ Section 27 21 19 – Data Communication Switches
- ☐ Section 27 22 19 – Server, SAN & Data Center Equipment
- ☐ Section 27 26 26 – Server, SAN & Data Center Integration

- ☐ Please forward Appendix A - Existing Server Schedule

Submit unaltered and completed form to:

Rebecca Szilagy
Communications by Design, Inc.
rszilagy@cbdconsulting.com

SEALED BID LABEL

Separate, or fold over, the label on the line below, and affix to the exterior of sealed container so information is clearly visible for Bid Submission. Ensure label is attached in a manner to prevent accidental removal or defacement. Label shall serve as sole identification for sealed bid at submission.

BID TO: Wayne-Westland Community School District
Attention: Ms. Jewell Clair
36745 Marquette
Westland, Michigan 48185

BID FROM: _____

_____

_____

PROJECT: SERVER, SAN AND DATA CENTER UPGRADES
TECHNOLOGY BID #3109

INCLUDING ADDENDA: Addendum No._____Dated_____
Addendum No._____Dated_____

DUE: December 16, 2026 1:30pm

BID FORM

BID TO: Wayne-Westland Community School District
Attention: Ms. Jewell Clair
36745 Marquette
Westland, Michigan 48185

BID FROM: _____

_____

_____

PROJECT: SERVER, SAN AND DATA CENTER UPGRADES
TECHNOLOGY BID #3109

The undersigned, having familiarized themselves with all local conditions affecting the cost of work, and having examined the site and all applicable Bidding Documents herein, and herein referenced, including, but not limited to, all addenda issued thereto, hereby propose to furnish all labor, material, equipment, applicable taxes and services required for proper completion of each of the following categories of this project for the sum of:

Bid Category _____ Title_____

_____Dollars ($_____).
Said amount written above constituting the Base Bid

Bid Category _____ Title_____

_____Dollars ($_____).
Said amount written above constituting the Base Bid

Bid Category _____ Title_____

_____Dollars ($_____).
Said amount written above constituting the Base Bid

Bid Category _____ Title_____

_____Dollars ($_____).
Said amount written above constituting the Base Bid

TAXES:
Bid sum includes all applicable taxes.

ALLOWANCES:
Base bid includes all applicable allowance cost(s) as set forth herein.

COST OF BONDS:
Bid sum includes cost of furnishing a Performance Bond and Labor and Material Payment Bond, each in the amount of one hundred percent (100%) of the bid.

ACKNOWLEDGEMENT OF ADDENDA:
The following addenda have been received, are hereby acknowledged, and their execution is included in both base bid and alternate bids herein.

Addendum No._____Dated_____ Addendum No._____Dated_____

ALTERNATES:
Base bid amount may be increased or decreased in accordance with each of the following alternate bids as may be selected, following procedures stated herein. Voluntary Alternates shown below are identified and described in detail on appropriate attachment(s) as referenced herein.

Voluntary Alternate A _____

Voluntary Alternate B _____

Voluntary Alternate C _____

Voluntary Alternate D _____

Voluntary Alternate E _____

PRINCIPAL SUBCONTRACTORS
As required herein, the following Subcontractors are proposed to be used for this project:

Legal Name:_____Work Proposed_____

Legal Name:_____Work Proposed_____

Legal Name:_____Work Proposed_____

BID SECURITY:
Accompanying this Bid, as required herein, is a bid security in the form of Certified Check/Cashier's Check/Bidder's Bond in the amount of:

_____ Dollars ($_____),
payable to the Owner, which it is agreed, shall be retained as liquidated damages, not as a penalty, by the Owner, if the undersigned fails to execute the Contract in conformity with the form of Contract incorporated and referenced herein and fails to furnish specified bonds within ten (10) days after date of issuance of a Letter of Intent to the undersigned.

If awarded the Contract, the undersigned agrees to commence work within ten (10) calendar days after date of issuance of a Purchase Order, which shall be considered as the notice to proceed, and agrees to complete the work in accordance with the schedule herein.

FAMILIAL DISCLOSURE:
Accompanying this Bid, as required herein, is a legally executed and notarized Michigan Familial Disclosure Statement.

EXCEPTIONS:
Bidder takes no exception to terms, conditions, specifications and/or any other requirements herein unless expressly noted, and specifically identified as provided for herein on unaltered Contract Exception form accompanying this Bid.

SIGNATORY AUTHORITY:
The undersigned certifies they are an authorized agent of the bidding entity, and legally able to bind the bidding entity to the terms, conditions and responsibilities of this, and all referenced bid documents. Furthermore, the undersigned acknowledges an understanding that non-compliance of this authority or any other bidding requirements may result in forfeiture of bid security, dismissal of consideration of bid submitted, and/or personal liability against the signatory.

AGREEMENT:
The undersigned agree(s) to provide the post-bid information required within ten (10) days after notification of a Letter of Intent and to execute an agreement for work covered by this Bid on the Owner's standard Purchase Order for which terms and conditions are expanded to include all Bidding Documents and subsequent addenda issued thereto.

In submitting this bid, it is understood that the Owner reserves the right to reject any or all bids. It is further agreed that this bid is binding for a period of Ninety (90) days from the opening thereof.

Respectfully submitted,

Date: _____

Firm Name: _____

By: _____

Signed: _____

Title: _____

Official Address: _____

_____

Telephone Number: _____

Fax Number: _____

Primary Contact Email Address: _____

(If Corporation, affix Seal)

Michigan Familial Relationship Disclosure Statement

In accordance with Section 1267 of Michigan Revised School Code this sworn and notarized statement of an authorized representative, discloses any familial relationship between the owner and/or any employee of the Bidder, and any member of the project Owner's governing Board(s) or Superintendent(s).

If any conflict of interest is discovered subsequent to submission of bid, written disclosure shall be submitted to the project Owner within seven (7) days of discovery. The project Owner reserves the right to immediately terminate any contract with Bidder upon notification of a conflict of interest. Upon such termination, the project Owner shall compensate Bidder only for the value of any goods or services provided to the Owner prior to such termination as determined by Designer.

(Check only one Box Below)

☐ It is hereby acknowledged and certified by Bidder that no familial relationship exists between the owner or any employee of the Bidder and any member of the project Owner's governing Board(s) or Superintendent(s).

☐ A familial relationship exists between the owner or an employee of the Bidder and a member of the project Owner's governing Board(s) or Superintendent(s). The person(s) and the relationship(s) are as follows:

Bidder	***Board or Superintendent***
_____	_____
_____	_____
_____	_____
_____	_____

Bidder Authorized Representative:

Bidder: _____

Representative's Signature: _____

Print or Type Name: _____

Representative's Title: _____

Subscribed and sworn this _____ day of _____, 20____.

In the County of _____ State of _____

By _____ Seal or Stamp:
Notary Public Signature

My commission expires on: _____

AFFIDAVIT OF COMPLIANCE – IRAN ECONOMIC SANCTIONS ACT
Michigan Public Act No. 517 of 2012

The undersigned, the owner or authorized officer of the below named contractor (the "Contractor"), pursuant to the compliance certification requirement provided in the **WAYNE-WESTLAND COMMUNITY SCHOOLS** (the "School District") Request For Proposals for District Technology Renovations (the "RFP"), hereby certifies, represents and warrants that the Contractor (including its officers, directors and employees) is not an "Iran linked business" within the meaning of the Iran Economic Sanctions Act, Michigan Public Act No. 517 of 2012 (the "Act"), and that in the event Contractor is awarded a contract as a result of the aforementioned RFP, the Contractor will not become an "Iran linked business" at any time during the course of performing the Work or any services under the contract.

The Contractor further acknowledges that any person who is found to have submitted a false certification is responsible for a civil penalty of not more than $250,000.00 or 2 times the amount of the contract or proposed contract for which the false certification was made, whichever is greater, the cost of the School District's investigation, and reasonable attorney fees, in addition to the fine. Moreover, any person who submitted a false certification shall be ineligible to bid on a request for proposal for three (3) years from the date the it is determined that the person has submitted the false certification.

CONTRACTOR:

BIDDER'S FIRM NAME _____

BY (SIGNATURE) _____

PRINTED NAME AND TITLE _____

STATE OF MICHIGAN)
)
COUNTY OF)

Subscribe and sworn before me on this _____ Seal:

day of_____, 20____, a Notary Public

in and for _____ County,

_____
Notary Public

My Commission expires _____ _____

REFERENCES

Customer name: _____
Address: _____
City/State/Zip: _____
Contact name: _____
Contact title: _____
Phone: _____
E-mail: _____
Scope of project: _____
_____
_____
Date of completion: _____

Customer name: _____
Address: _____
City/State/Zip: _____
Contact name: _____
Contact title: _____
Phone: _____
E-mail: _____
Scope of project: _____
_____
_____
Date of completion: _____

Customer name: _____
Address: _____
City/State/Zip: _____
Contact name: _____
Contact title: _____
Phone: _____
E-mail: _____
Scope of project: _____
_____
_____
Date of completion: _____

CONTRACT EXCEPTIONS

Check one Box

☐ Bidder takes no exception to, and agrees to comply with all sections, terms, conditions and/or requirements of the Contract Documents.

☐ Bidder proposes the following exceptions to the Contract Documents:

Paragraph Number	***Explanation***
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

NOTE:
Exception(s) to any bid sections, terms, conditions and/or requirements deemed excessive for any reason by the Owner and/or Designer may result in disqualification of Bid.

SCHEDULE OF VALUES/BID FORM

(Bidder may submit version of only this form with slight variation. All information in this form is required. Form submitted must materially match below both in content and format. Electronic version of this form is required with bid package as Microsoft Excel compatible spreadsheet on provided USB drive for each project section being bid. Failure to provide appropriate and complete SCHEDULE OF VALUES, as determined by the Owner and/or Designer, may result in disqualification of Bid. Bidder shall duplicate form as needed for bid submission)

Bidder: ____Bid Division: _________

ID	***Qty***	***Part Number***	***Mfg and Description***	***Unit Cost***	***Unit Labor Cost***	***Total Proposed Cost***
			PROJECT MANAGEMENT			
			TRAINING			
			BONDS AND INSURANCE			
			GRAND TOTAL (Must match base bid)			

END OF SECTION

SECTION 00 21 13
INSTRUCTIONS TO BIDDERS

PART 1 - GENERAL

1.01 OWNERSHIP

A. Bidders prepare and provide bids without any cost to the Owner and/or Designer. Once opened, bids become the sole property of the Owner. Bidders have no claim to, or ownership of bids opened. Bids become subject to all legal statutes including, if applicable, United States and Michigan Freedom of Information Acts and related laws.

1.02 COMPLIANCE

A. This document establishes the primary system(s) design configuration. The Bidder's bid response shall include all services, supplies, components and equipment required to provide a complete turnkey system(s) which meets or exceeds all specifications for each given bid item being proposed.

B. Owner prefers to enter into a contract with a single bidder for all materials for completion of this project, but shall consider combinations of portions of bids from various bidders. The Owner reserves the right to award portions of the project to multiple bidders who will be required to cooperate with one another in order to complete the work.

C. By their response, Bidders agree to comply with all sections, terms, conditions and/or requirements of the contract documents except as expressly noted, and specifically identified by paragraph number on the unaltered Contract Exceptions Bid Form. Exceptions to any bid sections, terms, conditions and/or requirements deemed excessive by the Owner and/or Bid Coordinator may disqualify Bid.

D. In compliance with the Freedom of Information Act (FOIA), the Owner shall make bid documents available for public review after issuance of purchase order to the successful bidder/s.

E. In connection with the execution of this Contract, Contractor and any Subcontractors shall not discriminate against any employee or applicant for employment because of race, religion, color, sex, age, or national origin.

F. Negligence in preparation, improper preparation, errors in, or omissions from Bids shall not relieve Bidder from fulfillment of any and all obligations and requirements of the Contract Documents.

G. All Bid documents and worksheets must be completed in detail and submitted together on time.

H. All documents constituting the entire present agreement shall be construed in accordance with and governed by the laws of the State of Michigan.

I. Designer shall have authority for interpretation of Contract Documents. In the event terms, provisions or any other portion of the Contract Documents is/are in dispute, Designer shall have full and final authority to interpret the Contract Documents, and such interpretation shall be final and binding.

J. In the event of a conflict between any terms or conditions in any of the documents comprising the entire present Agreement, the terms and conditions set forth in this document shall take precedence.

1.03 NOTICE AND RESPONSE

A. Upon notification of Bidder being considered as a finalist, the Bidder shall provide to the Owner and Designer, within 48 hours, a current "Dunn and Bradstreet Supplier Evaluation Report" and other documentation as may be required of finalists herein and as requested by Owner and/or Bid Coordinator.

B. Bidder shall provide timely response to all requests from Designer and/or Owner regarding clarification and/or elaboration concerning, but not limited to its Bid as may be deemed relevant by the Owner and/or Designer.

1.04 PROTECTION AND SAFETY

A. Contractor shall continuously maintain adequate protection of all Work from damage and shall protect the Owner's property from injury or loss arising in connection with the execution of the Contract. Contractor shall make good any such damage, injury or loss, except such as may be directly caused by agents or employees of the Owner. The Contractor shall adequately protect adjacent property as required by law, by the Contract Documents, or as otherwise required, to cause no damage to them during the execution of the Contract. This requirement shall also apply to structures above and below ground as conditions of the site require.

B. Contractor shall be solely responsible for, and have control over means, methods, techniques, sequences and procedures for initiating, maintaining and supervising all safety precautions and programs in connection with the performance of the contract. Contractor shall take all necessary precautions for the safety of employees and visitors on the site of the Project and shall comply with applicable provisions of federal, state, and municipal safety laws and building codes to prevent accidents or injury to persons on, about, or adjacent to the premises where the Work is being performed. Contractor shall erect and properly maintain at all times, as required by the conditions and

progress of the Work, all necessary safeguards for the protection of workers and the community.

C. Contractor shall vigorously defend any and all suits that may be brought against the Owner by any person and/or entity, whether in the employ of the Contractor or not, for damage to property, and/or injury or death to persons alleged or claimed to have been caused by or through the performance of work.

1.05 DRAWINGS DIAGRAMS AND ILLUSTRATIONS

A. Drawings, Diagrams and Illustrations are diagrammatic in nature and indicate general arrangement and nature of systems and work included.

B. Floor plan drawings are provided to assist the contractor in preparing documentation and reports as required herein.

PART 2 - MATERIALS

2.01 VOLUNTARY ALTERNATES AND SUBSTITUTION OF SPECIFIED PRODUCTS

A. This Request for Bid describes a particular implementation. All Bids must provide pricing on the "base bid" as described herein. Voluntary alternatives providing comparable functionality with significant cost reduction and/or performance enhancement may be proposed. Voluntary alternatives are encouraged, but must be identified as "Voluntary Alternates" and detailed on unaltered Bid Forms contained herein. Voluntary Alternates may be further detailed and/or explained in attachments to the unaltered Bid Forms contained herein. Exceptions to the Request for Bid specifications must be clearly noted and explained for each Voluntary Alternate proposed.

B. No substitutions of specified products may be made without specific prior authorization by Designer and Owner. Individual bid divisions herein contain particular information related to acceptable manufacturer and product requirements.

C. Trade-in, equipment/license exchanges or other return allowances may be provided as a voluntary alternate. Trade-in, exchange or other return equipment allowances shall <u>not</u> be included in base bid amount.

PART 3 - EXECUTION

3.01 EXAMINATION OF DOCUMENTS AND SITE

A. Bidders shall carefully examine the Contract Documents and the construction site to obtain first-hand knowledge of existing conditions and requirements. No plea of ignorance of conditions that exist, or any other relevant matter

concerning work to be performed in the execution of work will be accepted as justification for failure to fulfill every detail of all requirements as described herein.

3.02 QUESTIONS, INTERPRETATIONS AND ADDENDA

A. Any bidder finding discrepancies between Drawings, Specifications and/or Bid Documents, or be in doubt as to the exact meaning of any provision or detail shall notify the Designer at once, and before the deadline for Questions and Clarifications. The Designer may then, at their option, issue Addenda clarifying same. The Designer is not responsible for oral instructions, or Bidder's/Contractor's misinterpretations of Drawings, Specifications and/or Bid Documents.

B. The Designer reserves the right to issue Addenda at any time up to thirty-six (36) hours prior to the scheduled bid opening. All such addenda shall become, upon issuance, an inseparable part of the Specification/Contract Documents. Each bidder shall incorporate within their bid all costs for items listed in any/all Addenda, and shall acknowledge receipt and identifying number of each Addendum on the Bid Form and on the outside of the sealed bid container.

C. Addenda will be forwarded to each bidder who has received a copy of the Bidding Documents and has submitted "Intent to Bid Form".

3.03 BID SECURITY, BONDS AND INSURANCE

A. Bid Security, Performance and Payment Bonds are required on this project.

1. Bid security equal to five percent (5%) of the bid amount must accompany each bid in accordance with the Instruction to Bidders.

a. Bid security shall be either a Bid Bond issued by a company licensed in the State of Michigan to furnish bid security or Certified Check made payable to the Owner.

B. The selected Contractor will be required to provide a performance bond and a payment bond each in an amount equal to one hundred percent (100%) of the bid amount including any accepted alternates at the Owner's discretion.

1. The surety of the performance bond shall remain in effect until all acceptances and final contract close-out requirements herein have been executed by the Owner.

C. Contractor shall provide, prior to beginning any work at the sites, certificate of insurance for delivery to Owner indicating all required insurance coverage is in force.

1. Workers' Compensation and Employer's Liability Insurance

    a. Coverage A – Statutory

    b. Coverage B - $1,000,000 Per Accident

2. Broad Form Comprehensive General Liability Insurance (including – Premises, Elevators, Contractor's Protective Liability, Contractual, Products & Completed Operations – including Broad Form Extensions).

    a. Each Occurrence - $1,000,000

    b. General Aggregate - $2,000,000

    c. Products & Completed Operation Aggregate - $2,000,000

    d. Personal Injury & Advertising Injury - $1,000,000

    e. Fire Legal - $100,000

3. Sub-contractors Operations, Products – Completed Operations and Contractual Liabilities, plus such excess coverage as may be appropriate for the limits listed.

4. Comprehensive Automobile Liability Insurance (owned, hired, and non-owned automobiles).

    a. Bodily - $1,000,000 each Person and $1,000,000 each Occurrence

    b. Property Damage - $1,000,000

5. Furnish Owner with Contingent Liability Insurance Policy with coverage and liability limits the same as for Public Liability Insurance specified herein. Designate on policy as assured, only the Owner.

6. Furnish Owner with Contingent Property Damage Insurance Policy with coverage and liability limits the same as for Property Damage specified herein. Designate on policy as assured, only the Owner.

7. Policies shall include notification clause requiring ninety (90) days written notice to Owner in the event of policy cancellation, expiration, non-renewal, coverage reduction or other material change.

8. Contractor shall not commence work under the Contract until after all insurance required herein has been obtained and certificates for such are approved by Owner.

D. All such bonds and/or insurance shall be issued by surety licensed by the State of Michigan and acceptable to the Owner.

1. Insurance certificate(s) shall be signed by insurance agent licensed in the state of Michigan or a representative of the insurance company.

E. Contractor agrees to indemnify and hold harmless the Owner and Designer, including their agents and employees, from and against all claims, damages, losses and expenses, including, but not limited to, attorney fees arising out of, or resulting from the performance of the work to the fullest extent allowed by law on a comparison basis of fault.

3.04 MODIFICATION AND WITHDRAWAL

A. Bids may be withdrawn and/or changed any time prior to the deadline for submission of bids. Bids may not be withdrawn or changed thereafter and shall be deemed a firm offer continuing for ninety (90) calendar days. Bids received after the deadline for submission will be returned unopened at the Owner's discretion.

B. Withdrawal of any Bid after the opening time without specific approval by Owner may result in forfeiture of required bid security by Bidder.

3.05 CODES, ORDINANCES, REGULATIONS AND RELATED

A. All labor and materials shall be furnished and installed in strict accordance with the latest applicable codes, ordinances and regulations of any governing body having jurisdiction over this project.

B. In the event the quality of labor and materials required by the Drawings and Specifications herein exceeds requirements of current applicable codes, ordinances and regulations, the Drawings and Specifications shall take precedence.

C. In the event the quality of labor and materials required by current applicable codes, ordinances and regulations having jurisdiction over this project exceeds that of the Drawings and Specifications herein, the applicable codes, ordinances and regulations shall take precedence.

D. The Contractor shall give all notices and comply with all codes, laws, ordinances, rules and regulations of any authority having jurisdiction, which bears on the performance of its work. This compliance includes, but is not limited to, the Michigan School Safety Initiative (PA129, PA130, PA131 and PA138) if applicable to work being performed.

E. The Contractor shall pay for all licenses, permits, taxes, and fees required for this project; and shall comply with all federal, state, local and Owner's codes, laws, ordinances, regulations and other requirements applicable to the work specified at no additional cost to the Owner. Contractor shall submit copies of all approved certificates and approvals to the Owner upon receipt.

3.06 SUB-CONTRACTOR AND MATERIAL SUPPLIER

A. The successful Bidder shall submit to the Owner and Designer a complete list of all sub-contractors and all material suppliers proposed to engage on the work. Sub-contracts shall not be awarded until after they have been approved by the Designer and Owner.

B. Finalist bidders may be required to submit additional details related to sub-contractors and suppliers within forty-eight (48) hours after the bid opening.

C. Names of any principal sub-contractors must be listed on the Bid Form.

D. All contracts made by the successful Bidder with Subcontractors shall be covered by the terms and conditions herein. The successful Bidder shall see to it that Subcontractors are fully informed in regard to these terms and conditions, and shall bind all subcontractors to the same terms and conditions. Failure to do so will absolve the Owner from any liability for additional cost due to subcontractor claims for additional cost, time or any claim(s) for additional cost by subcontractor(s).

3.07 BID RESPONSE FORMAT

A. Bidder shall provide complete Bid copies in two formats as described herein.

1. One (1) Hard copy format responses shall be in a bound tabulated format. Each response shall have tab indicators for each section.

2. One (1) Electronic copy format responses shall be submitted on a USB Drive, readable by a standard Microsoft Windows workstation. Electronic media shall contain separate folders to organize response documentation as described herein. Files submitted electronically shall be ***Adobe Acrobat*** "PDF" format (SCHEDULE OF VALUES is additionally required to be on the disk in the appropriate folder as a spreadsheet and as described herein).

B. All Bid Response formats shall be clearly externally marked to include, but not be limited to:

1. Bidder identification.

2. Project Owner identification.

3. Project name.

4. Bid submission date.

C. Bid Responses shall include an index containing copies/PDF of a complete index of documents comprising Bid Response. Responses shall include, but not be limited to the following tabbed/folder sections:

1. Section 1 – Forms, which shall contain copies/PDF files of all required and completed bid forms.

    a. BID FORM

    b. Michigan Familial Relationship Disclosure Statement

    c. REFERENCES

    d. CONTRACT EXCEPTIONS

    e. SCHEDULE(s) OF VALUES

    f. BID BOND

2. Section 2 – Overview, which shall contain copies/PDF files of cover letter and/or executive overview.

3. Section 3 – Submittals, which shall contain copies/PDF files of all required and voluntary submittals.

4. Section 4 – Appendices, which shall contain copies/PDF files of other reference materials Bidder wishes to or is required to submit.

3.08 AWARD OF CONTRACT

A. The material proposed to be used for the completion of work, and the competency, solvency and responsibility of bidders will receive due consideration before award of contract. In the reception of bids for this work, the Owner incurs no obligation to accept the lowest, or any bid submitted. The right to accept or reject any and all bids or portion thereof is reserved by the Owner. The Owner reserves the right to require testimonial, accounting or legal documents pertaining to the solvency of a Contractor, or any other decision factor the Owner deems appropriate, prior to award of contract.

B. Owner reserves the right to select individual components from schedule of values independent of installation as may be determined in Owners best interest. Selected bidder may be required to install selected components provided by others.

C. Issuance of a Purchase Order by Owner in response to a valid bid shall be a Notice to Proceed, and shall become part of, but not limited to, all terms, conditions and requirements herein. Notice to Proceed shall have the full effect of contract award, and shall make all terms, conditions, requirements

and responsibilities of Bidder binding upon issuance. Notice to Proceed, once issued, shall become an inseparable part of the contract documents herein, and constitute both Bidder and Owner's acceptance of contract.

3.09 TIME, SCHEDULES, PROJECT MANAGEMENT, MEETINGS AND PLANS

A. Time is of the essence on this project. Award of contracts for this project will be contingent on the bidder's agreement to complete the work on or before the contract completion date stated herein.

B. All Contractors will commence work in such a manner and at such a time as to expeditiously interface with the work of other Contractors, and will pursue the project diligently to completion. All Contractors will work in a cooperative manner with Owner and other Contractors.

C. Contractor shall appoint an overall Project Manager acceptable to Owner, with skills and experience deemed appropriate by the Owner for the scope and size of the project. Project Manager shall be responsible for the scheduling of all Contractor resources and attending all project meetings. Upon notification of Bidder being considered a finalist, the Bidder shall submit professional resume of proposed Project Manager within forty-eight (48) hours.

1. Project meetings shall be conducted at Owner's selected and identified location weekly and at Owner's and/or Designer's discretion.

2. Within five (5) days of Notice to Proceed (issuance of a Purchase Order by the Owner), Contractor's Project Manager shall provide to the Owner a critical flow path in the form of a "Gantt Chart" (or equivalent) indicating the proposed sequence of events and approximate beginning and completion dates in accordance with, compliance to, and coordinated with requirements herein.

3. Changes of the Project Manager during the project shall not be acceptable without prior written approval from the Owner.

4. It is the responsibility of the Contractor's Project Manager to schedule work, work out issues, ensure that all required products and services are delivered according to schedule and attend to any other matters required by the Owner in the interest of professional and timely completion of the project.

5. The appointed Project Manager, or a designee acceptable to the Owner, shall be in attendance of all project meetings throughout the term of the project. Failure to do so may be considered a material breach of contract.

6. After a ten (10) business day notice, the Owner reserves the right to request a new Project Manager, when it appears that, in the Owner's sole

discretion, the Project Manager is not fulfilling the full responsibilities of the position. Failure by Contractor to provide adequate Project Manager meeting requirements of the Owner, may result in Contract termination.

3.10 CHANGES IN THE WORK

A. No changes in work with the effect of either increasing or decreasing in the project value shall be made without specific and prior authorization by the Owner and Designer.

B. Owner, without invalidating the contract and without notice to any surety, may at any time order extra work or make changes by altering, adding to or deducting from the work, the Contract Sum being adjusted accordingly. All such work shall be authorized by a written Change Order approved by Owner and Contract Designer. Upon receipt of such an order Contractor shall promptly proceed with the work involved. All such work shall be executed under the conditions of the original Contract. Owner authorized change order(s) may be issued at any time prior to Contract close out.

C. When so directed, Contractor shall promptly submit an itemized estimate and a unit price for performing or deleting such extra or changed work as may be contemplated. Any extensions or reductions of the contract time associated with extra or changed work shall be identified at the time Contractor submits such documentation.

D. At the Owner's discretion, adjustments in the Contract Sum shall be determined by one or more of the following methods:

1. By mutual acceptance of a lump sum cost, including overhead and profit, itemized and supported by sufficient substantiating data to permit evaluation.

2. By unit prices stated in the Contract Documents including, but not limited to, Schedule of Values.

3. By unit prices mutually agreed upon.

3.11 PAYMENT REQUESTS AND PAYMENTS

A. Contractor's invoices shall be submitted monthly in correlation with the Project Schedule indicating percentage of work completed.

B. All contract and change order invoices shall be sent directly to Contract Designer.

C. A 10% retainage shall be held back on all payment requests, including, but not limited to hardware, software, change orders and services, until final

completion and close out of the project or project phase as determined by Owner and Designer.

D. Contractors are required to submit all invoices on approved AIA Payment Request Forms or other billing format pre-approved by Contract Designer. Each AIA Payment Request Form shall be accompanied by a properly completed, executed and notarized Waiver of Lien which shall be in a format and contain verbiage approved by Owner.

E. The Contract Designer and Owner shall process payment requests on a monthly schedule and in accordance with their respective established processes and procedures. Payments will be made by the Owner based only on AIA Request Forms having been previously certified, audited and approved by Contract Designer and accompanied by acceptable Waiver of Lien.

END OF SECTION

SECTION 00 65 00
CONTRACT CLOSE OUT

PART 1 - GENERAL

1.01 WORK INCLUDED

A. Provide an orderly and efficient transfer of the completed work to Owner.

B. Details affecting work of this Section includes, but is not limited to all other Sections herein and all related Contract Documents.

C. Activities relative to Contract close-out are described in, but not limited to, this and other Sections of this document.

1.02 SUBSTANTIAL COMPLETION

A. "Substantial Completion" shall be defined as:

1. All responsibilities of Contractor for all provisions and requirements of all divisions and sections of complete Contract herein, and as amended, are properly and fully completed or properly, accurately and acceptably provisioned for.

2. All systems, equipment, facilities, services, programming and/or components required by all divisions and sections of complete Contract are fully operational, acceptable and useful to the Owner for their intended purposes.

B. Prior to requesting inspection by Designer to certify Substantial Completion, Contractor shall use adequate means to assure the Work is completed in accordance with the specified requirements and is ready for such inspection.

PART 2 - MATERIALS

2.01 NOT USED FOR THIS SECTION

PART 3 - EXECUTION

3.01 PROCEDURES

A. Contractor shall submit a written request to Designer indicating they have achieved Substantial Completion of Work.

B. Within a reasonable time after receipt of the request, Designer will inspect Work to determine status of completion.

C. Should Designer determine the Work is not substantially complete:

1. Designer promptly will so notify Contractor, in writing giving reasons therefore and providing sufficient details to allow Contractor to make corrective actions.

2. Contractor shall then expeditiously remedy the deficiencies and notify Designer in writing when ready for re-inspection.

3. Designer will re-inspect the Work.

4. Excessive re-inspections of Work may result in fees being assessed Contractor.

D. Should Designer concur the Work is substantially complete:

1. Designer will prepare a letter of Substantial Completion.

2. Designer will submit the letter to Owner and Contractor.

3. Contract shall be deemed “Closed Out” for retainage purposes.

4. Final Acceptance of the system shall be deemed complete.

END OF SECTION

SECTION 26 33 53
UNINTERRUPTIBLE POWER SUPPLIES

PART 1 - GENERAL

1.01 DESCRIPTION OF PROJECT

A. Work described in this specification section pertains to supply and installation of new uninterruptable power supply (UPS) units.

B. Contractor shall advise, coordinate and work cooperatively with Owner representatives and/or owner's designee related to installation.

C. Contractor shall configure, supply, connect, test, document, train Owner representatives and warrant a fully operational and compliant system, complete and with full functionality as specified herein.

D. Contractor shall coordinate installation with other contractors, Architect and the Owner as is appropriate.

1.02 WARRANTY

A. Complete installation shall be free from defect and/or failure for a period of five (5) years. Any replacement, upgrade or fix, including labor for any non-conforming, unsupportable or non-operational part of the system shall be fixed and/or replaced at no cost to the Owner.

B. Manufacturer's warranty shall be provided for all components of the system.

1. Any documents and/or submittals required by individual manufacturers for compliance with the standard and/or applicable extended warranty programs shall be provided and submitted for approval by the Contractor.

2. Contractor shall submit all documents, apply for warranty or extended warranty certification, and provide a Certificate of Warranty or Extended Warranty as may be applicable from the manufacturer prior to project closeout.

C. On-site services provided under the warranty shall be performed by personnel or representatives of Contractor as herein defined and located within physical proximity to provide response levels as specified herein.

D. System Warranty shall commence on date of substantial completion as certified by Designer and provided for herein. Delivery to work site of materials, physical removal from packaging, issuance of Contractor documents including, but not limited to invoices and/or packing slips, or any

event or documentation, not specifically provided for herein, shall have no effect on Warranty or System Acceptance by Owner and/or Designer.

1.03 STORAGE OF MATERIALS

A. All materials shall be secured when not in use by the Contractor.

B. It shall be the Contractor's responsibility to secure all equipment including material to be installed as part of the contract. No changes shall be made to the contract due to loss or theft of equipment and/or materials not officially accepted by the Owner.

C. Formal receipt of the materials shall not be completed by the Owner until completion of project closeout. The Contractor shall be responsible for all equipment until time of closeout as provided for herein.

1.04 SUBMITTALS

A. Submittals shall consist of, but not be limited to, technical cut sheets and detailed information pamphlets on all components of the system to be installed. All cut sheets and submittals shall be distinctly marked to highlight the actual part number of the item being submitted for approval with Bid Proposals.

B. Shop drawings and diagrams shall be submitted by Bidder for approval by Designer with Bid Proposals.

1. Shop drawings and diagrams shall show all data relating to structural, electrical, wiring, cross connect, interconnect, equipment arrangement/layout, and any other information deemed significant by the Designer.

2. No work constituting final installation shall be commenced until after approval of shop drawings by Designer.

C. Contractor shall provide proof of manufacturer support by photocopy of certification and letter of support from major component manufacturers for this specific project with Bid Proposals.

D. Equipment or material installed for this project that does not have an approved submittal associated with it, will be removed and replaced with acceptable equipment or material as defined by the Designer. All replacement costs including, but not limited to material and labor, shall be the sole responsibility of the Contractor.

1. The Owner and/or Designer may notify Contractor of any offending situations under this provision allowing Contractor up to forty-eight (48) hours to correct the situation prior to taking other corrective action.

2. The Owner reserves the right to replace unapproved materials and deduct the costs of doing so as defined herein from any amounts that may be due or become due Contractor.

1.05 REFERENCE SPECIFICATIONS

A. All work, products, and materials shall conform with the following standards as applicable for the intended use:

1. EIA/TIA Commercial and Administration Standards

2. FCC – All Applicable Rules and Regulations

3. IEEE

4. MOSHA Safety Standards

5. NEC

6. UL

1.06 CONTRACTOR

A. The Contractor shall accept complete responsibility for the installation, certification and support of the system. Contractor shall be an authorized vendor of all major components.

B. All work shall be performed and supervised by Project Managers, Engineers and/or Technicians who are qualified to install system and perform related tasks as recommended by the manufacturer and in accordance with the manufacturer's best practices and methods.

C. Project Managers, Engineers and Technicians employed on this project shall be properly and fully trained and qualified by the manufacturer on the installation and testing of the equipment and systems to be installed.

D. The Contractor shall have a proven track record in relevant similar system configuration and installation. This must be shown by the inclusion of references of at least three (3) projects involving the installation of similar systems completed by the Contractor in the prior two (2) years on unaltered forms with the sealed Bid Proposal as provided herein. Bid Proposal Form(s) may be duplicated as required in order to provide adequate space to list required number of reference installations for each division Bidder is responding to.

PART 2 - PRODUCTS

2.01 Supply the most current version of all products provided.

A. Manufacturer shall have five (5) years of experience and history manufacturing similar products to those specified.

B. Proposed components shall have been field tested and proven in actual use.

C. Prior and/or old versions of products, unless specifically approved and documented by Designer and/or Owner shall not be acceptable.

D. In cases where a newer version of hardware or software is available at the time of installation, Contractor shall request clarification from Designer on which version is to be used.

2.02 Furnish only new, first-class quality materials and equipment.

2.03 Administration access shall be protected by unique and secure log on.

2.04 In the event of a power failure, complete system shall automatically re-initialize and "become active" to the last configuration in use with no human intervention.

2.05 Acceptable Manufacturers (in alphabetical order)

A. APC

B. EATON

C. CYBERPOWER

D. LIEBERT/VERTIV

1. GXT5LI-5000MVRT3UXLN

E. MINUTEMAN

F. N1C

G. TRIPP-LITE

H. Or Equal.

2.06 UNINTERRUPTABLE POWER SUPPLIES (UPS) UNITS

A. Quantity two (2) Online Double-Conversion Uninterruptable Power Supplies (UPS) shall be provided and installed in the data center. One unit will be a replacement in an existing rack and one unit will be installed in the proposed rack enclosure with the proposed server hardware, meeting or exceed the following required feature sets, specifications and/or standards:

1. 5000VA Output Capacity

2. Lithium Ion (Li-Ion)

3. Traditional lead acid (VRLA) allowed as an alternate pricing option

4. Each unit shall include a four-post rack mount kit

5. Units shall protect all active components from power surges, sags and/or spikes in the power system.

B. Each unit shall attach to Owner's existing Ethernet network using standard 10/100/1000 port and provide alerting and management tools.

C. UPS equipment shall be SNMP manageable and be connected to a dedicated Ethernet port in each technology closet (IDF/MDF).

D. Input connection shall be NEMA L14-30P with a ten (10) foot cord

E. Output connections shall include:

1. Eight (8) NEMA 5-20R

2. Two (2) NEMA L6-30R

3. Output connections shall be separated into a minimum of two (2) discreet independently breaker/fuse protected circuits.

4. Two (2) vertical PDUs shall be provided to be installed in rear of racks as indicated below:

a. 110V output on the left side of rack

b. 220V output on the right side of rack

F. Full UPS monitoring and management software shall be included providing, but not limited to, the following features:

1. Battery Condition

2. Power Quality

3. All other features currently a part of the manufacturer's latest commercial release.

2.07 UPS ENVIRONMENTAL MONITORING EQUIPMENT AND MONITORING SOFTWARE

A. Each UPS device supplied by Contractor shall include environmental monitoring equipment to allow the tracking and monitoring of temperature and humidity of communication closet location.

B. Contractor shall supply all necessary software to allow tracking and monitoring of temperature and humidity from a single application interface. On premise, hybrid or cloud-based software are acceptable.

C. Contractor shall initially configure all environmental monitoring equipment to alert appropriate support staff via email when thresholds are reached. Contractor shall include all necessary equipment and labor to make fully functional.

D. Contractor shall include all necessary licensing for term of warranty.

2.08 ALLOWANCES

A. Not used.

PART 3 - EXECUTION

3.01 PREPARATION

A. Contractor shall conduct detailed system overview and examination including walkthrough with Designer verifying equipment and material locations as well as mounting and placement requirements prior to commencement of any final installation activities.

B. Contractor shall ensure all submittals and shop drawings have been provided to, and approval has been obtained from Designer prior to commencement of any final installation activities.

3.02 DEMOLITION

A. Contractor will coordinate with Owner regarding removal and disposal of one existing battery device that will be replaced. Device removal and disposal will include all battery devices, accessories and equipment.

3.03 INSTALLATION

A. Contractor shall conduct a pre-installation walkthrough of all IT closet locations to prepare for existing mounting condition.

B. Work areas shall be cleaned at the end of each day. All debris shall be cleared, removed and disposed of in an approved container for the site.

C. Contractor shall ensure that all designated network switches are powered by installed UPS units upon project completion. Designated switches shall be determined by Owner.

1. Contractor shall coordinate “cutover” from existing power accommodations to new UPS units with Owner to avoid any unexpected network outages during sensitive times.

D. Contractor shall be familiar with the environment where work will be done as specified herein and make every reasonable effort to minimize interference with Owner’s or other contractor’s activities.

E. Each UPS device shall be connected to central equipment using standard category 6 ethernet cabling provided by Contractor. Contractor shall supply ethernet patch cables at device location for each UPS device to Owner provided network equipment, cable shall not exceed 15’ in length. Cable color shall be coordinated with Owner and/or designer.

F. The Contractor shall furnish, set in place, and install all equipment necessary for a fully compliant and operational system as specified herein. Such materials shall include all items necessary for full and final operation of the system. The installation process includes, but is not limited to the following:

1. Inventory receipt of all components and equipment.

2. Storage of all equipment and components until such time those items are installed according to the specifications.

3. Transport equipment to the Owner’s installation location(s).

4. Assemble, install, configure and test all equipment and components, maintaining accurate inventory records and status documents and discarding packaging.

5. Collect all information necessary to accurately program all system devices to the Owner’s intended use and need.

G. It shall be the responsibility of the Contractor to repair or replace any damage done to the structure of finishes in the building by the Contractor. If in the course of work, Contractor damages, marks or misplaces any surfaces or access plates/panels the Contractor shall repair and/or replace the surface, plate or panel to the original condition.

H. Contractor shall strictly follow both industry best practices and Manufacturer requirements and recommendations for proper installation.

I. Worksites include the following:

1. William D. Ford Technical Center
   36455 Marquette St
   Westland, MI 48185

3.04 TESTING

A. In an effort to ensure a smooth “turn-up” of the new system Contractor shall submit to a thorough testing process as defined herein prior to cut over.

B. Prior to requesting testing by Designer, the Contractor shall use adequate means to ensure the work is completed in accordance with the specified requirements, meets the owner’s specific application requirements and is ready for functionality and integrity testing.

C. Testing Procedures

1. Prior to system “turn-up”, Contractor shall submit a written request to Designer indicating they have completed full and final configuration of the system and are ready to have system integrity and functionality tested.

2. Within reasonable time after receipt of request, Designer will provide a test schedule and coordinate the testing date(s) with Owner and Designer.

3. Should Designer determine the Work is not acceptably configured or not of adequate integrity:

a. Designer will notify Contractor, giving reasons therefore and providing sufficient details to allow Contractor to make corrective actions.

b. Contractor shall then expeditiously remedy the deficiencies and notify Designer in writing when ready for re-testing.

c. Designer will schedule re-test of the Work.

d. Excessive re-testing of Work may result in fees being assessed to the Contractor.

3.05 DOCUMENTATION

A. Contractor shall provide Owner as-built drawings and manuals of all equipment installed, warranty and maintenance information and other information the Contractor, Designer and/or Owner deem necessary. Documentation shall also be provided in a digital format in file formats and on media as specified by Owner and/or Designer.

B. Contractor shall be responsible for providing thorough, timely documentation on all hardware and software. Documentation shall include, but not be limited to:

1. Equipment description.

2. Equipment make.
3. Model number.
4. Serial number.
5. MAC address.
6. System configuration report.
7. Software version and options.
8. Physical installation location.
9. Software release.
10. Date installed.
11. Manufacturer's warranty.
12. Maintenance contract terms.
13. Verification of maintenance contract engagement.
14. Telephone numbers for service and support.
15. Detailed technical support and service procedure instructions.
16. All product (hardware and software) manuals and manufacturer supplied documentation, including, but not limited to, owner manuals, system administrator manuals and configuration guides. Where number of duplicate copies for particular manual or documentation item could be reasonably considered excessive, Contractor shall request direction from Owner and Designer.
17. Photocopy of original invoice listing make and model for all components and equipment from individual manufacturer(s), distribution source(s), or authorized agent(s) to establish manufacturer warranty start date for potential use after end of contract warranty provisions.
18. Complete record of all system and administrative passwords for full operation and administration of all system components and operations.

3.06 TRAINING

A. Not used.

3.07 SCHEDULE, MEETINGS AND PLANS

A. Planned sequence of operations shall be established by the Contractor within the guidelines established by the Owner, as required herein and as required to meet schedules.

B. Schedule

1. Post bid Interviews: Week of January 11, 2027

2. Contractor Chosen: Week of January 18, 2027

3. Work Commences: April 2027

4. Substantial Completion of Project: July 2027

5. Project Close-out: July 2027

C. All work shall be coordinated with Owner's on site.

D. Project progress meetings shall be held, but not limited to, weekly at a site and time identified as convenient for Owner and as required herein. Meetings will be attended as required herein.

END OF SECTION

SECTION 27 21 29
DATA COMMUNICATION SWITCHES

PART 1 - GENERAL

1.01 DESCRIPTION OF PROJECT

A. Work described in this specification section pertains to Ethernet switch infrastructure upgrades to replace existing equipment for the Wayne Westland Community Schools.

B. System shall be comprised of a building distribution switch at Wayne Memorial High School, in IDF locations for connection to William D. Ford Technical Career Center data center as described herein. Switches shall be installed, configured and connected to the existing cable plant.

1.02 WARRANTY

A. Complete installation shall be free from defect and/or failure for a period of three (3) years. Any replacement, upgrade or fix, including labor for any non-conforming or non-operational part of the system shall be fixed and/or replaced at no cost to the Owner.

B. Manufacturer's warranty and/or extended warranty shall be provided for all components of the system.

1. Any documents and/or submittals required by individual manufacturers for compliance with the standard and/or applicable extended warranty programs shall be provided and submitted for approval by the Contractor.

2. Contractor shall submit all documents, apply for warranty or extended warranty certification, and provide a Certificate of Warranty or Extended Warranty as may be applicable from the manufacturer prior to project closeout.

C. On-site services provided under the warranty shall be performed by personnel or representatives of Contractor as herein defined and located within physical proximity to provide response levels deemed acceptable to Owner.

D. Contractor shall provide the following response times for all malfunctioning equipment:

1. Next business day (NBD) or less for matters that render twenty percent (20%) or more of the system unable to maintain normal functionality. Replacement parts for any item determined to be functioning below full design capacity shall be replaced promptly. Replacement components shall be shipped to Owner in order to arrive on the next business.

Replacement components shall be shipped in advance of Owner return of non-functional components (Advance Replacement).

2. Two (2) business days for matters not meeting the above criteria.

3. Response time shall be measured from the time Contractor is notified by Owner to the time work is begun to resolve the matter.

E. Bidder shall provide current annual maintenance contract pricing for recommended maintenance programs for all equipment following the specified and included five (5) year period as a Voluntary Alternate. This information will be considered by Owner and Designer as part of the bid evaluation process.

F. System Warranty shall commence on date of substantial completion as certified by Designer and provided for herein. Delivery to work site of materials, physical removal from packaging, issuance of Contractor documents including, but not limited to invoices and/or packing slips, or any event or documentation, not specifically provided for herein, shall have no effect on Warranty or System Acceptance by Owner and/or Designer.

1.03 STORAGE OF MATERIALS

A. All materials shall be secured when not in use by the Contractor.

B. It shall be the Contractor's responsibility to secure all equipment including material to be installed as part of the contract. No changes shall be made to the contract due to loss or theft of equipment and/or materials not officially accepted by the Owner.

C. Formal receipt of the materials shall not be completed by the Owner until completion of project closeout. The Contractor shall be responsible for all equipment until time of closeout as provided for herein.

1.04 SUBMITTALS

A. Submittals shall consist of, but not be limited to, technical cut sheets and detailed information pamphlets on all components of the system to be installed. All cut sheets and submittals shall be distinctly marked to highlight the actual part number of the item being submitted for approval with Bid.

B. Shop drawings and diagrams shall be submitted by Bidder for approval by Designer with Bid.

1. Shop drawings and diagrams shall show all data relating to structural, electrical, wiring, cross connect, interconnect, equipment arrangement/layout, and any other information deemed significant by the Designer.

2. No work constituting final installation shall be commenced until after approval of shop drawings by Designer.

C. Contractor shall provide proof of manufacturer support by photocopy of certification and letter of support from major component manufacturers for this specific project with Bid.

D. Equipment or material installed for this project that does not have an approved submittal associated with it, will be removed and replaced with acceptable equipment or material as defined by the Designer. All replacement costs including, but not limited to material and labor, shall be the sole responsibility of the Contractor.

1. The Owner and/or Designer may notify Contractor of any offending situations under this provision allowing Contractor up to forty-eight (48) hours to correct the situation prior to taking other corrective action.

2. The Owner reserves the right to replace unapproved materials and deduct the costs of doing so as defined herein from any amounts that may be due, or become due, Contractor.

E. The Contractor shall submit within ten (10) calendar days after the Notice to Proceed, a schedule that reflects the sequence of activities of the Contractor's approach to the execution of and completion of the work. The schedule shall be broken into work areas to provide for a clear identification of the planned progress of the work. Included in the schedule will be a list of tasks with list of deliverables and the percentage of work completed. This schedule shall coincide with progress payments, applications dates and projected amounts. All durations shown will be in working days. The timeframe described in the Contractor's Schedule shall represent the Contractor's plan for organizing, directing, managing, controlling, staffing and executing the work required by the Contract Documents. Owner will rely on such schedules to coordinate and otherwise plan related work of Owner personnel, other separate contractors, or the Owner’s routine daily work.

1.05 REFERENCE SPECIFICATIONS

A. All work, products, and materials shall conform with the following standards as applicable for the intended use:

1. IEEE

2. EIA/TIA

3. NEC

4. FCC

5. UL

6. MIOSHA

1.06 CONTRACTOR

A. Contractor shall be an authorized vendor of all major components.

B. All work shall be performed and supervised by Project Managers, Engineers and/or Technicians who are qualified to install system and perform related tests as recommended by the manufacturer and in accordance with the manufacturer's best practices and methods.

C. Project Managers, Engineers and Technicians employed on this project shall be properly and fully trained and qualified by the manufacturer on the installation and testing of the equipment and systems to be installed.

D. Contractor shall have offices or primary work locations for related personnel in physical proximity to sites of work that can reasonably be expected to allow service response times required for warranty and as described herein.

E. Contractor shall coordinate their delivery and installation with other contractors, Designer and the Owner as is appropriate. Contractor shall remain responsible for all delivery activities at Owner designated site, including but not limited to unloading of materials, record keeping and inventory of material receipt and securing material. Owner shall have no responsibility in material receipt beyond coordination communication.

F. The Contractor shall have a proven track record. This must be shown by the inclusion of references of at least three (3) projects involving similar systems completed by the Contractor in the prior two (2) years on unaltered forms with the sealed Bid as provided herein. Bid Form(s) may be duplicated as required in order to provide adequate space to list required number of reference installations for each division Bidder is responding to.

PART 2 - PRODUCTS

2.01 Acceptable Manufacturers (In alphabetical order):

A. CISCO/MERAKI

B. EXTREME

C. HPE/ARUBA

D. JUNIPER/MIST

E. RUCKUS

F. Or Equal.

2.02 System Requirements

A. Supply most current version of all products provided.

B. Manufacturer shall have five (5) years of experience and history manufacturing similar products to those specified.

C. Proposed components shall have been field tested and proven in actual use.

D. Prior and/or old versions of products, unless specifically approved and documented by Designer and/or Owner shall not be acceptable.

E. In cases where a newer version of hardware or software is available at the time of installation, Contractor shall request clarification from Designer on which version is to be used.

F. Furnish only new, first-class quality materials and equipment.

G. Individual switches shall be capable of being fully administered from any web browser attached to the network.

H. Administration access shall be protected by unique and secure log on (User ID and Password).

I. System administrator shall be capable of complete switch back-up and full switch restoration from a previously saved configuration.

J. In the event of a power failure, complete system shall automatically re-initialize and "become active" to the last configuration in use with no human intervention.

2.03 DATA CENTER HOST/STORAGE SWITCH

A. Two (2) Data Center Host/Storage Switch shall be provided and installed in the data center at the Ford building to facilitate host and storage system connections and to District Data Center Switch equipment, meeting or exceeding the following requirements:

1. Twelve (12) 25GB Ethernet SFP28 ports.

2. Non-blocking, wire speed

3. N+1 load balancing, hot swappable, redundant power supplies.

4. RMON

5. IEEE 802.1AB LLDP

6. Jumbo frame support

7. Auto-MDIX support

8. IPv6

9. 802.3ad LACP

10. IP Routing support for Static, RIP and OSPF

11. IP Multicast Routing support for PIM sparse and dense mode

12. IEEE 802.1p and IP-ToS utilizing eight (8) QoS ques

13. Bandwidth Shaping

B. IEEE compliant link aggregation across switches for switch interconnect link aggregation at backplane speed.

2.04 BACK-UP SYSTEM SWITCH

A. One (1) Back-up System Switch device shall be provided and installed in Wayne Memorial High School Main Distribution Fram (MDF) to facilitate back-up system connections and to District Data Center Switch and/or Building Distribution Switch equipment, meeting or exceeding the following requirements:

1. Eight (8) 25GB Ethernet SFP28 ports.

2. Non-blocking, wire speed

3. N+1 load balancing, hot swappable, redundant power supplies.

4. RMON

5. IEEE 802.1AB LLDP

6. Jumbo frame support

7. Auto-MDIX support

8. IPv6

9. 802.3ad LACP

10. IP Routing support for Static, RIP and OSPF

11. IP Multicast Routing support for PIM sparse and dense mode

12. IEEE 802.1p and IP-ToS utilizing eight (8) QoS ques

13. Bandwidth Shaping

14. IEEE compliant link aggregation across switch modules for backbone gigabit link aggregation to distribution switches/switch stacks.

2.05 BASIC INFRASTRUCTURE MANAGEMENT

A. Network Management shall include features such as, but not limited to:

1. Assist with deploying, onboarding and configuration of new network devices.

2. Bulk configuration, back-up and restore tools.

3. Troubleshooting tools that facilitate rapid location, isolation and repair of network problems.

4. Provide detailed performance monitoring and assist in detecting network performance anomalies and trends both in real time and historical.

5. Maintain and report network inventory, configuration details, device history and performance.

6. Assist with system firmware updates.

7. Strong preference for on-premise or hybrid cloud/on-premise solutions.

8. Contractor shall include all necessary licensing and support for any network management software for the term of the system warranty.

9. ICMP and SNMP v2, v3 monitoring support for generic network devices.

10. System generated topology views.

11. User customizable dashboard views.

12. Alert notifications with customizable event triggers. Notifications to include email, syslog entry, SNMP trap or running custom script.

13. Contractor shall fully configure network management software to Owner's requirements.

2.06 ALLOWANCES

A. Not used.

PART 3 - EXECUTION

3.01 PREPARATION

A. Contractor shall conduct a detailed walk through of all facilities to verify mounting and physical installation requirements.

B. Contractor shall conduct a preliminary installation and configuration meeting at the convenience of the Owner to discuss Owner plans for network applications and device attachments to ensure proper final configuration for all parameters including, but not limited to:

1. VLAN and routing configuration

2. Security configuration

3. Physical layout and connection schemes and configurations

4. PoE budget planning and configuration

5. Work collaboratively with Owner to design a switch device programming plan to ensure all existing devices work as they did previously when new hardware is installed.

6. Confirm switch and device naming and identification scheme.

a. Physical labeling

b. Electronic / configuration management information.

7. Management and problem diagnostic options.

C. Contractor shall ensure all submittals and shop drawings have been provided to, and approval has been obtained from Designer prior to commencement of any final installation activities.

1. Additionally, a detailed installation plan shall be provided for Owner and Designer approval prior to the commencement of any final installation activities. This plan shall include, but not be limited to the following:

a. Switch software configuration(s).

b. Physical layout and connection schemes and configurations

c. Schedule with locations

d. Cutover plans to minimize downtime

3.02 DEMOLITION

A. Contractor shall remove existing switch device and accessories as required. Contractor shall transport switch device to Owner approved location for disposition.

3.03 INSTALLATION

A. Contractor shall be familiar with the environment where work will be done as specified herein and make every reasonable effort to minimize interference with Owner's or other contractor's activities.

B. All equipment provided by Contractor shall be fully configured and installed for the Owner's applications based on an installation plan provided by Contractor and meeting approval of Owner and Designer prior to the commencement of work.

C. Work Areas shall be cleaned at the end of each day. All debris shall be cleared, removed and disposed of in an approved container for the site. All equipment and tools shall be removed from common areas and stored in approved, secure storage locations. Any work that may impede the general use of the space and/or other contractor's work and cannot be removed shall be flagged and cordoned off by the Contractor prior to their departure.

D. All equipment and materials shall be installed in a neat and workmanlike manner. Manufacturer recommended installation procedures and industry best practices shall be used throughout the project.

E. The Contractor shall furnish, set in place, and physically install all equipment necessary for a fully compliant and operational system as specified herein.

F. Contractor shall fully cooperate with Owner for detailed switch software/firmware configuration and system integration activities.

G. The installation process includes, but is not limited to the following:

1. Inventory receipt of all components and equipment.

2. Storage of all equipment and components until such time those items are installed according to the specifications.

3. Transport equipment to the Owner's installation location(s).

4. Physically assemble, install, configure and test based on an approved test plan all equipment and components, maintaining accurate inventory records and status documents and discarding packaging as may be directed by Owner.

5. Label all system devices as may be appropriate and required by Owner and Designer using approved labels.

6. Work includes extending connection and interconnection cables from equipment, as required, to Owner identified connection ports at all locations.

    a. Work includes supply and installation of new connection/patch cables to all devices for a fully functional and compliant system. Some devices may require special care and suitable tools to complete such connection or re-connection of cables.

    b. Patch cables shall not exceed fifteen (15) feet in length unless otherwise specified.

    c. Coordinate all patching plans and specific cable lengths used with Owner and Designer. Patch cables shall not be excessive in length for the connections made, and as such multiple lengths of cable will be required in each closet to properly and acceptably complete this portion of the work.

    d. Patch cables shall be Category 6 cable.

    e. Coordinate all patch cable colors with Owner and Designer. Multiple colors may be used to differentiate particular device types.

    f. Install all patch cable in neat workman like manner including, but not limited to dressing all cable routes and slack with .5" Velcro straps.

    g. One compliant patch cable shall be provided for each device distribution port provided under this contract.

7. Contractor shall supply all new fiber patch cables for necessary optics. Fiber patch cables will be neatly routed and not excessively long.

8. Contractor shall supply all new DAC cables for necessary connectivity. DAC cables will be neatly routed and not excessively long.

9. Work includes removal and, at the Owner's discretion, disposal of all old and unused patch cords and wiring closet rack and switch components that will not be in use for the new systems being deployed.

10. Complete system administrator training programs as specified herein.

11. Work shall be performed to meet local codes and industry standards including proper grounding and bonding of installed equipment.

H. Sites of Work:

1. William D. Ford Technical Center
   36455 Marquette St
   Westland, MI 48185

2. Wayne Memorial High School
   3001 4th Street
   Wayne, MI 48184

I. It shall be the responsibility of the Contractor to repair or replace any damage done to the structure of finishes in the building by the Contractor. If in the course of work, Contractor damages, marks or misplaces any surfaces or access plates/panels the Contractor shall repair and/or replace the surface, plate or panel to the original condition.

   1. Final determination as to the damage condition and/or repair/replacement fitness of any surface, plate or panel shall be the sole responsibility of the Designer.

   2. The building and work area shall be returned to its original condition prior to final sign off of the project.

J. Contractor shall fully install and configure all network infrastructure for complete, compliant and final Owner applications and requirements including all physical labeling for asset management.

3.04 TESTING

A. In an effort to ensure a smooth “turn-up” of the new system Contractor shall submit to a thorough testing process as defined herein prior to cut-over.

B. Prior to requesting testing by Designer, the Contractor shall use adequate means to assure the Work is completed in accordance with the specified requirements, meets the owner’s specific application requirements and is ready for functionality and integrity testing.

C. Testing Procedures

   1. Prior to system “turn-up”, Contractor shall submit a written request to Designer indicating they have completed full and final configuration of the system, and are ready to have system integrity and functionality tested. Such request shall include a written proposed test plan for complete system functionality.

   2. Within reasonable time after receipt of request and proposed test plan, Designer will provide amendment(s) to the proposed test plan, a test schedule and coordinate testing date(s) with Owner and Contractor.

3. Should Designer determine the Work is not acceptably configured or not of adequate integrity:

    a. Designer promptly will so notify Contractor, giving reasons therefore and providing sufficient details to allow Contractor to make corrective actions.

    b. Contractor shall then expeditiously remedy the deficiencies and notify Designer in writing when ready for re-testing.

    c. Designer will schedule re-test of the Work.

    d. Excessive re-testing of Work may result in fees being assessed Contractor.

4. Should Designer and Owner concur the Work is configured properly, and system integrity is as required installation may proceed.

3.05 DOCUMENTATION

A. Contractor shall be responsible for providing thorough and timely documentation on all hardware and software. Documentation shall include, but not be limited to:

1. Equipment description.

2. Equipment make.

3. Model number.

4. Software release.

5. Manufacturer's warranty.

6. Maintenance contract terms.

7. Verification of maintenance contract engagement.

8. Telephone numbers for service and support.

9. Detailed technical support and service procedure instructions.

10. All product (hardware and software) manuals and manufacturer supplied documentation, including, but not limited to owner manuals, system administrator manuals and configuration guides. Where number of duplicate copies for particular manual or documentation item could be reasonably considered excessive, Contractor shall request direction from Owner and Designer.

11. Photocopy of original invoice listing make and model for all components and equipment from individual manufacturer(s), distribution source(s), or authorized agent(s) to establish manufacturer warranty start date for potential use after end of contract warranty provisions.

12. Complete inventory of installed hardware and system software. Hardware inventory shall include, but not be limited to, model numbers, serial number, physical installation location and software/firmware options.

3.06 TRAINING

A. Not used.

3.07 SCHEDULE, MEETINGS AND PLANS

A. Sequence of operations shall be established by the Contractor within the guidelines established by the Owner, documented herein, required by Designer, Architect and/or Construction Manager and as required to meet schedules.

B. Schedule

1. Post bid Interviews: Week of January 11, 2027

2. Contractor Chosen: Week of January 18, 2027

3. Work Commences: April 2027

4. Substantial Completion of Project: July 2027

5. Project Close-out: July 2027

C. Planned sequence of operations shall be established by the Contractor within the guidelines established by the Owner, as required herein and as required to meet schedules.

D. Project progress meetings shall be held, but not limited to, weekly at a site and time identified as convenient for Owner and as required herein. Meetings will be attended as required herein.

END OF SECTION

SECTION 27 22 19
SERVERS, SAN & DATA CENTER EQUIPMENT

PART 1 - GENERAL

1.01 DESCRIPTION OF PROJECT

A. Work described in this specification section pertains to new data center based Servers and Storage Area Network equipment and replacements to existing core computer equipment intended to be used for instructional and administrative applications. Server hardware is intended to be used for physical and virtual server deployment for centralized resources.

1. Systems shall be comprised of interoperable components including, but not limited to Central Processing Units (CPUs), Operating Systems, displays, memory, keyboards, connecting cables, optical and magnetic disk drives/storage systems and patch and connector cords integrated into common working systems.

2. Equipment is intended to replace and migrate existing VMware vSphere Essentials Plus based virtualized server infrastructure and physical based devices to a new VMware based (or other hypervisor platform) configuration.

B. Contractors shall propose Systems and/or components to be deployed using standard procedures and technology components and as specified herein. The system components are intended to be installed and connected to the owner's physical infrastructure as specified herein.

C. The Contractor shall supply, configure, test, document, train Owner representatives and warrant a fully operational and compliant system and/or component connection to the system complete and with full functionality as specified herein.

D. Contractor shall coordinate their testing and delivery with other contractors, Designer and the Owner as is appropriate.

1. Contractor shall deliver components as specified to individual building staging location/room inside as identified and coordinated by owner. Delivery to the individual building locations for Owner unloading will not be accepted.

1. Loading dock facilities, pallet lift equipment, or related material handling equipment/facilities may not be available at site of work.

2. Delivery shall be coordinated with Owner, Designer and others based on specific release schedule of materials on a building basis and as directed, required and published by Designer and Owner.

1. Complete shipment of all materials at one time may not be accepted.

2. Delivery of equipment prior to the required, published and formally agreed upon release date will not be accepted.

1.02 WARRANTY

A. Complete installation shall be free from defect and/or failure for a period of five (5) years. Any replacement, upgrade or fix, including labor for any non-conforming or non-operational part of the system shall be fixed and/or replaced at no cost to the Owner.

B. Owner has requested alternate pricing for a seven (7) year warranty on the SAN hardware that would include the replacement of HDD's due to equipment failure.

C. Manufacturer's warranty and/or extended warranty shall be provided for all components of the system.

1. Any documents and/or submittals required by individual manufacturers for compliance with the standard and/or applicable extended warranty programs shall be provided and submitted for approval by the Contractor.

2. Contractor shall submit all documents, apply for warranty or extended warranty certification, and provide a Certificate of Warranty or Extended Warranty as may be applicable from the manufacturer prior to project closeout.

D. On site services provided under the warranty shall be performed by personnel or representatives of Contractor as herein defined and located within physical proximity to provide response levels deemed acceptable to Owner.

E. Contractor shall provide the following response times for all malfunctioning equipment:

1. Four (4) hours or less for matters that render the system unable to maintain normal functionality. Replacement parts for any item determined to be functioning below full design capacity shall be replaced promptly. Replacement components shall be shipped to Owner in order to arrive on the next business day. Replacement components shall be shipped in advance of Owner return of non-functional components (Advance Replacement).

2. Response time shall be measured from the time Contractor is notified by Owner to the time work is begun to resolve the matter.

F. Bidder shall provide current annual maintenance contract pricing for recommended maintenance programs for all equipment following the

specified and included warranty period as a Mandatory Alternate. This information will be considered by Owner and Designer as part of the bid evaluation process.

G. System Warranty shall commence on date of substantial completion as certified by Designer and provided for herein. Delivery to work site of materials, physical removal from packaging, issuance of Contractor documents including, but not limited to invoices and/or packing slips, or any event or documentation, not specifically provided for herein, shall have no effect on Warranty or System Acceptance by Owner and/or Designer.

1.03 SUBMITTALS

A. Submittals shall consist of, but not be limited to, technical cut sheets and detailed information pamphlets on all components of the system to be installed. All cut sheets and submittals shall be distinctly marked to highlight the actual part number of the item being submitted for approval with Bid Proposals.

B. Shop drawings, data sheets and diagrams shall be submitted by Bidder for approval by Designer with Bid Proposals.

1. Shop drawings, data sheets and diagrams shall show all data relating to structural, electrical, wiring, cross connect, interconnect, equipment arrangement/layout, and any other information deemed significant by the Designer.

2. No work constituting final configuration, shipment or installation shall be commenced until after approval of shop drawings, data sheets and diagrams by Owner and Designer.

C. Bidder may be required to provide working “sample” equipment, without cost, one each of the proposed systems for Owner and Designer evaluation and review.

1. Owner and/or Designer may require evaluation “sample” of proposed configuration(s) of Bidder within ten (10) days of public bid opening.

2. Bidder shall provide required units for evaluation period of up to sixty (60) days from receipt by Owner.

3. Bidder shall provide required evaluation unit(s) within ninety-six (96) hours of request by Owner and/or Designer, delivering unit(s) as directed.

D. Contractor shall provide proof of manufacturer support by photocopy of certification and letter of support from major component manufacturers for this specific project with Bid Proposals.

E. Equipment or material installed for this project that do not have an approved submittal associated with it, will be removed and replaced with acceptable equipment or material as defined by the Contract Designer. All replacement costs including, but not limited to material and labor, shall be the sole responsibility of the Contractor.

1. The Owner and/or Designer may notify Contractor of any offending situations under this provision allowing Contractor up to forty-eight (48) hours to correct the situation prior to taking other corrective action.

2. The Owner reserves the right to replace unapproved materials and deduct the costs of doing so as defined herein from any amounts that may be due, or become due Contractor.

F. The Contractor shall submit within ten (10) calendar days after the Notice to Proceed, a schedule that reflects the sequence of activities of the contractor's approach to the execution of and completion of the work. The schedule shall be broken into work areas to provide for a clear identification of the planned progress of the work. Included in the schedule will be a list of tasks with list of deliverables and the percentage of work completed. This schedule shall coincide with progress payments applications dates and projected amounts. All durations shown will be in working days. Applications that generate Microsoft Project compatible files shall be management tools of choice. The timeframe described in the Contractor's Schedule shall represent the Contractor's plan for organizing, directing, managing, controlling, staffing and executing the work required by the Contract Documents. The district will rely on such schedules to coordinate and otherwise plan the work of the District, other separate contractors, or the District's routine daily work.

1.04 REFERENCE SPECIFICATIONS

A. All work, products, and materials shall conform with the following standards as applicable for the intended use:

1. EIA/TIA Commercial and Administration Standards

2. NEC

3. IEEE 802

4. IETF RFCs

5. FCC – All Applicable Rules and Regulations

6. UL

7. MIOSHA Safety Standards

1.05 CONTRACTOR

A. Owner, should it feel to be in its best interest, reserves the right to retain services of others for installation and configuration of system components.

B. Contractor shall be an authorized vendor of all major components.

1. Any work shall be performed and supervised by Project Managers, Engineers and/or Technicians who are qualified to configure or install specified equipment and perform related tests as recommended by the manufacturer and in accordance with the manufacturer's best practices and methods and as required herein.

2. Project Managers, Engineers and Technicians employed on this project shall be properly and fully trained and qualified by the manufacturer on the installation and testing of the equipment and systems to be provided.

3. The Contractor shall have a proven track record in comparable system supply and installation. This must be shown by the inclusion of references of at least three (3) projects involving the supply and/or installation of similar systems completed by the Contractor in the prior two (2) years with the sealed Bid Proposal as provided herein.

PART 2 - PRODUCTS

2.01 Acceptable Manufacturers

A. Lists of acceptable manufacturers have been provided to establish a standard of quality for individual components associated with the specified system. Indicated components include particular models and makes currently preferred by Owner.

B. Any system bid shall be based on either acceptable manufacturer's components or components deemed equal in quality and function for the intended applications.

C. Judgment and determination associated with equivalency of components, compatibility with identified acceptable items and/or fitness for the intended use and application shall be solely by Owner and Designer.

1. Computer memory shall be certified and sourced from computer equipment manufacturer. No third-party memory will be deemed equal.

2.02 Supply most current version of all products provided.

A. Manufacturer shall have five (5) years of experience and history manufacturing similar products to those specified.

B. Proposed components shall have been field tested and proven in actual use.

C. Prior and/or old versions of products, unless specifically approved and documented by Designer and/or Owner shall not be acceptable.

D. In cases where a newer version of hardware or software is available at the time of installation, Contractor shall request clarification from Owner and Designer on which version is to be used.

2.03 Furnish only new, first class quality materials and equipment.

2.04 All specified references such as, but not limited to, capacities, storage, memory and speeds, are identifying minimum useable configured capacities. Any system overhead such as, but not limited to, RAID allowance shall not be considered part of the useable capacity, and will not count toward required specified capacities.

2.05 Furnish all materials, patch cables, connections and components required for fully connected and operational system to optimize it for the operational requirements of Owner.

2.06 RACK MOUNT SERVERS

A. Acceptable Manufacturers (In alphabetical order):

1. DELL

2. HEWLETT-PACKARD

3. LENOVO/IBM

B. Three (3) rack mount computer servers shall be provided to support the new VMWare server configuration, each meeting or exceeding the following required feature sets, specifications and/or standards:

1. Dual-socket Xeon 6, twenty-four (24) physical cores per processor/ forty-eight (48) total per host (or equal AMD EPYC).

2. 1.5TB manufacturer-certified DDR5 ECC registered DIMM memory, rated 6400MT's, installed in a manufacturer-recommended balanced configuration.

a. Each server must have available open DIMM slots to allow the upgrading of the unit, with standard commercially available memory, to 3TB without removal of installed memory.

3. Two (2) enterprise SSD boot drives, minimum 480 GB each, configured as RAID 1; manufacturer-supported internal boot modules accepted.

4. N+1 power supply redundancy per host.

5. Four (4) 25GB SFP28 Ethernet ports.

    a. Connection to network core switch with Contractor supplied DAC cables.

6. Current generation ILO, iDRAC or equivalent for out-of-band management.

2.07 STORAGE AREA NETWORK (SAN) EQUIPMENT

A. Acceptable Manufacturers (In alphabetical order):

1. DELL / EMC

2. HEWLETT-PACKARD

3. Or Equal

B. Single SAN configuration shall meet or exceed the following required feature sets, specifications and/or standards:

1. Four (4) full speed 25GB SFP28 iSCSI I/O connections / attachment of each storage (SAN) controller to network core using Contractor supplied DAC cables.

    a. Expandable to Twelve (12) 25GB SFP28 connections

2. Dual redundant iSCSI attached SAN controllers.

3. N+1 power supply redundancy per tray.

4. 120 TB On-line available Storage configured for fault tolerance.

    a. Flash Drives

    b. RAID 6

    c. Storage tier shall be connected with 50Gb of bandwidth per dual redundant SAN controller (100Gb total).

5. 800 TB minimum on-line available storage configured for fault tolerance.

    a. Enterprise-grade high-capacity HDD’s

    b. RAID 6

c. Storage tier shall be connected with 50Gb of bandwidth per dual redundant SAN controller (100Gb total).

6. Available open drive bays and cabinets to add 120TB additional storage configured for fault tolerance with only the addition of drive hardware.

7. Ability to provide auto-tiering of storage based on utilization in the base configuration.

8. Out-of-band management including all necessary licensing.

2.08 SERVER BACKUP EQUIPMENT

A. Acceptable Manufacturers (In alphabetical order):

1. DELL

2. HEWLETT-PACKARD

3. LENOVO/IBM

B. One (1) rack mount computer server shall be provided, meeting or exceeding the following required feature sets, specifications and/or standards:

1. Single-socket Intel Xeon 6, sixteen (16) physical cores (or equal AMD EPYC).

2. 128GB manufacturer-certified DDR5 ECC registered DIMM memory, installed in a manufacturer-recommended balanced configuration.

a. Minimum eight (8) RDIMM slots total.

3. Two (2) enterprise SSD boot drives, minimum 480GB each, configured as RAID 1; manufacturer-supported internal boot modules accepted.

4. Two (2) 25GB SFP28 Ethernet ports

a. Connection to network core switch with Contractor supplied DAC cables

5. Current generation ILO, iDRAC or equivalent for out-of-band management.

C. Network Attached Storage Backup Device (NAS) shall be provided to meet or exceed the following standards:

1. Snapshot capability

2. De-duplication functionality

3. High speed direct image copy of primary SAN

4. 200 TB of usable capacity

5. Two (2) full speed 25GB SFP28 Ethernet connection for attachment of NAS device to network using Contractor supplied DAC cables.

6. District is currently using and prefers VEEAM but all software and utility tools shall be considered.

2.09 DATA CABINET ENCLOSURE

A. Acceptable manufacturers (In alphabetical order):

1. APC

2. MIDDLE ATLANTIC

3. VERTIV

4. Or Equal

B. One (1) fully-enclosed four-post enterprise server cabinet shall be provided to meet or exceed the following:

1. Minimum 42U capacity, standard 19-inch EIA-310 mounting

2. Compatible with all proposed equipment, square-hole mounting rails, and cable management

3. Lockable, perforated front and rear doors and removable, lockable side panels

4. Adjustable leveling feet and manufacturer-required stabilization hardware

5. Integrated grounding and bonding provisions for frame, panels, and doors

6. Top and bottom cable entry, vertical cable management and mounting provisions for proposed hardware

7. Include mounting hardware, cage nuts, screws, and keys

2.10 OPERATING SYSTEMS

A. Contractor shall provide an enterprise-grade, software-defined datacenter solution. Only the current license version of solution shall be provided.

B. Acceptable Manufacturers – Virtualization Software

1. VMware Cloud Foundation (VCF) running ESXi

    a. VCF stack, inclusive of VMware ESXi, vCenter Server, vSAN storage, and NSX networking.

2. Microsoft Azure Stack HCI running Hyper-V

    a. Hyper-V, Windows Admin Center & Azure Portal, S2D, SDN, Azure Arc-enabled infrastructure and Azure Stack HCi

3. Or Equal that is capable of importing OVA files

    a. Nutanix Pro is of particular interest for this project.

4. Any proposed solution must be capable of High Availability with automated migration and failover.

C. Acceptable Manufacturers – Backup Software

1. VEEAM

    a. Backup and Replication

2. Backup Software Operating System shall include, but not be limited to the following capabilities:

    a. Full VM recovery

    b. File level recovery

    c. Built-in deduplication and compression

    d. Ability to backup all physical servers identified on Appendix A including all necessary licensing. Appendix A made available upon receipt of Intent to Bid form.

3. All operating systems shall include all necessary components and options for a fully compliant system including all warranty requirements.

2.11 OWNER ALLOWANCE

A. Contractor shall include allowances for equipment and/or other contract service reimbursements as required below in base bid lump sum amount(s). Equipment and/or contract services shall be provided and sourced at Owner's discretion and convenience with full cooperation by Contractor and paid for from successful bidder's contract in the amount(s) provided for herein. Any allowance amount proving to be excessive for the intended equipment and/or

contract services shall be credited to the Owner against contract payment requests.

1. Allowance shall be made in the amount of $14,850.00 for contract services related to electrical upgrades, reconfiguration, testing and/or documentation.

PART 3 - EXECUTION

3.01 PREPARATION

A. Contractor shall ensure all submittals have been provided and/or updated and current approval has been obtained from Designer and Owner prior to commencement of any final ordering and/or installation activities specific to each release schedule or phase. Submittals shall include, but not be limited to:

1. Shop drawings, data sheets and system diagrams including specific cable connectors and types proposed to be installed.

3.02 INSTALLATION

A. The Contractor shall furnish all equipment necessary for a fully compliant and operational system as specified herein. The delivery process includes, but is not limited to the following:

1. Storage of all equipment and components until such time those items are released for delivery to a specific staging location in a specific building according to the specifications.

2. Coordination for delivery of materials to Owner specified sites with Owner personnel to accommodate reasonable, efficient, safe and secure arrival at intended locations.

3. Coordination with Owner, Designer and Others for planning related to installation of the proposed rack and hardware.

4. Transport equipment to the Owner’s installation location(s).

5. Inventory receipt of all components and equipment shipped to individual Owner locations to comply with latest release schedule.

6. Work shall include careful coordination and cooperation with others to ensure a timely, cost effective and proper installation for Owner’s intended application. Such efforts shall include, but not be limited to, coordinating and cooperating with other contractors, Owner, Designer, Contract Designer and Engineer.

7. Physical unpacking and installing components

a. Such installation shall include connection to Owner's network core equipment using Contractor supplied DAC cables and other patch cords as may be required. Cable distances for device connectivity shall not exceed 10M.

8. Configuration of all hardware and the subsequent migration of Owner's current host servers and SAN. Contractor shall coordinate with Owner to ensure involvement of owner representatives during migration process for the purposes of training and knowledge transfer.

9. All decommissioned equipment shall be carefully removed and be transported to Owner designated location for disposition.

10. Basic Operating System load and connection testing.

11. Each physical component shall bear a unique bar-coded label approved by Owner and Designer, permanently affixed in a location coordinated with Owner and Designer. Bar code label shall be unique identification for device which identifies, but is not limited to the following information:

    a. Device MAC address

    b. Device serial number

    c. Device model number

    d. Device asset tag number

12. Contractor shall provide software database populated with inventory data correlated to bar code label as required and directed by Owner and Designer.

B. Worksites include the following:

1. Dyer Administration Building
   6745 Marquette
   Westland, Michigan 48185

2. William D. Ford Career-Technical Center
   36455 Marquette
   Westland, Michigan 48185

C. It shall be the responsibility of the Contractor to repair or replace any damage done to the structure or finishes in the building by the Contractor. If in the course of work, Contractor damages, marks or otherwise defaces any surfaces, the Contractor shall repair and/or replace the surface to the original condition.

1. Repairs shall include, but not be limited to patching and painting.

2. Final determination as to the damage condition and/or repair/replacement fitness of any surface, plate or panel shall be the sole responsibility of the Contract Designer.

3. The building and work area shall be returned to its original condition prior to final sign off of the project.

3.03 TESTING

A. In an effort to ensure a smooth "configuration" of the new system Contractor shall submit to a thorough testing process as defined herein prior to final configuration.

B. Prior to requesting testing by Designer, the Contractor shall use adequate means to assure the Work is completed in accordance with the specified requirements, meets the owner's specific application requirements and is ready for functionality and integrity testing. Testing shall include, but not be limited to the following:

1. Basic hardware diagnostics to ensure all components are properly operating in the Owner environment.

2. Connectivity testing

C. Testing Procedures

1. Prior to system "turn-up", Contractor shall submit a written request to Designer indicating they have completed full and final configuration of the system and are ready to have system integrity and functionality tested. Such request shall include a written proposed test plan for complete system functionality.

2. Within reasonable time after receipt of request and proposed test plan, Designer will provide amendment(s) to the proposed test plan, a test schedule and coordinate testing date(s) with Owner and Contractor.

3. Should Designer determine the Work is not acceptably configured or not of adequate integrity:

a. Designer promptly will so notify Contractor, giving reasons therefore and providing sufficient details to allow Contractor to make corrective actions.

b. Contractor shall then expeditiously remedy the deficiencies and notify Designer in writing when ready for re-testing.

c. Designer will schedule re-test of the Work.

d. Excessive re-testing of Work may result in fees being assessed Contractor.

4. Should Designer and Owner concur the Work is configured properly and system integrity is as required:

   a. Owner and Designer will review Contractor's detailed "configuration" plan, and upon finding it acceptable, Contract Designer will issue a memorandum of Testing Completion to Owner and Contractor after which system "configurations" can proceed.

3.04 DOCUMENTATION

A. Contractor shall, throughout the completion of the project, provide Owner a file storage system that shall include all necessary equipment, including if reasonably required, file drawers, folders, dividers, etcetera, to contain all as-built drawings/diagrams, owners manuals of all equipment installed, warranty and maintenance information and other information the Contractor, Designer and/or Owner deem necessary. Documentation shall also be provided in a digital format in file formats and on media as specified by Owner and/or Designer.

B. Contractor shall be responsible for providing thorough, timely documentation on all hardware and software. Documentation shall include, but not be limited to:

1. Equipment description.
2. Equipment make.
3. Model number.
4. Software release.
5. Date delivered.
6. Manufacturer's warranty.
7. Maintenance contract terms.
8. Verification of maintenance contract engagement.
9. Telephone numbers for service and support.
10. Detailed technical support and service procedure instructions.
11. All product (hardware and software) manuals and manufacturer supplied documentation, including, but not limited to owner manuals, system

administrator manuals and configuration guides. Where number of duplicate copies for particular manual or documentation item could be reasonably considered excessive, Contractor shall request direction from Owner and Designer.

12. Photocopy of original invoice listing make and model for all components and equipment from individual manufacturer(s), distribution source(s), or authorized agent(s) to establish manufacturer warranty start date for potential use after end of contract warranty provisions.

13. System Configuration Report.

14. Complete inventory of installed hardware and system software. Hardware inventory shall include, but not be limited to, model numbers, Ethernet MAC address, serial numbers, physical installation location and software options.

3.05 TRAINING

A. Contractor shall provide training for the Owner designated system administrator(s). Owner shall designate up to three (3) administrators to be trained. Training shall be a minimum of two (2), three (3) hour sessions in length, at the convenience of the Owner personnel, and of sufficient duration to satisfactorily complete training on all system administration functions including, but not limited to:

1. Basic trouble shooting of the installed system and components including diagnostic and problem resolution actions.

2. System back-up and restore functions and procedures for all system parameters and configurations.

3. Device additions, moves, repairs and changes as well as reconfiguration.

4. Review of system alerts, logs and monitoring of configuration parameters including but not limited to system configuration changes.

5. Review of hardware monitoring tool (iDRAC, iLO, etc.) including but not limited to the demonstration of automated alerting for system and/or hardware failures.

B. Contractor shall submit a written training plan, course description(s) and syllabus to Owner and Designer for approval. Owner and/or Designer may require amendments(s) to training plan, course description and syllabus prior to training being scheduled.

3.06 SCHEDULE, MEETINGS AND PLANS

A. Schedule

1. Post bid Interviews: Week of January 11, 2027
2. Contractor Chosen: Week of January 18, 2027
3. Work Commences: March 2027
4. Substantial Completion of Project: July 2027
5. Project Close-out: July 2027

B. Planned sequence of operations shall be established by the Contractor within the guidelines established by the Owner, as required herein and as required to meet schedules.

C. All work shall be coordinated with Owner's construction manager on site.

D. Project progress meetings shall be held, but not limited to, weekly at a site and time identified as convenient for Owner and as required herein. Meetings will be attended as required herein.

END OF SECTION

SECTION 27 26 26
SERVERS, SAN & DATA CENTER INTEGRATION

PART 1 - GENERAL

1.01 DESCRIPTION OF PROJECT

A. Work described in this specification section pertains to the integration of new equipment (27 22 19), configuration, integration, migration, and testing of new hardware into the new core computer server infrastructure intended to be used for instructional and administrative applications.

B. Contractor shall be responsible for the complete configuration, integration, migration, testing, and commissioning of all systems and components included in the awarded scope of work. Owner-designated technical personnel shall participate in these activities for knowledge transfer and familiarization with the installed systems. Such participation shall not relieve Contractor of responsibility for successful completion of the work, including system migration, restoration of functionality, and final acceptance of Owner.

C. Contractors shall propose labor and/or work plans to be deployed using standard procedures, best practices and technology components and as specified herein.

D. The Contractor shall design, engineer, configure, integrate, test, document, and train Owner representatives and warrant a fully operational and compliant system and/or component connection to the system complete and with full functionality as specified herein.

E. Contractor shall advise, coordinate and work cooperatively with Owner representatives or owner’s designee related to configuration changes required and/or proposed for Owner’s existing physical infrastructure.

F. Contractor shall carefully coordinate their testing and delivery with other contractors, Designer and the Owner as is appropriate.

1.02 WARRANTY

A. Complete installation shall be free from defect and/or failure due to workmanship for a period of one (1) year. Any reconfiguration or fix for any non-conforming or non-operational part of the system shall be fixed and/or reconfigured at no cost to the Owner.

B. On site services provided under the warranty shall be performed by personnel or representatives of Contractor as herein defined and located within physical proximity to provide response levels deemed acceptable to Owner.

C. Contractor shall provide the following response times for all malfunctioning equipment:

1. Four (4) hours or less for matters that render system unable to maintain normal productivity.

D. Response time shall be measured from the time Contractor is notified by Owner to the time work is begun to resolve the matter.

E. Bidder shall provide proactive system service at the end of the warranty period. Such warranty service shall include but not be limited to refresher instruction for technical team, maintenance of firmware and Operating System versions including any installation or patching as may be necessary to ensure systems currency, review of best practice operations and detailed written commentary review of system logs and files.

1.03 SUBMITTALS

A. Complete work plan, project outline and schedule shall be submitted by Bidder for approval by Owner with Bid Proposals.

1. The Contractor shall submit a schedule that reflects the sequence of activities of the contractor's approach to the execution of and completion of the work. The schedule shall be broken into work areas to provide for a clear identification of the planned progress of the work. Included in the schedule will be a list of tasks with list of deliverables and the percentage of work completed. This schedule shall coincide with progress payments applications dates and projected amounts. All durations shown will be in working days. Microsoft Project is the software of choice for this schedule. The timeframe described in the Contractor's Schedule shall represent the Contractor's plan for organizing, directing, managing, controlling, staffing and executing the work required by the Contract Documents. Owner will rely on such schedules to coordinate and otherwise plan related work of Owner personnel, other separate contractors, or the Owner’s routine daily work.

2. No work constituting final installation shall be commenced until after formal approval of shop drawings by Owner.

B. Resumes and proof of credentials for Project Manager, Engineers, Technicians and Trainers proposed to work on project shall be submitted by Bidder for approval by Owner with Bid Proposal.

C. Work product or material installed for this project that does not have an approved submittal associated with it, will be removed and replaced with acceptable material as defined by the Designer. All replacement costs including, but not limited to material and labor, shall be the sole responsibility of the Contractor.

1. The Owner and/or Designer may notify Contractor of any offending situations under this provision allowing Contractor up to forty-eight (48) hours to correct the situation prior to taking other corrective action.

2. The Owner reserves the right to replace unapproved materials and deduct the costs of doing so as defined herein from any amounts that may be due or become due Contractor.

1.04 REFERENCE SPECIFICATIONS

A. All work, products, and materials shall conform with the following standards as applicable for the intended use:

1. EIA/TIA Commercial and Administration Standards

2. NEC

3. IEEE 802

4. IETF RFCs

5. FCC – All Applicable Rules and Regulations

6. UL

7. MIOSHA Safety Standards

1.05 CONTRACTOR

A. The Contractor shall accept complete responsibility for the certification and support of the system and/or components as required herein. Contractor shall be an authorized installation agent of all major components should such a designation be available.

B. All work shall be performed and supervised by Project Managers, Engineers and/or Technicians who are qualified to install the proposed system and perform related tests as recommended by the manufacturer and in accordance with the manufacturer's best practices and methods.

C. Contractor staff employed on this project shall be properly trained, certified, experienced and provide proof of required credentials.

1. Project Managers, Engineers and Technicians shall be properly and fully trained and qualified by the manufacturer or industry recognized certification programs acceptable to the Owner on the installation and testing of the equipment and systems to be installed.

2. A Certified Project Manager having Project Management Professional (PMP) credentials shall supervise this project.

3. Contractor credentials and certification for advanced Operating System installation and configuration. Owner intends to deploy an assortment of complex enterprise technologies of both Microsoft and UNIX/LINUX. Work shall include, but not be limited to, coordination of application software with Operating Systems for full version control and compatibility for this project.

4. Contractor shall employ internetworking engineers familiar and skilled in the installation, configuration, optimization and virtualization of commonly deployed servers.

5. Engineers and technicians shall possess appropriate Microsoft Certified server certifications relevant to the proposed work.

6. Engineers and technicians shall possess VMware Certified Professional (VCP) for current version of VMware. This requirement is only applicable should the Owner select a proposal that includes VMware as the hypervisor. Should another hypervisor platform be bid, engineers and technicians shall possess equivalent certifications for the proposed platform(s).

7. Contractor shall hold current Microsoft and VMware Partner certifications.

    a. Preference will be given to Bidders holding Microsoft Certification with Advanced Infrastructure competencies.

    b. Preference will be given to bidders with staff engineers possessing VMware Certified Design Expert (VCDX) and/or VMware Certified Advanced Professional (VCAP) certification or current equivalent. This requirement is only applicable should the Owner select a proposal that includes VMware as the hypervisor. Equivalent certifications shall be held by contractors proposing other relevant hypervisors.

    c. Contractor shall possess current manufacturer certifications, partner authorizations, or other documented qualifications appropriate to the hardware, software, and virtualization platform proposed. VMware-specific certifications and authorizations shall apply only when VMware is included in the awarded solution.

8. Substitution of project personnel for work on this project shall not be made without prior approval by Owner and Designer.

D. The Contractor shall have a proven track record in comparable system supply and configuration. This must be shown by the inclusion of references of at least three (3) projects involving the supply and/or installation of similar systems completed by the Contractor in the prior two (2) years with the sealed Bid Proposal as provided herein.

PART 2 - PRODUCTS

2.01 OWNER ALLOWANCES

1. Not used.

PART 3 - EXECUTION

3.01 PREPARATION

A. Contractor shall conduct a detailed walk-through examination with Designer and Owner verifying equipment and material locations as well as application, management and user requirements prior to commencement of other implementation and integration activities.

B. Contractor shall conduct a baseline performance analysis for all systems that are to be upgraded. Such test shall establish system performance of all systems prior to any upgrade activity.

C. Contractor shall ensure all submittals have been provided to, and formal approval has been obtained from Owner prior to commencement of any final installation activities.

3.02 INSTALLATION

A. Contractor shall develop and present for Owner and Designer approval a preliminary yet complete network architecture and system migration plan including, but not limited to:

1. Physical diagrams of server and SAN placement including rack layout and specific interconnection plan.

2. Coordinate and cooperate with Owner, Designer and others on an organizational protocol plan for network and sub-net structure including VLAN and TCPIP.

3. Coordinate and cooperate with Owner, Designer and others on an organizational security plan for multiple level user authentication as well as guest access.

4. Provision for server and SAN expansion for future technology initiatives being considered by the district.

5. Owner and Designer shall require up to two weeks to complete review(s) of preliminary Server and SAN architecture plan and provide written approval. Approval will be dependent upon acceptable and timely response to answers Owner and Designer may require of Contractor after the presentation of the plan.

a. If Contractor is unable to provide a plan acceptable to Owner and Designer after a reasonable duration is extended to do so, Owner reserves the right to terminate Contract.

F. Contractor shall be familiar with the environment where work will be done as specified herein and make every reasonable effort to minimize interference with Owner's normal daily activities.

G. Work Areas shall be cleaned at the end of each day. All debris shall be cleared, removed and disposed of in an approved container for the site. All equipment and tools shall be removed from common areas and stored in approved, secure storage locations. Any work that may impede the general use of the space and cannot be removed shall be flagged and cordoned off by the Contractor prior to their departure.

H. All software and hardware configuration shall be done in a neat and workmanlike manner. Best practices installation principles shall be used throughout the project.

I. The Contractor shall configure all equipment necessary for a fully compliant and operational system as specified herein. The integration process includes, but is not limited to the following:

1. Collect all information necessary to accurately program all devices provided by others to the Owner's intended use and need.

2. Label all system devices as may be appropriate and required by Owner and Designer.

3. Configure/program devices provided by others to the Owner's intended use and need.

4. Coordinate with others for interconnection, integration and installation of other physical and programmatic components on the Owner's network infrastructure.

5. Coordinate and schedule with Owner any/all system and application outages for this live system upgrade. Unscheduled system and/or application outages shall not be acceptable and may result in back charges to the Contractor.

6. Configure hypervisor environment to cover the requirements of this project as identified in this document or agreed upon with Owner.

7. Migrate existing SQL server(s) and SQL databases as identified on Appendix A.

8. Install and configure out-of-band management capabilities on all provided servers and SAN hardware to be fully functional.

9. Integrate and configure SAN infrastructure to support boot from SAN of clustered servers if Owner required.

10. Design and integrate disk management procedures for SAN. Configure and map LUNS for optimal storage.

11. Install and configure new NAS storage and backup devices per requirements for a fully functional and compliant system.

12. Design, integrate and deploy snapshot and backup plan based on Owner's existing configuration with updates and modernization.

13. Design, configure and install new backup design capable of backing up various file and data types including, but not limited to full, incremental and disk to disk.

14. Organize new connections and remove unused connections in cabinets and cable trays in the data center. Work shall include removal of all abandoned cables, connectors and supporting materials.

15. Complete end user and system administrator overview training programs as specified herein.

16. Work shall be performed to meet local codes and industry standards including proper grounding and bonding of installed equipment.

E. Worksites include the following:

1. Dyer Administration Building
   6745 Marquette
   Westland, Michigan 48185

2. William D. Ford Career-Technical Center
   36455 Marquette
   Westland, Michigan 48185

J. It shall be the responsibility of the Contractor to repair or replace any damage done to the structure or finishes in the building by the Contractor. If in the course of work, Contractor damages, marks or misplaces any surfaces or access plates/panels the Contractor shall repair and/or replace the surface, plate or panel to the original condition.

1. Final determination as to the damage condition and/or repair/replacement fitness of any surface, plate or panel shall be the sole responsibility of the Contract Designer.

2. The building and work area shall be returned to its original condition prior to final sign off of the project.

K. Following installation and system "turn-up", but prior to final acceptance of the system, Contractor shall conduct follow-up interviews with Owner identified administrators and staff to review system functionality, suitability and confirm feature and program fitness for Owner applications.

1. Interview candidates and techniques shall be approved by Owner in advance of any staff interaction.

2. Follow-up interviews shall be fully documented by Contractor and submitted to Owner for approval.

3. Interviews shall not exceed 24 persons.

3.03 TESTING

A. In an effort to ensure a smooth "turn-up" of the new system Contractor shall submit to a thorough testing process as defined herein prior to cut-over.

B. Prior to requesting testing by Designer and Owner, the Contractor shall use adequate means to assure the Work is completed in accordance with the specified requirements, meets the owner's specific application requirements and is ready for functionality and integrity testing.

C. Contractor shall conduct a baseline performance analysis for all systems that are upgraded. Such test shall establish system performance of all systems after the completion of upgrade activity to be compared to the pre-conversion performance tests.

D. Testing Procedures

1. Prior to system "turn-up", Contractor shall submit a written request to Designer indicating they have completed full and final configuration of the system and are ready to have system integrity and functionality tested. Such request shall include a written proposed test plan for complete system functionality.

2. Within reasonable time after receipt of request and proposed test plan, Designer will provide amendment(s) to the proposed test plan, a test schedule and coordinate testing date(s) with Owner and Contractor.

3. Should Designer, Contract Designer and/or Owner determine the Work is not acceptably configured or not of adequate integrity:

a. Contract Designer promptly will so notify Contractor, giving reasons therefore and providing sufficient details to allow Contractor to make corrective actions.

b. Contractor shall then expeditiously remedy the deficiencies and notify Contract Designer in writing when ready for re-testing.

c. Contract Designer will schedule re-test of the Work.

d. Excessive re-testing of Work may result in fees being assessed Contractor.

4. Should Designer, Contract Designer and Owner concur the Work is configured properly and system integrity is as required:

a. Contract Designer will review Contractor's detailed "turn-up" plan, and upon finding it acceptable issue a memorandum of Testing Completion to Owner, Designer and Contractor after which system "turn-up" can proceed.

3.04 DOCUMENTATION

A. Contractor shall be responsible for providing thorough, timely documentation on all system configuration, integration and connections. Documentation shall include, but not be limited to:

1. Drawings/diagrams of system interconnections.

a. Physical

b. Logical

2. Equipment description.

3. Equipment make.

4. Model number.

5. Software release.

6. Date installed.

7. Procedure manual for new system administration

8. Telephone numbers for service and support.

9. Detailed technical support and service procedure instructions.

10. As built drawings/diagrams for each building.

11. System Configuration Report.

3.05 TRAINING

A. System Administration Training

1. Contractor shall provide on-site system configuration overview training for Owner designated system administrator(s). Owner shall designate up to three (3) administrators to be trained. Training shall be a minimum of two (2), six (6) hour sessions in length, at the convenience of the Owner personnel, and of sufficient duration to satisfactorily complete training on all system administration functions including, but not limited to:

a. Basic trouble shooting of the installed system and components including diagnostic and problem resolution actions.

b. System back-up and restore functions and procedures for all system parameters and configurations.

c. Review of system alerts, logs and monitoring of automatic configuration changes provided by the system in configured parameters that may include, but not limited to power changes, load balancing and port status.

d. Complete review of System Administration Procedure Manual as developed by Contractor, approved by Owner and provided for herein.

B. Owner currently utilizes VMware virtualization technology. Owner will seriously consider alternate hypervisor solutions that meet or exceed the functional, performance, availability, compatibility, and operational requirements established in these specifications.

C. Where Contractor proposes and Owner selects VMware as the hypervisor platform, no additional formal hypervisor certification training beyond what is provided for above and herein shall be required.

D. Certification Training

1. Where Contractor proposes, and Owner selects an alternate hypervisor platform, Contractor shall provide comprehensive administrator certification training for up to three (3) Owner-designated technical personnel. Training shall address installation, configuration, virtual machine management, high availability, backup and recovery integration, monitoring, troubleshooting, maintenance, and routine administration of the proposed platform.

2. All costs associated with the required training shall be included in Contractor's proposal. Owner shall bear no costs (tuition, travel, etc.) for

training except personnel time and living expenses (lodging and meals) while training designees are off site, if training is conducted remotely. Training shall be a manufacturer certified and content shall cover all material needed to allow Owner designees to sit for, and pass, basic certification testing (testing fees not included).

E. Contractor shall submit a written training plan, course description(s) and syllabus to Owner and Designer for approval prior to training being scheduled. Owner and/or Designer may require amendments(s) to training plan, course description and syllabus prior to training being scheduled.

3.06 SCHEDULE, MEETINGS AND PLANS

A. Schedule

1. Post bid Interviews: Week of January 11, 2027
2. Contractor Chosen: Week of January 18, 2027
3. Work Commences: May 2027
4. Substantial Completion of Project: July 2027
5. Project Close-out: July 2027

B. Planned sequence of operations shall be established by the Contractor within the guidelines established by the Owner, as required herein and as required to meet schedules.

C. Project progress meetings shall be held, but not limited to, weekly at a site and time identified as convenient for Owner and as required herein. Meetings will be attended as required herein.

END OF SECTION

Michigan Department of Labor and Economic Opportunity

Prevailing Wage Rate Schedule

state	county	category	classification	level	apprentice	updated	hourlyrate	overtime	doubletime	fourtens	makeupday
MI	Wayne	4.1 Power Equip. Operator â€“ Commercial	4.1 Power Equip. Operator â€“ Commercial - Journeyman	Journeyman		11/1/2025	73.64	97.79	121.93	TRUE	TRUE
MI	Wayne	4.1 Power Equip. Operator â€“ Commercial	4.1 Power Equip. Operator â€“ Commercial - Apprentice	Apprentice	Level 1 0 - 6 Months	11/1/2025	59.15	76.06	92.95	TRUE	TRUE
MI	Wayne	4.1 Power Equip. Operator â€“ Commercial	4.1 Power Equip. Operator â€“ Commercial - Apprentice	Apprentice	Level 2 7 -12 Months	11/1/2025	61.56	79.67	97.77	TRUE	TRUE
MI	Wayne	4.1 Power Equip. Operator â€“ Commercial	4.1 Power Equip. Operator â€“ Commercial - Apprentice	Apprentice	Level 3 13 - 18 Months	11/1/2025	63.98	83.3	102.61	TRUE	TRUE
MI	Wayne	4.1 Power Equip. Operator â€“ Commercial	4.1 Power Equip. Operator â€“ Commercial - Apprentice	Apprentice	Level 4 19 - 24 Months	11/1/2025	66.39	86.92	107.43	TRUE	TRUE
MI	Wayne	4.1 Power Equip. Operator â€“ Commercial	4.1 Power Equip. Operator â€“ Commercial - Apprentice	Apprentice	Level 5 25 - 30 Months	11/1/2025	68.81	90.55	112.27	TRUE	TRUE
MI	Wayne	4.1 Power Equip. Operator â€“ Commercial	4.1 Power Equip. Operator â€“ Commercial - Apprentice	Apprentice	Level 6 25 - 30 Months	11/1/2025	71.22	94.16	117.09	TRUE	TRUE
MI	Wayne	4.2 Power Equip. Operator â€“ Commercial	4.2 Power Equip. Operator â€“ Commercial - Journeyman	Journeyman		11/1/2025	73.34	97.33	121.33	TRUE	TRUE
MI	Wayne	4.2 Power Equip. Operator â€“ Commercial	4.2 Power Equip. Operator â€“ Commercial - Apprentice	Apprentice	Level 1 0 - 6 Months	11/1/2025	58.94	75.74	92.53	TRUE	TRUE
MI	Wayne	4.2 Power Equip. Operator â€“ Commercial	4.2 Power Equip. Operator â€“ Commercial - Apprentice	Apprentice	Level 2 7 -12 Months	11/1/2025	61.34	79.34	97.33	TRUE	TRUE
MI	Wayne	4.2 Power Equip. Operator â€“ Commercial	4.2 Power Equip. Operator â€“ Commercial - Apprentice	Apprentice	Level 3 13 - 18 Months	11/1/2025	63.74	82.94	102.13	TRUE	TRUE
MI	Wayne	4.2 Power Equip. Operator â€“ Commercial	4.2 Power Equip. Operator â€“ Commercial - Apprentice	Apprentice	Level 4 19 - 24 Months	11/1/2025	66.14	86.54	106.93	TRUE	TRUE
MI	Wayne	4.2 Power Equip. Operator â€“ Commercial	4.2 Power Equip. Operator â€“ Commercial - Apprentice	Apprentice	Level 5 25 - 30 Months	11/1/2025	68.54	90.14	111.73	TRUE	TRUE
MI	Wayne	4.2 Power Equip. Operator â€“ Commercial	4.2 Power Equip. Operator â€“ Commercial - Apprentice	Apprentice	Level 6 31 - 36 Months	11/1/2025	70.94	93.74	116.53	TRUE	TRUE
MI	Wayne	4.3 Power Equip. Operator â€“ Commercial	4.3 Power Equip. Operator â€“ Commercial - Journeyman	Journeyman		11/1/2025	72.52	96.11	119.69	TRUE	TRUE
MI	Wayne	4.3 Power Equip. Operator â€“ Commercial	4.3 Power Equip. Operator â€“ Commercial - Apprentice	Apprentice	Level 1 0 - 6 Months	11/1/2025	58.37	74.88	91.39	TRUE	TRUE
MI	Wayne	4.3 Power Equip. Operator â€“ Commercial	4.3 Power Equip. Operator â€“ Commercial - Apprentice	Apprentice	Level 2 7 -12 Months	11/1/2025	60.74	78.44	96.13	TRUE	TRUE
MI	Wayne	4.3 Power Equip. Operator â€“ Commercial	4.3 Power Equip. Operator â€“ Commercial - Apprentice	Apprentice	Level 3 13 - 18 Months	11/1/2025	63.09	81.96	100.83	TRUE	TRUE
MI	Wayne	4.3 Power Equip. Operator â€“ Commercial	4.3 Power Equip. Operator â€“ Commercial - Apprentice	Apprentice	Level 4 19 - 24 Months	11/1/2025	65.45	85.51	105.55	TRUE	TRUE
MI	Wayne	4.3 Power Equip. Operator â€“ Commercial	4.3 Power Equip. Operator â€“ Commercial - Apprentice	Apprentice	Level 5 25 - 30 Months	11/1/2025	67.81	89.04	110.27	TRUE	TRUE
MI	Wayne	4.3 Power Equip. Operator â€“ Commercial	4.3 Power Equip. Operator â€“ Commercial - Apprentice	Apprentice	Level 6 31 - 36 Months	11/1/2025	70.17	92.59	114.99	TRUE	TRUE
MI	Wayne	4.4 Power Equip. Operator â€“ Commercial	4.4 Power Equip. Operator â€“ Commercial - Journeyman	Journeyman		11/1/2025	71.66	94.82	117.97	TRUE	TRUE
MI	Wayne	4.4 Power Equip. Operator â€“ Commercial	4.4 Power Equip. Operator â€“ Commercial - Apprentice	Apprentice	Level 1 0 - 6 Months	11/1/2025	57.77	73.99	90.19	TRUE	TRUE
MI	Wayne	4.4 Power Equip. Operator â€“ Commercial	4.4 Power Equip. Operator â€“ Commercial - Apprentice	Apprentice	Level 2 7 - 12 Months	11/1/2025	60.08	77.45	94.81	TRUE	TRUE
MI	Wayne	4.4 Power Equip. Operator â€“ Commercial	4.4 Power Equip. Operator â€“ Commercial - Apprentice	Apprentice	Level 3 13 - 18 Months	11/1/2025	62.4	80.93	99.45	TRUE	TRUE
MI	Wayne	4.4 Power Equip. Operator â€“ Commercial	4.4 Power Equip. Operator â€“ Commercial - Apprentice	Apprentice	Level 4 19 - 24 Months	11/1/2025	64.71	84.39	104.07	TRUE	TRUE
MI	Wayne	4.4 Power Equip. Operator â€“ Commercial	4.4 Power Equip. Operator â€“ Commercial - Apprentice	Apprentice	Level 5 25 - 30 Months	11/1/2025	67.03	87.87	108.71	TRUE	TRUE
MI	Wayne	4.4 Power Equip. Operator â€“ Commercial	4.4 Power Equip. Operator â€“ Commercial - Apprentice	Apprentice	Level 6 31 - 36 Months	11/1/2025	69.35	91.35	113.35	TRUE	TRUE
MI	Wayne	4.5 Power Equip. Operator â€“ Commercial	4.5 Power Equip. Operator â€“ Commercial - Journeyman	Journeyman		11/1/2025	70.69	93.37	116.03	TRUE	TRUE
MI	Wayne	4.5 Power Equip. Operator â€“ Commercial	4.5 Power Equip. Operator â€“ Commercial - Apprentice	Apprentice	Level 1 0 - 6 Months	11/1/2025	57.09	72.96	88.83	TRUE	TRUE
MI	Wayne	4.5 Power Equip. Operator â€“ Commercial	4.5 Power Equip. Operator â€“ Commercial - Apprentice	Apprentice	Level 2 7 - 12 Months	11/1/2025	59.36	76.37	93.37	TRUE	TRUE
MI	Wayne	4.5 Power Equip. Operator â€“ Commercial	4.5 Power Equip. Operator â€“ Commercial - Apprentice	Apprentice	Level 3 13 - 18 Months	11/1/2025	61.62	79.76	97.89	TRUE	TRUE
MI	Wayne	4.5 Power Equip. Operator â€“ Commercial	4.5 Power Equip. Operator â€“ Commercial - Apprentice	Apprentice	Level 4 19 - 24 Months	11/1/2025	63.9	83.18	102.45	TRUE	TRUE
MI	Wayne	4.5 Power Equip. Operator â€“ Commercial	4.5 Power Equip. Operator â€“ Commercial - Apprentice	Apprentice	Level 5 25 - 30 Months	11/1/2025	66.16	86.57	106.97	TRUE	TRUE
MI	Wayne	4.5 Power Equip. Operator â€“ Commercial	4.5 Power Equip. Operator â€“ Commercial - Apprentice	Apprentice	Level 6 31 - 36 Months	11/1/2025	68.43	89.97	111.51	TRUE	TRUE
MI	Wayne	4.6 Power Equip. Operator â€“ Commercial	4.6 Power Equip. Operator â€“ Commercial - Journeyman	Journeyman		11/1/2025	68.98	90.8	112.61	TRUE	TRUE
MI	Wayne	4.6 Power Equip. Operator â€“ Commercial	4.6 Power Equip. Operator â€“ Commercial - Apprentice	Apprentice	Level 1 0 - 6 Months	11/1/2025	55.89	71.16	86.43	TRUE	TRUE
MI	Wayne	4.6 Power Equip. Operator â€“ Commercial	4.6 Power Equip. Operator â€“ Commercial - Apprentice	Apprentice	Level 2 7 -12 Months	11/1/2025	58.07	74.43	90.79	TRUE	TRUE
MI	Wayne	4.6 Power Equip. Operator â€“ Commercial	4.6 Power Equip. Operator â€“ Commercial - Apprentice	Apprentice	Level 3 13 - 18 Monhs	11/1/2025	60.25	77.71	95.15	TRUE	TRUE
MI	Wayne	4.6 Power Equip. Operator â€“ Commercial	4.6 Power Equip. Operator â€“ Commercial - Apprentice	Apprentice	Level 4 19 - 24 Months	11/1/2025	62.44	80.99	99.53	TRUE	TRUE
MI	Wayne	4.6 Power Equip. Operator â€“ Commercial	4.6 Power Equip. Operator â€“ Commercial - Apprentice	Apprentice	Level 5 25 - 30 Months	11/1/2025	64.62	84.26	103.89	TRUE	TRUE
MI	Wayne	4.6 Power Equip. Operator â€“ Commercial	4.6 Power Equip. Operator â€“ Commercial - Apprentice	Apprentice	Level 6 31 - 36 Months	11/1/2025	66.8	87.53	108.25	TRUE	TRUE
MI	Wayne	4.7 Power Equip. Operator â€“ Commercial	4.7 Power Equip. Operator â€“ Commercial - Journeyman	Journeyman		11/1/2025	61.67	79.83	97.99	TRUE	TRUE
MI	Wayne	4.7 Power Equip. Operator â€“ Commercial	4.7 Power Equip. Operator â€“ Commercial - Apprentice	Apprentice	Level 1 0 - 6 Months	11/1/2025	50.78	63.5	76.21	TRUE	TRUE
MI	Wayne	4.7 Power Equip. Operator â€“ Commercial	4.7 Power Equip. Operator â€“ Commercial - Apprentice	Apprentice	Level 2 7 -12 Months	11/1/2025	52.58	66.2	79.81	TRUE	TRUE

Michigan Department of Labor and Economic Opportunity

Prevailing Wage Rate Schedule

state	county	category	classification	level	apprentice	updated	hourlyrate	overtime	doubletime	fourtens	makeupday
MI	Wayne	4.7 Power Equip. Operator â€“ Commercial	4.7 Power Equip. Operator â€“ Commercial - Apprentice	Apprentice	Level 3 13 - 18 Months	11/1/2025	54.4	68.93	83.45	TRUE	TRUE
MI	Wayne	4.7 Power Equip. Operator â€“ Commercial	4.7 Power Equip. Operator â€“ Commercial - Apprentice	Apprentice	Level 4 19 - 24 Months	11/1/2025	56.22	71.66	87.09	TRUE	TRUE
MI	Wayne	4.7 Power Equip. Operator â€“ Commercial	4.7 Power Equip. Operator â€“ Commercial - Apprentice	Apprentice	Level 5 25 - 30 Months	11/1/2025	58.03	74.37	90.71	TRUE	TRUE
MI	Wayne	4.7 Power Equip. Operator â€“ Commercial	4.7 Power Equip. Operator â€“ Commercial - Apprentice	Apprentice	Level 6 31 - 36 Months	11/1/2025	59.85	77.1	94.35	TRUE	TRUE
MI	Wayne	4.8 Power Equip. Operator â€“ Commercial	4.8 Power Equip. Operator â€“ Commercial - Journeyman	Journeyman		11/1/2025	60.64	71.39	86.73	TRUE	TRUE
MI	Wayne	4.8 Power Equip. Operator â€“ Commercial	4.8 Power Equip. Operator â€“ Commercial - Apprentice	Apprentice	Level 1 0 - 6 Months	11/1/2025	50.05	62.4	74.75	TRUE	TRUE
MI	Wayne	4.8 Power Equip. Operator â€“ Commercial	4.8 Power Equip. Operator â€“ Commercial - Apprentice	Apprentice	Level 2 7 -12 Months	11/1/2025	51.82	65.06	78.29	TRUE	TRUE
MI	Wayne	4.8 Power Equip. Operator â€“ Commercial	4.8 Power Equip. Operator â€“ Commercial - Apprentice	Apprentice	Level 3 13 - 18 Months	11/1/2025	53.58	67.7	81.81	TRUE	TRUE
MI	Wayne	4.8 Power Equip. Operator â€“ Commercial	4.8 Power Equip. Operator â€“ Commercial - Apprentice	Apprentice	Level 4 19 - 24 Months	11/1/2025	55.35	70.36	85.35	TRUE	TRUE
MI	Wayne	4.8 Power Equip. Operator â€“ Commercial	4.8 Power Equip. Operator â€“ Commercial - Apprentice	Apprentice	Level 5 25 - 30 Months	11/1/2025	57.11	72.99	88.87	TRUE	TRUE
MI	Wayne	4.8 Power Equip. Operator â€“ Commercial	4.8 Power Equip. Operator â€“ Commercial - Apprentice	Apprentice	Level 6 31 - 36 Months	11/1/2025	58.88	75.65	92.41	TRUE	TRUE
MI	Wayne	5.1 Truck Driver Class	5.1 Truck Driver Class - Journeyman	Journeyman		8/18/2023	54.1	70.52	86.94	TRUE	FALSE
MI	Wayne	5.2 Truck Driver Class	5.2 Truck Driver Class - Journeyman	Journeyman		N/A	13.73	20.6	27.46		
MI	Wayne	5.3 Truck Driver Class	5.3 Truck Driver Class - Journeyman	Journeyman		N/A	13.73	20.6	27.46		
MI	Wayne	5.4 Truck Driver Class	5.4 Truck Driver Class - Journeyman	Journeyman		N/A	13.73	20.6	27.46		
MI	Wayne	Electricians	Electricians - Journeyman	Journeyman		1/7/2008	83.54	114.99	142.83	FALSE	FALSE
MI	Wayne	Electricians	Electricians - Apprentice	Apprentice	1st Period	1/7/2008	52.81	68.94	81.47	FALSE	FALSE
MI	Wayne	Electricians	Electricians - Apprentice	Apprentice	2nd Period	1/7/2008	55.6	73.13	87.05	FALSE	FALSE
MI	Wayne	Electricians	Electricians - Apprentice	Apprentice	3rd Period	1/7/2008	58.38	77.28	92.61	FALSE	FALSE
MI	Wayne	Electricians	Electricians - Apprentice	Apprentice	4th Period	1/7/2008	61.16	81.47	98.18	FALSE	FALSE
MI	Wayne	Electricians	Electricians - Apprentice	Apprentice	5th Period	1/7/2008	63.95	85.66	103.76	FALSE	FALSE
MI	Wayne	Electricians	Electricians - Apprentice	Apprentice	6th Period	1/7/2008	69.52	94	114.88	FALSE	FALSE
MI	Wayne	Laborer Common	Laborer Common - Journeyman	Journeyman		N/A	13.73	20.6	27.46		
MI	Wayne	Laborer Skilled	Laborer Skilled - Journeyman	Journeyman		N/A	13.73	20.6	27.46		
MI	Wayne	Laborer, Common - Commercial	Laborer, Common - Commercial - Journeyman	Journeyman		9/18/2025	56.5	73	89.5	FALSE	FALSE
MI	Wayne	Laborer, Common - Commercial	Laborer, Common - Commercial - Apprentice	Apprentice	Apprentice Level 1	9/18/2025	48.25	60.63	73	FALSE	FALSE
MI	Wayne	Laborer, Common - Commercial	Laborer, Common - Commercial - Apprentice	Apprentice	Apprentice Level 2	9/18/2025	49.9	63.1	76.3	FALSE	FALSE
MI	Wayne	Laborer, Common - Commercial	Laborer, Common - Commercial - Apprentice	Apprentice	Apprentice Level 3	9/18/2025	51.55	65.58	79.6	FALSE	FALSE
MI	Wayne	Laborer, Common - Commercial	Laborer, Common - Commercial - Apprentice	Apprentice	Apprentice Level 4	9/18/2025	54.85	70.53	86.2	FALSE	FALSE
MI	Wayne	Laborer, Skilled - Commercial	Laborer, Skilled - Commercial - Journeyman	Journeyman		N/A	13.73	20.6	27.46		
MI	Wayne	Low Voltage Technician	Low Voltage Technician - Journeyman	Journeyman		11/12/2021	60.91	81.88	102.84	TRUE	TRUE
MI	Wayne	Low Voltage Technician	Low Voltage Technician - Apprentice	Apprentice	Period 1	11/12/2021	37.26	46.4	55.54	TRUE	TRUE
MI	Wayne	Low Voltage Technician	Low Voltage Technician - Apprentice	Apprentice	Period 2	11/12/2021	38.92	48.89	58.86	TRUE	TRUE
MI	Wayne	Low Voltage Technician	Low Voltage Technician - Apprentice	Apprentice	Period 3	11/12/2021	40.58	51.38	62.18	TRUE	TRUE
MI	Wayne	Low Voltage Technician	Low Voltage Technician - Apprentice	Apprentice	Period 4	11/12/2021	43.34	54.97	66.6	TRUE	TRUE
MI	Wayne	Low Voltage Technician	Low Voltage Technician - Apprentice	Apprentice	Period 5	11/12/2021	43.9	56.36	68.82	TRUE	TRUE
MI	Wayne	Low Voltage Technician	Low Voltage Technician - Apprentice	Apprentice	Period 6	11/12/2021	44.81	58.1	71.39	TRUE	TRUE

GRETCHEN WHITMER
GOVERNOR

STATE OF MICHIGAN
DEPARTMENT OF LABOR AND ECONOMIC OPPORTUNITY
LANSING

SUSAN CORBIN
DIRECTOR

2025 Prevailing Wage Job Classifications
Wage Hour Division

The classifications are provided and used by the Wage & Hour Division based on typical tasks for categories of construction mechanics in the construction industry. Contractors are responsible for identifying and placing workers in classifications based on the work performed.

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1. Laborer (6 Rate Classifications)

1.1 Laborer, common

Nature of work: Performing tasks involving physical labor at building, highway, and heavy construction projects, tunnel and shaft excavations, and demolition sites including the following tasks or other tasks not listed which are not considered skilled craft work.

Typical duties:

1. Loading, unloading, stockpiling, and staging construction materials by hand or with hand-operated equipment such as a pallet jack, unless included in a skilled trade.
2. Digging and filling holes and trenches and using post hole diggers.
3. Removing excess dirt or grout away from an auger as the auger progresses.
4. Cleaning and sweeping.
5. Moving and hoisting forms to point of installation, cleaning forms, and stripping forms not intended for reuse.
6. Demolition of highways, bridges, and buildings, to include operating remote control demolition equipment.
7. Removing materials to be discarded.
8. Clearing and grubbing with hand tools.
9. Performing signaling and rigging for material placement, removal, and demobilization.
10. Using hand tools driven by compressed air, gas, or electric power to perform such work as breaking old pavement, loosening or digging hard earth, trimming bottom and sides of trenches, breaking large rocks, chipping concrete, trimming or cutting stone, caulking steel plates, or compacting earthen backfill.
11. Using paving breakers and chipping hammers to break up concrete to be repaired or replaced.
12. Mopping, brushing, or spreading bituminous compounds over surfaces for protection; and spraying materials such as water, sand, or steam through a hose to clean, coat, or seal surfaces.
13. Tending a stationary or portable liquid asphalt kettle, starting fires under the kettle, controlling the heat applied to the kettle by regulating dials or burners, maintaining desired temperature in asphalt, regulating valves for discharging asphalt from the kettle; cleaning and pouring asphalt joints in concrete paving with nozzle or can; and distributing asphalt road-building materials evenly over road surface by raking, shoveling, and brushing materials to

correct thickness and to add or take away material to fill low spots or to reduce high spots.

14. Operating a power driven chain saw to clear areas of timber by felling trees and sometimes cutting the fallen trees into short sections to facilitate their removal.
15. Operating a device used to burn or melt holes through concrete (this device consists of a consumable aluminum magnesium rod inside a small iron pipe through which oxygen is forced under pressure, the end of the assembly is lighted, and the concrete is melted by the intense heat).
16. Driving self-propelled buggy to transport concrete from mixer or source of supply to place of deposit, operating levers to dump load, and operating buggy by pushing or pulling by hand between mixer or other source to site of work.
17. Covering, insulating, and uncovering concrete.
18. Operating remote control vibrating compactor (such as a "whacker").
19. Operating power-driven water cooled saws to cut concrete, including walk-along, hand-guided, or riding.
20. Operating power-driven, walk-along, hand-guided tools for excavation, hauling, or grading.
21. Operating control levers of a nonpowered infrared heater unit to regulate heat being applied to asphalt surface.
22. Placing and operating ground thawing equipment.
23. Tending heating devices.
24. Cutting, scraping, and removing materials for demolition, including rigging and signaling, and using a cutting torch, plasma arc, and air arc for demolition work.
25. Dismantling, moving, and cleaning forms after concrete hardens if the forms are not to be reused.
26. Installing preformed wire baskets by tapping hooks along the edge of the baskets to keep them in place on highway projects.
27. Running string line so an asphalt spreader operator can determine height and edge of asphalt surface.
28. Setting string line for curb machines and placing concrete and moving and cleaning forms for curbs, sidewalks, and gutters.
29. Installing, removing, altering, repairing, and erecting interlocking or modular block walls (nonmortar).

30. Installing, removing, altering, and repairing paving stones of any materials set in sand cushion including, but not limited to, paving stones, natural stone, and synthetic materials when not set in mortar.
31. Providing fire watch and hole watch.
32. Cleaning, screening, and feeding sand to hopper or pot of sandblasting machine.
33. Cleaning and preparing surfaces for the application of paint by sandblasting, water blasting, or using other equipment for purposes other than preparation.
34. Installing, removing, altering, and repairing guardrails (other than guardrails on bridges), tension cable guardrails, guardrail posts, highway signs and sign structures, and median barriers.
35. Installing, removing, altering, and repairing metal fencing used to define property boundaries, rights-of-way, medians, or driving lanes including barbed wire, chain link, temporary fencing, and woven wire, excluding decorative iron fencing, or providing safety for such areas.
36. Cleaning and dressing the slopes of roadway cuts and embankments while suspended by ropes or cables, using hand tools as required.
37. Operating hand-guided vibratory or impact compactor, and adjusting levers, throttles, and other devices necessary for operation.
38. Removing, altering, and repairing post-tension and prestressed cables.
39. Dewatering excavation and construction work sites, including the operation of water pumps.
40. Performing pipe rehabilitation work, including cleaning, relining, cutting, and inspecting; and using all equipment used for pipe rehabilitation work, including closed-circuit TV trucks, pipe inspection cameras, cutters, bypass pumps, steam and water boilers, inversion units, jetters, vactors, and wet-out conveyors.
41. Performing hazardous waste operations and working in and around hazardous waste, excluding asbestos abatement and lead and mold remediation.
42. Below grade, installing soil venting systems.
43. Installing, removing, altering, and repairing membrane materials used for landfills, holding ponds, contaminated soil, or other applications, including the welding and fusing of such materials.
44. Performing caisson work.

Flag Person. Performing duties to regulate flow of traffic through a construction project by using handheld flags and signs. May keep in radio contact with others regulating traffic through the work zone:

1. Controlling movement of vehicular traffic through construction projects.
2. Discussing traffic routing plans and type and location of control points with superior.
3. Directing movement of traffic through site using sign, hand, and flag signals.
4. Warning construction workers when approaching vehicle fails to heed signals to prevent accident and injury to workers.
5. Informing drivers of detour routes through construction sites.
6. Recording license plate number of traffic control violators for law enforcement.
7. Giving hand marker to last driver in lineup of one-way traffic at opposite end of site, signaling clearance for reverse flow of traffic.

Watch Person. Monitoring access to a construction project site:

1. Allowing entrance or exit of employees, truckers, and authorized visitors.
2. Checking credentials or approved roster before admitting anyone.
3. Issuing passes at own discretion or on instruction from superiors.
4. Directing visitors and truckers to various parts of the construction project.
5. Inspecting outgoing traffic to prevent unauthorized removal of company property or products.
6. Recording information about trucks or other carriers entering and leaving.
7. Checking permits from employees for tools or materials taken from premises.

Typical tools used: Air hammer, earth tamper, cement mixer, small mechanical hoist, surveying and measuring equipment, chain saw, cutoff saw, compaction equipment (hand-operated or remote control), concrete drill, concrete vibrator, jackhammer, paving breaker, air compressor, chipping tool, hammer, pliers, chisel, screwdriver, rigging equipment, cutter, shovel, rake, wheelbarrow, file, bar, sockets and wrench, level, scraper, grinder, core drill, rock drill, broom, torch, arc welder, ladder, knives, concrete slab saw, concrete wall saw, signs, flags, radio, and personal protective equipment.

1.2 Laborer, skilled

Nature of work: performing skilled laborers' work and assisting special craft persons by performing the duties associated with the special crafts including duties typically considered those of a hod-carrier, mason tender, brick tender, drill runner tender, refractory worker, stone tender, shot-crete nozzle operator, track layer, concrete placement laborer, or top man.

Typical duties:

1. Mixing cement used in the patching of concrete and performing other tasks as may be directed by cement mason.
2. Mixing plaster, stucco, acrylic compounds, or similar materials for plasterers and delivering same to location where plasterer is working; constructing, erecting, and dismantling scaffolds for plastering regardless of scaffold height; and cleaning and caring for tools and equipment used in the preparation and application of plaster.
3. Mixing fireproofing; constructing, erecting, and dismantling scaffolds for fireproofing regardless of scaffold height; and cleaning and caring for tools and equipment used in the preparation and application of fireproofing.
4. Handling the equipment and directing the placing of concrete or mortar that is moved by pressure or pneumatic equipment, such as gunite or shot-crete; may fine-grade and place wire mesh at times; and may perform other related duties.
5. Assisting brick masons, stonemasons, and block masons by preparing mortar mix, either by hand or machine; delivering material to masons on scaffold; operating small material moving equipment such as power buggy, hoists, mortar mix pumps, and other similar equipment; constructing, erecting, and dismantling all mason scaffolds regardless of scaffold height; and erecting temporary enclosures for heat and shelter of mason scaffold.
6. Mechanically mixing mortar ingredients to proper consistency and delivering to mason on scaffold or at site of work; keeping materials supplied to mason and assisting according to directions of mason.
7. Installing, removing, altering, repairing, erecting, and patching precast products including, but not limited to, planks, walls, and panels.
8. Cutting openings through concrete with core drill, concrete wall saws, and slab saws.
9. Top man assisting pipelayer, including keeping stakes and string line set in place out in front of trenching machine so that machine will cut ditch in correct location, setting stakes so that pipelayers can fine-grade ditch and measure from the batter board down to correct depth of ditch, assembling valves and other parts to be lowered into the excavation, rigging of pipe sections to be lowered into the trench,

maintaining the operation of water pumps and observing the excavation for warning signs of cave-ins, and cutting of pipe at the direction of the pipelayer.

10. Placing concrete and lowering hose-like flexible shaft of vibrator into newly poured concrete; starting power unit and holding shaft, allowing hammerhead on shaft to vibrate, thus consolidating the concrete (air, electric, or gasoline-operated vibrators are used).
11. Performing work related to the construction, remodeling, or repairing of railroads and rail systems, including the grading and maintaining of rights-of-way, laying ties or other rail supporting materials, and laying rails.
12. Setting stringline and forms for concrete curb, gutter, and sidewalk.

Typical tools used: air hammer, earth tamper, cement mixer, mortar mixer, small mechanical hoist, surveying and measuring equipment, chain saw, cutoff saw, compaction equipment (hand-operated or remote control), concrete drill, concrete vibrator, jackhammer, paving breaker, air compressor, chipping tool, hammer, pliers, chisel, screwdriver, rigging equipment, cutter, shovel, rake, wheelbarrow, file, bar, sockets and wrench, level, scraper, grinder, core drill, rock drill, broom, torch, arc welder, ladder, knives, concrete slab saw, and concrete wall saw.

1.3 Laborer, Landscaping

Nature of work: performing landscaping including seeding, sodding, and planting of woody and herbaceous plant material, including native plant material such as grasses, shrubs, and trees; installing edging and ground cover, including mulches, decorative rock, and other materials associated with plantings; and installing erosion control measures limited to erosion blanket, silt fence, and bale checks and temporary erosion control measures.

Typical duties:

1. Seeds, sods, and plants greenery to contract specifications by performing landscaping duties, including site development, soil preparation, fertilizing, building garden accessories, and laying mulches and decorative rock around trees and buildings.
2. Erecting silt fencing to contract specifications.
3. The duties do not include electrical work, fencing (other than silt fencing), retaining walls, paving bricks, all concrete work, woodwork (such as park benches), or other work that is generally performed by a general laborer or skilled craft worker.
4. Installing underground sprinkler systems for irrigation.

Typical tools used: shovel, rake, wheelbarrow, and seed and fertilizer broadcaster.

1.4 Underground and Open Cut Laborer

Nature of Work: This classification covers the installation, removal, maintenance, and repair of underground utility infrastructure; including water, sewer, gas, stormwater, catch basins, manholes, hydrants, culverts, and box culverts; using open cut or trench excavation methods. Work is performed both at grade and within excavations up to and beyond eight feet in depth, including activities assisting pipelayers directly in trench operations.

Typical Duties:

1. Installing, removing, altering, maintaining, and repairing underground pipes used for water, water main, sanitary sewage, stormwater runoff, catch basins, and manholes, regardless of material.
2. Laying pipe on utility projects: receiving pipe lowered into trench, inserting spigot end into bell end, adjusting for line and grade, and sealing joints.
3. Laying and connecting pipes on highway projects by non-weld methods and sealing joints.
4. Setting proper excavation depth and fine grading the ditch before placement.
5. Aligning, assembling, and guiding pipe sections together ("Bottom Man" duties).
6. Cleaning and lubricating pipe ends.
7. Backfilling and compacting trenches alongside laid pipe.
8. Operating trench compaction equipment (e.g., "whacker").
9. Receiving, guiding, and positioning pipe sections within excavations.
10. Assembling large-diameter metal culverts and precast concrete box culverts.
11. Installing and repairing culverts and manholes to control surface and subsurface water.
12. Installing and fusing HDP fusion pipe for sewer and water systems.
13. Boring and welding pipe casings related to underground utilities.
14. Guiding equipment operators around existing utilities and performing general laborer duties inside trenches.

Typical Tools Used: Shovels, bars, lasers, targets, level, measuring and surveying equipment, stick rule, pipe fusion equipment, impact wrench, rigging equipment, small mechanical hoist, chain saw, cutoff saw, compaction equipment (hand-operated or remote control), paving breaker, air compressor, chipping hammer, hammers, pliers, chisel, screwdriver, wheelbarrow, scraper, grinder, torch, ladder, and welding equipment.

1.5 Tunnel miner

Nature of work: drilling earth and rock excavations to construct underground shafts and tunnels for projects such as roads, railways, and waterways, and performing work within tunnels.

Typical duties:

1. Performing tunnel and underground construction.
2. Setting up and operating pneumatic drilling machinery and moving lever controlling drilling action to drill blast holes in tunnel heading according to spacing, angle, and depth of hole.
3. Wedging, nailing, or bolting timber or steel retaining structures to prevent cave-ins.
4. Working in caissons.
5. Boring and welding pipe casings as related to tunnel work.
6. Lancing surfaces by using sandblasting, water blasting, or other equipment.

Typical tools used: drills, saws, jack leg, hammers, tunnel boring machines, locomotives, mucking machines, conveyors, grout pumps, rigging equipment, and welding equipment.

2. Class 2 Equipment

2.1 Articulated hauler

2.2 Boom truck

2.3 Landscaping equipment, includes hydro seeder or mulcher, sod roller, farm tractor with attachment specifically seeding sodding, or plant, and two-framed forklift (excluding front, posi-track, and skid steer loaders), no earthwork or grading for elevations

2.4 Off-road truck

3. Power Equip. Operator – Highway & Heavy (5 Rate Classifications)
3.1 Equip. Operator – Highway & Heavy

3.1.1 Concrete pump

3.1.2 All cranes with over 135-foot boom, excluding jib

3.1.3 Dragline, crawler, hydraulic backhoe (track or wheel mounted) and/or other similar equipment with shovel-type controls three cubic yards and over manufacturer's rated capacity including all attachments

3.1.4 Grader or motor patrol

3.1.5 Pile driving

3.1.6 Tugboat - 100 h.p. and over when license required

3.2 Equip. Operator – Highway & Heavy

3.2.1 Asphalt bituminous stabilizer plant

3.2.2 Cableway

3.2.3 Concrete mixer, stationary plant

3.2.4 Derrick (guy or stiffleg) (power) (skids or stationary)

3.2.5 Dragline, crawler, hydraulic backhoe (track or wheel mounted) and/or similar equipment with shovel-type controls, up to three cubic yards manufacturer's rated capacity including all attachments

3.2.6 Dredge or engineers, dredge (power) and engineer

3.2.7 Front end loader, five cubic yards and over including attachments

3.2.8 Locomotive crane operator

3.2.9 Mixer (paving) concrete paving, road mole, including mucking operations, Conway or similar type

3.2.10 Mechanic - welder on power equipment

3.2.11 Tractor - boom type

3.2.12 Tandem scraper

3.2.13 Truck crane - crawler crane

3.2.14 Tugboat 100 h.p. and over

3.3 Equip. Operator – Highway & Heavy

3.3.1 Air track rock drill

3.3.2 Automatic road machine (CMI or similar)

3.3.3 Backfiller operator

3.3.4 Concrete batch plant operator

3.3.5 Bituminous rollers, rubber tired or steel drummed (eight tons and over)

3.3.6 Bituminous spreader and finishing machines (power), including pavers, macro surfacing and micro surfacing, or similar types (operator and screed person)

3.3.7 Brokk or R.T.C. remote control or similar type with all attachments

3.3.8 Cat challenger tractors or similar types pulling rock wagons, bulldozers, and scrapers

3.3.9 Chip harvester and tree cutter

3.3.10 Concrete distributor and spreader finishing machine, longitudinal float, joint machine, and spray machine

3.3.11 Concrete mixer on jobsite

3.3.12 Concrete mobil

3.3.13 Crushing plant (gravel and stone) or gravel washing, crushing and screening plant

3.3.14 Curb machine

3.3.15 Directional boring machine

3.3.16 Dope machine (pipeline)

3.3.17 Drill rigs, heavy rotary or churn or cable drill

3.3.18 Dual tractor

3.3.19 Elevating grader

3.3.20 Fork lift or straddle carrier

3.3.21 Fork lift or lumber stacker

3.3.22 Front end, posi-track, or skid steer loaders, over one cubic yard up to five cubic yards with attachments

3.3.23 GPS remote operating of equipment

3.3.24 Hoist engineer (power)

3.3.25 Hydraulic tree planter

3.3.26 Launcher person (tanker person or pilot license)

3.3.27 Locomotive

3.3.28 Milling, grinding, planing, fine grade, or trimmer machine

3.3.29 Multiple machines, such as air compressors, welding machines, generators, pumps

3.3.30 Pavement breaker or tamping machine (power driven) might mite similar type

3.3.31 Pickup sweeper, one cubic yard and over hopper capacity

3.3.32 Pipeline wrapping, cleaning or bending machine

3.3.33 Power plant engineer, 100 KWH and over

3.3.34 Power actuated horizontal boring machine, over six inches

3.3.35 Pugmill

3.3.36 Pumpcrete

3.3.37 Rubber-tired farm tractor with backhoe including attachments

3.3.38 Scraper

3.3.39 Self-propelled soil stabilizer

3.3.40 Slip form (power driven) (paving)

3.3.41 Tie tamper and ballast machine

3.3.42 Tractor, bulldozer

3.3.43 Tractor, wheel type, over 50 h.p. with PTO unrelated to landscaping

3.3.44 Trenching machine (sewer, water, gas) excludes walk behind trencher

3.3.45 Tub grinder, morbark, or similar type

3.3.46 Well point dismantling or installation

3.4 Equip. Operator – Highway & Heavy

3.4.1 Air compressor, 600 CFM or over

3.4.2 Bituminous roller (under eight tons)

3.4.3 Concrete saw (multiple blade) (power operated)

3.4.4 Form trench digger (power)

3.4.5 Front end, skid steer, or posi-track loaders, up to and including one cubic yard with attachments

3.4.6 Gunite gunall

3.4.7 Hydraulic log splitter

3.4.8 Loader (barber Greene or similar type)

3.4.9 Post hole driving machine/post hole auger

3.4.10 Power actuated auger and boring machine

3.4.11 Power actuated jack

3.4.12 Pump

3.4.13 Self-propelled chip spreader (flaherty or similar)

3.4.14 Sheep foot compactor with blade - 200 h.p. and over

3.4.15 Shouldering machine (power) apsco or similar type including self-propelled sand and chip spreader

3.4.16 Stump chipper and tree chipper

3.4.17 Tree farmer (machine)

3.5 Equip. Operator – Highway & Heavy

3.5.1 Cat, challenger, or similar type of tractors, when pulling disk or roller

3.5.2 Conveyor

3.5.3 Dredge deck hand

3.5.4 Fire person or tank car heater

3.5.5 Gravel screening plant (portable not crushing or washing)

3.5.6 Greaser (tractor)

3.5.7 Lever person

3.5.8 Oiler (power shovel, crane, truck crane, dragline, crushers, and milling machines, or other similar heavy equipment)

3.5.9 Power sweeper

3.5.10 Sheep foot roller and rollers on gravel compaction, including vibrating rollers

3.5.11 Tractor, wheel type, over 50 h.p., unrelated to landscaping

4. Power Equip. Operator – Commercial (8 Rate Classifications)

4.1 Power Equip. Operator – Commercial

4.1.1 Tower crane 250 feet and over

4.1.2 Truck or crawler crane with 200 feet of boom and over, including jib

4.2 Power Equip. Operator – Commercial

4.2.1 Concrete pump with 50 meters/164 feet of boom and over

4.2.2 Pile driving when three drums in use

4.2.3 Tower crane 200 feet and over

4.2.4 Truck or crawler crane with 150 feet of boom up to and not including 200 feet, including jib

4.3 Power Equip. Operator – Commercial

4.3.1 All-terrain vehicle cranes

4.3.2 Concrete pump 32-49 meters/102-164 feet

4.3.3 Derrick (guy & stiffleg)

4.3.4 Stationary tower crane up to 200 feet

4.3.5 Self-erecting tower crane 100 feet and over measured from boom foot pin

4.3.6 Traveling tower crane

4.3.7 Truck or crawler crane up to and not including 150 feet of boom, including jib

4.4 Power Equip. Operator – Commercial

4.4.1 Crawler backhoe including attachments

4.4.2 Fireperson, chief boiler license

4.4.3 Hoist engineer (three drums or more)

4.4.4 Locomotive

4.4.5 Overhead crane (inside building perimeter)

4.4.6 Tractor - boom type

4.5 Power Equip. Operator – Commercial

4.5.1 Air compressor 450 CFM or over (two or more machines)

4.5.2 Concrete mixer

4.5.3 Concrete pump up to 31 meters/101 feet of boom

4.5.4 Drill rigs, heavy rotary or churn or cable drill when used for caisson for elevator or building construction

4.5.5 Forklift

4.5.6 Front end, posi-track, and skid steer type loaders one cubic yard and over, including attachments

4.5.7 Hoist engineer (one or two drums)

4.5.8 Mechanic-welder (on power equipment)

4.5.9 Power plant (100 KW and over or multiples equal to 100 KW and over)

4.5.10 Pump operator and/or conveyor (two or more machines)

4.5.11 Self-erecting tower crane under 100 feet measured from boom foot pin

4.5.12 Straddle carrier

4.5.13 Tractor over D2

4.5.14 Well point pump

4.6 Power Equip. Operator – Commercial

4.6.1 Concrete batch plant

4.6.2 Fireperson, first class boiler license

4.6.3 Front end, posi-track, and skid steer type loaders up to one cubic yard, including attachments

4.6.4 Gunite machine

4.6.5 Tractor operator D2 or similar size

4.6.6 Trenching machine (sewer, water, gas) excludes walk behind trencher

4.7 Power Equip. Operator – Commercial

4.7.1 Air compressor 600 CFM or over

4.7.2 Brake person

4.7.3 Concrete pump/pumpcrete or complaco type

4.7.4 Fireperson, temporary heat second class boiler license

4.7.5 Oiler (power shovel, crane, truck crane, dragline, crushers and milling machines, or other similar power equipment)

4.7.6 Pick-up sweeper (one cubic yard hopper capacity)

4.7.7 Pump and/or conveyor

4.8 Power Equip. Operator – Commercial

4.8.1 Elevator operator

4.8.2 Greaser

4.8.3 Mechanical space heater (temporary heat no boiler license required

5. Truck Driver (4 Rate Classifications)

5.1 Class

5.1.1 Mechanic - welder (on vehicles in Code Nos. 602 through 616)

5.1.2 Tractor trailer driver

5.1.3 Truck driver (hauling machinery including operation of hand and power operated winches)

5.2 Class

5.2.1 Four or more axle unit, straight body truck

5.3 Class

5.3.1 Bituminous distributor driver

5.3.2 Bituminous distributor (one person operation)

5.3.3 Three axle units

5.4 Class

5.4.1 Bituminous distributor spray operator (rear and oiler)

5.4.2 Dump person

5.4.3 Greaser

5.4.4 Pilot car driver

5.4.5 Rubber-tired, self-propelled packer, under eight tons

5.4.6 Two axle unit

5.4.7 Slurry operator

5.4.8 Tank truck helper (gas, oil, road oil, and water)

5.4.9 Tractor operator, under 50 h.p.

6. Heating and frost insulators

Nature of work: applies to workers who apply insulation materials to mechanical systems to reduce loss or absorption of heat, prevent moisture condensation, deaden sound, and prevent vibration. The workers remove all insulation materials from mechanical systems unless the mechanical system is being scrapped.

Typical duties:

1. Preparing and physically distributing on the job site cork, plastic, magnesia, or similar or substitute materials used as thermal insulation, to include building enclosures and hanging polyurethane. Manufacturing, fabricating, assembling, molding, handling, erecting, spraying, pouring, making, hanging, applying, adjusting, altering, repairing, dismantling, reconditioning, corrosion controlling, and testing of heat or frost insulation, such as cork, mineral wall, infusorial earth, mercerized silk, flax, fiber, fire felt, foam glass, Sytrofoam, polyurethane, polystyrene, metals, plastics, fibrous matter, roving, and resins.
2. Covering or encapsulating of boilers, tanks, refrigeration units, evaporators, turbines, fittings, valves, ducts, flues, vats, equipment, hot and cold pipes, or any other hot or cold surfaces with the insulation materials listed in these typical duties, used for the purpose of thermal insulation, fire stoppage, fireproofing, radiator protection, sound deadening, and the lagging (covering) on piping.
3. Removing all insulation materials from mechanical systems, unless the mechanical system is being scrapped (pipes, boilers, ducts, flues, and breechings). All clean up required in connection with this work, including the sealing, labeling, and dropping of scrap material into the appropriate containers.
4. Measuring and cutting insulation for covering surfaces using tape measures, handsaws, knives, and scissors.
5. Fitting insulation around obstructions and shaping insulating materials and protective coverings as required.
6. Determining the amounts and types of insulation needed and methods of installation based on factors such as location, surface shape, and equipment use.
7. Installing sheet metal around insulated pipes with screws in order to protect the insulation from weather conditions or physical damage.
8. Applying, removing, and repairing insulation on industrial equipment, pipes, ductwork, or other mechanical systems such as heat exchangers, tanks, and vessels to help control noise and maintain temperatures.
9. Selecting appropriate insulation such as fiberglass, Styrofoam, or cork based on the heat retaining or excluding characteristics of the material.
10. Reading blueprints and specifications to determine job requirements.

11. Covering, sealing, or finishing insulated surfaces or access holes with plastic covers, canvas strips, sealants, tape, cement, or asphalt mastic.
12. Preparing surfaces for insulation application by brushing or spreading on adhesives, cement, or asphalt, or by attaching metal pins to surfaces.

Typical tools used: metal cutters, reciprocating saws, industrial sewing machines, shears, staple guns, and utility knives.

7. Boilermakers

Nature of work: assembling, analyzing defects in, and repairing boilers, pressure vessels, tanks, and vats in fields following blueprints and using hand tools and portable power tools and equipment. Constructing, erecting, and assembling all boiler parts and work in connection with the boiler, including boiler fronts, heat units, water walls, tube supports, and casings. All connections between the boiler and stack (commonly known as breeching), built of sheet steel or iron, supports for same (which are not part of the building structure), uptakes, smoke boxes, air and water heaters, smoke consumers, and hot and cold air ducts (except when used for ventilation purposes). Pontoons, purifying boxes, gas generators, wash tanks and scrubbers, standpipes, brewery vats, exception glass enameled tanks, and water towers. All iron and steel pipeline, penstock, and flue work. Steam, air, gas, oil, and water, or other liquid tanks or containers requiring tight joints. Blast furnaces and rolling mills, hot stoves cupolas, dump cars, and all gasometers as well as frame work in connection with same. Iron and steel stacks in connection with power plants and rolling mills. Economizers, superheaters, attemperators, air heaters, casing, downcomers, sludge boxes, and sluice troughs. All demolition of boiler equipment, if replaced with the same or similar equipment or if the demolished parts are moved and rebuilt somewhere else. All handling, unloading, and working with boilermaker material.

Typical duties:

1. Locating and marking reference points for columns or plates on foundation using master straightedge, squares, transit, and measuring tape and applying knowledge of geometry.
2. Attaching rigging or signaling crane operator to lift parts to specified position.
3. Aligning structures or plate sections to assemble boiler frame, tanks, or vats using plumb bobs, levels, wedges, dogs, or turnbuckles. Hammering, flame-cutting, filing, or grinding irregular edges of sections or structural parts to facilitate fitting edges together.
4. Bolting or arc-welding structures and sections together. Positioning drums and headers into supports and bolting or welding supports to frame. Aligning water tubes and connecting and expanding ends to drums and headers, using tube expander.
5. Belling, beading with power hammer, or welding tube ends to ensure leakproof joints. Bolting or welding casing sections, uptakes, stacks, baffles, and such fabricated parts as chutes, air heaters, fan stands, feeding tubes, catwalks, ladders, coal hoppers, and safety hatches to frame, using wrench. Installing manholes, handholes, valves, gauges, and feedwater connection in drums to complete assembly of water tube boilers. Assisting in testing assembled vessels by

pumping water or gas under specified pressure into vessel and observing instruments for evidence of leakage.

6. Repairing boilers or tanks in field by unbolting or flame cutting defective sections or tubes, straightening plates, using torch or jacks, installing new tubes, fitting and welding new sections, and replacing worn lugs on bolts. May rivet and caulk sections of vessels using pneumatic riveting and caulking hammers.
7. Fabricating parts such as stacks, uptakes, and chutes to adapt boiler to premises in which it is installed.

Typical tools used: hammers, hoists, levels, punches, nail sets, drifts, and welding tools.

8. Bricklayers

The term "bricklayer" includes the following and similar jobs: brick masonry, stonemasonry, artificial masonry, pointing-cleaning-caulking, and setting precast.

Nature of work:

1. Brick masonry. Brick masonry includes the following work procedures and materials installation:
    a. Laying brick made from any material in, under, or upon any structure or form of work where bricks are used, whether in the ground, over its surface, or beneath water; in commercial and residential buildings, rolling mills, iron works, blast or smelter furnaces, or lime or brick kilns; in mines or fortifications, and in all underground work, such as sewers, telegraph, electric, and telephone conduits; and including the installation of substitutes for brick such as all carbon materials, Karbate, Impervite or mixtures, all acid resistant materials, and all terra cotta and porcelain materials, except where those materials are manufactured to substitute for tile.
    b. All cutting of joints, pointing, cleaning, and cutting of brick walls, fireproofing, block-arching, and terra cotta cutting and setting; laying and cutting all tile
    c. plaster, mineral-wool, cork blocks, and glass masonry, or any substitute for those materials; laying all pipe sewers or water mains and filling all joints on the same when such sewers or conduits are of any vitreous material, burnt clay, cement, or any substitute materials used for those purposes; cutting, rubbing, and grinding all kinds of brick and setting all cut stone trimmings on brick buildings; preparing and erecting plastic, castables, or any refractory materials; and installing hollow metal door frames in masonry applications where the door frames are cemented into the concrete block wall as the wall is built.
    d. Cleaning, grouting, pointing, and other work necessary to achieve and complete the work under the foregoing categories; all waterproofing and black mastic waterproofing, silicone, or substitutes sandwiched between masonry units in the interior of the wall.
    e. All terra cotta called unit tile in sizes over 6" x 12" regardless of method of installation; all quarry tile over 9" x 9" x 1/4" in size; split brick or quarry tile or similar material if bedded and jointed with one operation. The bedding, jointing, and pointing of those materials shall be the work of the craft installing the same.

f. All burnt clay extruded cellular products regardless of trade name or method of installation when used as a veneer on structures; all clay products in sizes larger than 6" x 12" known as terra cotta tile, unit tile, ceramic veneer, machine-made terra cotta, and like materials, regardless of the method of installation. Where the preponderance of material to be installed is to be used in connection therewith, the bricklayers shall install all such materials. Brick paving is part of the bricklayer classification.

2. Stonemasonry. Stonemasonry includes the following work procedures and materials installation:
    a. Laying all riprap, rubble work, with or without mortar, setting all cut stone, marble, slate, or stone work (meaning, as to stone, any work manufactured from such foreign or domestic products as are specified and used in the interior or on the exterior of buildings by architects and customarily called "stone" in the trade); cutting all shoddies, broken ashlar, or random ashlar that is roughly dressed upon the beds and joints, and range ashlar not over ten inches in height; dressing all jambs, corners, and ringstones that are roughly dressed upon the beds, joints, or reveals, and the cutting of a draft upon same for plumbing purposes only; and cleaning, cutting of joints, and pointing of stone work.
    b. Stonemasonry work applies to all work in buildings, sewers, bridges, railroads, breakwaters, jetties, playgrounds, parks, landscaping, and curbing or other public works, and to all kinds of stone, particularly to the product of the locality where the work is being done. Stonemasons shall have the right to use all tools which they consider necessary in performing their work.
    c. Cleaning, grouting, pointing, and other necessary work to achieve and complete the work described under this subitem.
3. Artificial masonry. Artificial masonry includes the following work procedures and materials installation:
    a. Cutting, setting, and pointing of cement blocks and all artificial stone or marble, either interior or exterior, when set by the usual custom of the stonemason and marble setter. All cement that is used for backing up external walls, the building of party walls, columns, girders, beams, floors, stairs, arches, and all material substituted for clay or natural stone products.
    b. All artificial masonry and the cutting, setting, and pointing of all concrete prefabricated slabs, regardless of dimension size.
4. Pointing-cleaning-caulking. Pointing-cleaning-caulking includes the following:
    a. The pointing-cleaning-caulking of all types of masonry, caulking of all window frames encased in masonry, brick, stone, or cement structures,

including all grinding and cutting out on such work, and all sandblasting, steam cleaning, and gunite work.

b. The pointing, cleaning, and weatherproofing of all buildings, grain elevators, and chimneys built of stone, brick, or concrete, including all grinding, cutting out, sand blasting, and gunite work on same.

The bricklayer uses building materials, such as brick, structural tile, concrete cinder, glass, gypsum, and terra cotta block to construct or repair walls, partitions, arches, sewers, and other structures.

9. Carpenters

Nature of work: Constructing, erecting, installing, and repairing structures, structural members, and fixtures made of wood, plywood, wallboard, and materials that take the place of wood, such as plastic, metals, composites, and fiberglass, using carpenter hand tools and power tools.

Typical duties:

1. Conforming the layout of buildings or structures on the site of plot to local building codes, blueprints, sketches, or building plans.
2. Selecting specified types of lumber or other materials. Preparing layout, using rule, framing square, and calipers. Mark cutting and assembling lines on materials, using pencil, chalk, and marking gauge. Shaping materials to prescribed measurements,
3. using saws, chisels, and planes. Assembling, cutting, and shaping materials and fastening them together with nails, dowel pins, or glue. Erecting framework for structures and laying sub-flooring. Covering sub-floor with building paper to keep out moisture and laying hardwood, parquet, and wood-strip block floors by nailing floors to sub-floor, cementing them to mastic, or asphalt base. Verifying trueness of structure with plumb bob, electronic lasers, transit, total station, measuring devices, and carpenter's level. Applying decorative paneling to walls. Measuring boards, timbers, or plywood using square, measuring tape, and ruler; marking cutting lines on materials using pencil and scriber; and sawing boards and plywood panels to required sizes.
4. Making and setting all concrete forms (except curb forms on highway and heavy construction), including establishment of building lines or flow lines (box culverts, bridges) including footing forms. Making all forms used in tilt-up construction. Laying out, installing, and constructing wall forms and footing forms, all block-outs, wood or steel, and laying out and installing all embedded items. Building rough wooden structures, such as concrete forms, scaffolds, wooden bridges, trestles, coffer dams, tunnel, and sewer support. Welding and burning. Constructing forms and chutes for pouring concrete. Nailing cleats (braces) across boards to construct concrete-supporting forms. Cutting and assembling timbers to build trestles and cofferdams. Building falsework to temporarily strengthen, protect, or disguise buildings undergoing construction. Setting of precast bridge sections. Welding incidental to concrete form work.
5. Building and handling scaffolds used by carpenters. All scaffolding, constructed or assembled, 14' 6" and higher for normal or specialty use (regardless of purpose) excluding scaffolding used to access only plaster and masonry work.

6. Handling and installing ladders, handrails, walkways, platforms, and gangways made of wood as well as shoring and lagging. Building temporary shelters and offices, wood frames, light gauge metal buildings, and pole buildings.
7. Handling and installing wood and metal studs and exterior panels. Laying out reference lines and points for use in computing location and position of metal framing and furring channels and marking position for erecting metalwork using chalk line. Measuring, marking, and cutting metal runners, studs, and furring channels to specified size using tape measure, straightedge, and hand and portable power-cutting tools and welding equipment. Securing metal framing to walls and furring channels to ceilings using hand and portable power tools.
8. Handling and installing insulation, thermal, and other material (not sprayed urethane or polyurethane) in connection with carpentry work.
9. Installing insulation such as bat, board, sating, insulated wall panels, thermal, Styrofoam, sound attenuation, and fiberglass when the installation of the insulation material is not applied as an integral part of the roofing system.
10. Installing doors, wood windows, and bucks, including hardware (bucks are rough frames in which finished frames are inserted), in building framework and brace them with boards nailed to framework. Fitting and nailing sheathing on outer walls and roofs on buildings. Installing beams and trusses of wood laminate. Handling and applying all exterior and interior siding of various composites, including wood, particle board, cement board, light gauge steel, vinyl, aluminum, and other materials.
11. Handling, cutting, sawing, and fitting drywall products (sheetrock) and lead-lined drywall whether for walls, ceilings, floors, soffits, or any use, no matter how installed - nailed, screwed, glued, or otherwise (interior, exterior). Lead-lined drywall is used in x-rays to avoid radiation exposure. Installing (comer) corner guards and wooden and plastic column covers.
12. Planning gypsum drywall installation, erecting metal framing and furring channels using various fasteners, clips, screws, and related welding techniques for fastening drywall, and installs drywall to cover walls, ceilings, soffits, shafts, and movable partitions in residential, commercial, and industrial buildings; reading blueprints and other specifications to determine method of installation, work procedures, and material, tool, and work aid requirements. Measuring and marking cutting lines on drywall using square, tape measure, and marking devices. Scribing cutting lines on drywall using straightedge and utility knife and breaks board along cut lines. Fitting and fastening board into specified position on wall using screws, hand or portable power tools, or adhesive. Cutting openings into board for electrical outlets, vents,

or fixtures using keyhold saw or other cutting tools. Installing fire-rated wall systems.

13. Installing plasterboard or other wallboard to ceiling and interior walls of building using hand tools and portable power tools; installing horizontal and vertical metal or wooden studs for attachment of wallboard on interior walls using hand tools. Cutting angle iron and channel iron to specified size using hacksaw, and suspending angle iron grid and channel iron from ceiling using wire. Scribing measurements on wallboard using straightedge and tape measure, and cutting wallboard to size using knife or saw. Cutting out openings for electrical and other outlets using knife or saw. Attaching wallboard to wall and ceiling supports using glue, nails, screws, hammer, or powered screwdriver. Trimming rough edges from wallboard to maintain even joints using knife. Nailing prefabricated metal pieces around windows and doors and between dissimilar materials to protect drywall edges.
14. Handling and installing door frames, wood and hollow metal doors, hollow metal door frames, rollup garage doors, overhead doors or Rolling fire doors, automatic doors, channel iron door bucks, glass sliding, and bi-fold doors.
15. Handling, installing, and caulking cabinets, cabinetry, shelving, fixtures, and counter tops.
16. Making, handling, and setting frames, sash, blinds, magnetic tile, chalk, bulletin boards, trim, and other fixtures (for example, cabinets, bookcases, and benches). Applying shock-absorbing, sound-deadening, and decorative paneling to ceilings and walls. Fitting and installing prefabricated window frames, doors, doorframes, weather stripping, interior and exterior trim, and finish hardware, such as locks, letter drops, and kick plates.
17. Measuring, cutting, assembling, and installing metal framing and decorative trim for windows, doorways, and vents. Fitting, aligning, and hanging doors and installing hardware, such as locks and kick-plates.
18. Handling and installing builders hardware, including door tracks of every description. Installing weather strips. Making, fitting, and hanging fly screens for doors, windows, and other openings.
19. Handling and installing access flooring, computer floors, and raised or elevated floors. Installing modular headwall units and laboratory casework and fume hoods.
20. Handling and installing wood flooring.
21. Handling and installing modular or demountable furniture, such as office partitions, cubicles, and other modular office products.
22. Handling and installing acoustical and egg crate ceiling systems in their entirety (hanger wire, grid, molding, and tile), whether vertically or horizontally installed.

23. Handling and assembling chairs, seats, bleachers, benches, children's playground equipment, lockers (wood or composite), metal shelving, and other furniture in theaters, halls, schools, stadiums, and other places of assemblage on floors of any kind. Installing protection screens (chalkboards), toilet partitions (plastic laminate, solid plastic), and building stairs.

Typical tools used:

Hammers, knives, power screwdrivers, ladders, extension ladders, fold up ladders, levels calibrating electronic levels, spirit levels, visual beam laser levels, power sanders, belt sanders, hand rotary tools, orbit sanders power saws circular saws, compound miter saws, reciprocating saws, worm drive saws, squares combination squares, framing squares, layout bars welding equipment. Any specialty or necessary tools and equipment for assembly, fabrication, or installation of all products and applications related to this classification.

10. Carpet layers (linoleum)

Nature of work: applies to workers who measure, cut, sew, make-up and seam, tape, and fit. Laying, installing, sealing, and waxing materials to be cemented, tacked, or otherwise applied to its base and adhered to any surface. These materials may be used as shock-absorbing, sound absorbing, or decorative coverings. Except for terrazzo, magnesite, and latex built-up floors, the materials include oil, cloth, matting, linen, carpet, synthetic turf, linoleum, vinyl, plastic, rubber, cork, mastic, asphalt, mastipave, tile, wood tile, interlocking and magnetic tile, chalk and bulletin board, nonslip or abrasive materials, resilient, decorative seamless surface coatings, monolithic coverings (monolithic means all resilient seamless material such as epoxy, polyethylene, plastics, and their derivatives, components, and systems), and all other resilient coverings on floors, walls, counters, table tops, and ceilings.

Typical duties:

1. Handling materials at the point of installation.
2. Performing necessary preparation and finish work such as sweeping, scraping, sanding, or chipping dirt and irregularities from base surfaces; filling cracks with putty, plaster, or cement grout to form smooth, clean foundations; and drilling holes for sockets and pins.
3. Installing underlayment; sanding and filling; fitting of metal edgings, metal comers, and caps; and fitting devices for attachment of these materials.
4. Spreading adhesive cement over floor to cement foundation material to the floor.
5. Laying covering on cement.
6. Rolling finished floor to smooth it out and press cement into base and covering.
7. Stripping, buffing, and waxing resilient floors.
8. Joining edges of carpet and seam edges where necessary by sewing or by using tape with glue and heated carpet iron.
9. Cutting and trimming carpet to fit along wall edges, openings, and projections; finishing edges with a wall trimmer.
10. Inspecting the surface to be covered to determine its condition and correcting any imperfections that might show through the carpet or cause the carpet to wear unevenly.
11. Rolling out, measuring, marking, and cutting carpet to size with a carpet knife following floor sketches and allowing extra carpet for final fitting.
12. Planning layout of the carpet, allowing for expected traffic patterns, and placing seams for best appearance and longest wear.

13. Stretching carpet to align with walls and ensuring a smooth surface, and pressing the carpet in place over tack strips or using staples, tape, tacks, or glue to hold the carpet in place.
14. Taking measurements and studying floor sketches to calculate the area to be carpeted and the amount of material needed.
15. Cutting carpet padding to size and installing padding following the prescribed method.
16. Nailing tack strips around the area to be carpeted or using old strips to attach edges of new carpet.

Typical tools used: Glue guns, butane glue guns, cool tip glue guns, electric glue guns, knife blades, floro scraper blades, hooked blades, tackless cutter blades, trimmer blades, power saws, jamb saws, toe kick saws, undercut saws, shears, carpet base cutters, carpet shears, stand up cutters, strip cutters. staple guns, air underlayment staplers, edge binding staplers, hammer tackers, heavy duty electric staplers, tensioners, carpet tucking tools, swivel lock stretchers.

11. Cement masons

Nature of work: applies to workers who set up rodding and finish fresh concrete, perform work on existing concrete, or work with various cementatious products.

Typical duties:

1. Setting and laying out forms and bulkheads when used as screeds. Rodding, shaping, smoothing, stamping, and finishing the surfaces of freshly poured concrete floors, walls, sidewalks, curbs, swimming pools, paving, and steps and finishing
2. extruded barrier rails or any other concrete surface requiring finishing, using hand tools or power tools, including floats, trowels, screeds, and straightedge.
3. Preparing surfaces using grinder or chisel and hammer, including electric or pneumatic. All processes of patching, rubbing, and sacking with fresh concrete, cementatious materials, or epoxy compound.
4. Laying out and installing expansions, control joints, and edges.
5. Installing complete process of specialty flooring such as concrete overlays, micro topping, staining, exposed aggregate, and stamped concrete.
6. Applying penetrating sealers, primer protective coatings, and protective covers (blankets, poly, etc.) to concrete floors and steps when part of the finishing process.
7. Installing seamless composition floors such as quartzite or dex-o-tex, and installing and finishing epoxy-based coatings or polyester-based linings to all surfaces when the coatings or linings are applied by spraying or troweling in conjunction with pouring of the floor.
8. Complete concrete polishing grinding systems using hand tools or machines.
9. Sandblasting or water blasting for architectural finish or patching preparation
10. Cutting joints with concrete saw for the control of cracks in buildings and sidewalks, driveways, curbs, and gutters contiguous to buildings.

Typical tools used: floats, trowels, rubber floats, rubbing stones, set-up tools, saws, laser levels, eye levels, total stations, tapes, laser screeds, power screeds, walking or riding troweling machines, concrete polishing machines, concrete floor saws, and power or pump sealer sprayers.

12. Electricians

Nature of work: applies to workers who are responsible for installation, assembly, construction, inspection, operation, and repair of all electrical work within the property lines of any given property (manufacturing plants, commercial buildings, schools, hospitals, power plants, parking lots). This scope of work shall begin at the secondary side of the transformer when the transformer is furnished by the local utility and the service conductors are installed underground. When service conductors are installed overhead in open air from wooden poles, this scope of work shall start immediately after the first point of attachment to the buildings or structures.

Typical duties:

1. Planning and laying out electrical systems that provide power and lighting in all structures. This includes cathodic protection systems utilized to protect structural steel in buildings and parking structures.
2. Handling, moving, loading, and unloading of electrical materials, materials used in association with an electrical system, electrical equipment, and electrical apparatus on the job site, whether by hand or where power equipment and rigging are required.
3. Welding, burning, brazing, bending, drilling, and shaping copper, silver, aluminum, angle iron, and brackets used in connection with the installation and erection of electrical wiring and equipment.
4. Measuring, cutting, bending, threading, forming, assembling, and installing electrical raceways (conduit, wireways, cable trays) using tools such as hacksaw, pipe threader, power saw, and conduit bender.
5. Installing wire in raceways (conduit, wireways, troughs, cable trays). This wire may be ahead of service, service conductors, feeder wiring, subfeeder wiring, branch circuit wiring control circuits, life safety circuits, temperature control circuits, scada systems, process control systems, and digital and analog control systems.
6. Chasing and channeling necessary to complete any electrical work, including fabricating and installing duct banks and manholes incidental to electrical, electronic, data, fiber optic, and telecommunication installation; for example: cell tower wiring and apparatus.
7. Splicing wires by stripping insulation from terminal leads with knife or pliers, twisting or soldering wires together, and applying tape or terminal caps.
8. Installing and modifying lighting fixtures to include L.E.D., fiber optic, and similar fixtures and their supports.
9. Installing and modifying electrical and fiber optic equipment (AD-DC motors, variable frequency drives, transformers, reactors, capacitors, motor generators,

emergency generators, UPS equipment, data processing systems, and enunciator systems where sound is not a part thereof).

10. Installing raceway systems utilizing conduit, conduit bodies, junction boxes, device boxes for switches, and receptacles. This may also include wiring systems utilizing other methods and materials approved by the National Electrical Code (MC cable, AC cable, BX or flexible metal tubing, or electrical nonmetallic tubing).
11. Installing main service equipment, distribution panels, subpanels, branch circuit panels, motor starters, disconnect switches, and all other related items. This includes all temporary wiring and lighting systems.
12. Installing and wiring instrumentation and control devices as they pertain to heating, ventilating, air condition (HVAC) temperature control and energy management systems, building automation systems, and electrically or fiber optically operated fire and smoke detection systems where other building functions or systems are controlled.
13. Testing continuity of circuit to ensure electrical compatibility and safety of components. This includes installation, inspecting, and testing of all grounding systems including those systems designed for lightning protection; testing of low, medium, and high voltage cables, equipment, and apparatus. This includes electrical heat stress testing and associated wiring.
14. Removing electrical systems, fixtures, conduit, wiring, equipment, equipment supports, or materials involved in the transmission and distribution of electricity within the parameters of the building property line if reuse of any of the existing electrical system is required. This may include the demolition, removal, and disposal of the electrical system.
15. Installing, repairing, altering, and maintaining solar photovoltaic wiring, apparatus, and equipment.
16. Installing, repairing, altering, and maintaining wind power generation wiring, apparatus, and equipment.
17. Wiring overhead bridge cranes, hoists, and their related control systems.
18. Constructing, altering, and repairing highway and street lighting, traffic signal systems, athletic field lighting systems, airport runway and taxi lighting systems, and their related control systems.

Typical tools used: Cable reels, single reel cable trailers, wheeled wire dispensers, wire dollies, wire hand caddies, wire pullers, tuggers, electrical and hydraulic conduit benders, screwdrivers, insulated screwdrivers, Phillips head screwdrivers, round shank screwdrivers, square shank screwdrivers, stripping tools, automatic insulation strippers, self-adjusting insulation strippers, universal stripping tools, wire strippers, voltage and current meters, milliametters, test lamps, volt tick meters, voltmeters, wire or cable

cutters, cable cutters, high leverage cable cutters, insulated cable cutters, utility cutters, punches, crescent wrenches, tap wrenches, Allen wrenches, nut drivers, pliers (various).

13. Elevator constructors

Nature of work: assembling and installing all commercial conveyances: electric, cable driven, hydraulic, rack and pinion, freight and passenger elevators, escalators, dumbwaiters, moving walks, ramps, and lifts.

Typical duties:

1. Handling, unloading, and hoisting all equipment to be assembled or installed by workers performing work within this job classification.
2. Assembling, installing, repairing, and maintaining elevators, escalators, moving sidewalks, and dumbwaiters using hand tools and power tools and testing devices such as test lamps, ammeters, and voltmeters.
3. Laying out system components, frameworks, and foundations; installing counterbalance rails, motor pump, cylinder and plunger foundations, and elevator cars (which includes the platform, walls, and doors).
4. Cutting prefabricated sections of framework, rails, and other elevator components to specified dimensions.
5. Positioning electric motor and equipment on top of elevator shaft using hoists and cable slings or mounting elevator apparatus in machine room, overhead or below.
6. Installing all wiring, conduit, and raceways.
7. Connecting electrical wiring to control panels and electric motors.
8. Adjusting safety controls, counterweights, door mechanisms, and components such as valves, ratchets, seals, and brake linings.
9. Inspecting wiring connections, control panel hookups, door installations, and alignments and clearances of cars and hoistways to ensure that equipment will operate properly.
10. Testing newly installed equipment to ensure that it meets specifications, such as stopping at floors for set amounts of time.
11. Sinking, boring, drilling, or digging cylinder wells.
12. Erecting and assembling theatre stage and curtain elevator equipment and guides or rigging.
13. Locating malfunctions in brakes, motors, switches, and signal and control systems using test equipment.
14. Disassembling defective units, and repairing or replacing parts such as locks, gears, cables, and electric wiring.
15. Maintaining log books that detail all repairs and checks performed.
16. All cleanup required in connection with the installation of elevators.

Typical tools used: event or graphic data recorders, hydraulic pressure gauges, amp meters, millivoltmeters, test lamps, voltmeters, saws, grinders, acetylene torch, drill.

14. Glaziers

Nature of work: installing, setting, cutting, preparing, fabricating, distributing, handling, or removing the following: glass and glass substitutes used in place of glass, preglazed windows, retrofit window systems, mirrors, curtain wall systems, window wall systems, suspended glass systems, louvers, skylights, entrance ways including automatic doors, patio doors, store front, column covers, panels and panel systems, glass hand rails, decorative metals as part of the glazing system, and the sealing of all architectural metal and glass systems for weatherproofing and structural reasons.

Typical duties:

1. Installing the materials described under item A in the course of building construction, repair, remodel, alteration, or retrofit.
2. Installing and welding extruded rolled or fabricated materials including, but not limited to, all metals, plastics, and vinyls, or any materials that replace same, metal and vinyl tubes, mullions, metal facing materials, corrugated flat metals, aluminum panels, muntins, facia, trim moldings, porcelain panels, architectural porcelain, plastic panels, unitized panels, showcase doors, glass handrails and relative materials, including those in buildings related to storefront, door and window construction, and curtain wall systems.
3. Installing and maintaining automatic door entrances, door and window frame assemblers such as patio sliding or fixed doors, vented or fixed windows, shower doors, bathtub enclosures, and storm sash where the glass becomes an integral part of the finished product.
4. Transporting, handling, rigging, unloading, and loading of tools, equipment materials, and clean up.
5. Setting art glass, prism glass, beveled glass, leaded glass, automotive glass, protection glass, plate glass, window glass, wire glass, ribbed glass, ground glass, colored glass, figured glass, vitrolite glass, carrara glass, all types of opaque glass, class chalk boards, structural glass, tempered and laminated glass, and all types of insulating glass units.
6. Caulking glass to glass, glass to metals, metals to substrates and glass to substrates.
7. Installing metal sill, head, and jamb flashing.
8. All plastics or other similar materials when used in place of glass to
9. be set or glazed in its final resting place with or without putty, vinyl, molding, rubber, lead, sealants (such as Thiokol), neoprene, silicone, and all types of mastics in wood, iron, aluminum, sheet metal, or vinyl sash, doors, frames, stone wall cases, showcases, bookcases, sideboards, partitions, and fixtures.

Typical tools used: files, glass cutters, grinding or polishing machines, power saws, miter saws, all types of levels and laser levels, all types of squares, all types of power tools, all types of hand tools, suction cups, power suction cups, swing stages, platform lifts, scaffolding, safety equipment, welding equipment, step ladders, and extension ladders.

15. Lathers

Nature of work: erecting (horizontal) metal framework to which wooden, metal, or rockboard lath is fastened.

Typical duties:

1. Measuring and marking surfaces to lay out work using tape measures, straightedges, or squares and mark devices.
2. Drilling holes in floor and ceiling and driving ends of wooden or metal studs into holes to provide anchor for furring or rockboard laths.
3. Fitting and fastening wallboard or drywall into position on wood or metal frameworks using glue, nails, or screws.
4. Hanging dry lines (stretched string) to wall moldings in order to guide positioning of main runners.
5. Measuring and cutting openings in panels or tiles for electrical outlets, windows, vents, plumbing, and other fixtures using keyhole saws or other cutting tools.
6. Hanging drywall panels on metal frameworks of walls and ceilings in offices, schools, and other large buildings using lifts or hoists to adjust panel heights when necessary.
7. Assembling and installing metal framing and decorative trim for windows, doorways, and vents.
8. Trimming rough edges from wallboard to maintain even joints using knives.
9. Cutting and screwing together metal channels to make floor and ceiling frames according to plans for the location of rooms and hallways.

Typical tools used: lifts, putty knives, saws; drywall, hacksaw, keyhole, trowels, utility knives, claw hammers, and lathing hammers.

16. Ground person

Nature of work: performing ground work to assist the journeyman lineman on work that is not energized.

Typical duties:

1. Manually digging and backfilling pole holes, anchor holes, and trenches.
2. Loading, unloading, and moving materials and equipment used for the construction of power lines.
3. Assisting in assembling conduit systems, boxes, signals, and bases on the ground. May frame and erect poles.
4. Pulling nonenergized guy wires.
5. Excavating dirt or rock on the outside line portion of a project.
6. Tamping or compacting dirt following excavation work.

Typical tools used: jackhammers, air drills, shovels, picks, tamps, trenching equipment, and other tools used in excavating or compacting dirt or rock.

17. Ironworkers

Nature of work: performing field storage and yarding, (on-site storage area or railhead) laying out, fabricating, modifying, erecting, installing, removing, repairing, renovating, retrofitting, demolishing, or dismantling of structural, architectural, ornamental, miscellaneous, and reinforcing members and related components or fixtures made of iron, steel, other ferrous and nonferrous metals and alloys, acrylic, ceramics, fiberglass, fiber-reinforced plastics or composites (FRP products), glass architectural or structural, precast, and prestressed concrete or stone, and materials that take their place, in buildings, bridges of all types, structures, civil work of all kinds, facilities, plants, and machinery, equipment, and appurtenances related thereto.

Typical duties:

Erecting structural steel and installing architectural, ornamental, and miscellaneous metals: the unloading, sorting, yarding, erection, installation, assembly, and final alignment of the main structural steel of precast concrete framework and ancillary structural supports related thereto, including any field fabrication or modification of buildings and bridges of all types, including, but not limited to, highway, light rail transit

and related systems, railroad, pedestrian, and bridges over all waters, structures, civil works of all kinds, plants, or facilities and the structural framing and supports for machinery and plant and facility equipment.

Performing any combination of duties to hoist and install all structural components, including, but not limited to, columns, girders, beams, diaphragms, and all other bracing, joists, purlins, girts, wall restraint angles, plates, all metal floor and roof deck, channels, angles, or other structural shapes.

Verifying elevations and vertical and horizontal alignment of structural and ancillary members by means of levels, plumb bobs, and optical instruments such as transits, eye level, lasers, Total Station, or Pacific Laser Systems.

After assembly and final alignment, structural members are permanently bolted, welded, riveted, pinned, screwed, or otherwise secured into place. Setting up hoisting equipment to raise and place structural and ancillary members and components; fastening or securing members to cable of crane or other hoisting equipment by means of cable, chain, or rope; doing all signaling (via hand, telephone, or radio) to worker operating hoisting equipment during erection or installation; guiding members into place using tag lines, comealongs, portable hydraulic jacks, pry bars, wedges, and aligning pins.

Laying out, drilling, and epoxying, grouting, or fastening anchor bolts or other anchoring devices described in this classification, excluding embedded items.

Erecting, installing, aligning, and securing (by means of bolts, brackets, clips, epoxy core drilling and grouting or welding) architectural, ornamental, and miscellaneous metals (including iron, steel, aluminum, brass, or any other type of metal, glass, acrylic, or plastic) and related structural supports, including, but not limited to, stairways, stair treads, newel posts, balusters, gates, and handrails; ladders, catwalks and platforms; grating, floor plates, checker plates, and toe or kick plates; multiple function support components; relieving angles and lintels which are bolted or welded into place; and revolving doors and window grills.

Modifying or altering main structural and ancillary members and components using oxyacetylene torch, plasma arc cutter, hand and power saws, drills, grinders, and welders.

Performing demolition or dismantling of all materials described in this classification if materials, members, or components are to be reused or re-erected.

Bridges: performing field unloading, sorting, and yarding, laying out, erecting, aligning, repairing, and renovating structural steel girders, beams, and metal components, such as ornamental railings, handrails, crash and guardrails, and safety fencing relating to pedestrians; precast or prestressed girders, beams, segments, members, and related components such as architectural precast concrete facades for all types of

bridges, including the installation of all steel tendons, bar tendons, and DWYI-DAG bars, strands, and the entire pre- or post-tensioning process including the calibrating and use of hydraulic jacks or other equipment and the grouting of prestress (bonded) cables when installed on the job site.

Installing bridge seat assemblies, including bearing or shoe plates, rocker arms, and pins; trusses; diaphragm and other bracing; floor beams, bridge flooring, and ballast plates; expansion control assemblies and joints including slide assemblies; and the erection of structural steel framework supporting machinery and mechanical devices for lift, swing, or bascule bridges and the unloading, erection, cabling, and placing of all such machinery and devices to approximate position on anchor bolts.

Installing structural cabling including spinning and cable stays; installing and erecting cableways and travelers if required for erection of bridge. Placing all reinforcing steel for cast-in-place concrete on all bridges, including, but not limited to, substructures such as caissons, footings, pier stem and caps, abutments, approach panels, sloped paving,

bridge decks, J-barrier and crash rails, retaining walls, and wing walls. Erecting and dismantling related steel falsework and temporary bridges.

Concrete reinforcing: the unloading, carrying, placing, and typing of all concrete reinforcing such as rebar, wire mesh, expanded metal, post-tensioning cables (including the calibrating and use of hydraulic jacks during the entire tensioning process) or prestress bonded cables including the grouting of all bonded cables and tendons when installed on the job site, and the layout and surface preparation (cleaning or grinding, placement, and welding) of shear connectors (such as Nelson studs).

Positioning and securing steel bars in concrete forms and other required locations to reinforce concrete. Determining numbers, sizes, shapes, and location of reinforcing rods from blueprints, sketches, or oral instructions. Selecting and placing rods in forms or at required locations; spacing and fastening them together, using wire and pliers or mechanical splices, and installing all associated chairs, bolster bars, or cement bricks for correct spacing. Cutting bars to required lengths using hacksaw, bar cutters, or oxyacetylene torch. Bending steel rods with hand tools or rod bending machine. Reinforcing concrete with wire mesh or rebar for slabs-on-grade, floor systems, fireproofing of structural steel members (including clips, bolts, or steel studs), and simulated rock formations. Welding reinforcing bars together, using standard arc welding or specialty welding processes. Welding deck pans on a bridge and reinforcing supports for the concrete structure: lays out and drills holes for dowel placement and secures dowels by means of epoxy adhesive, grout, or other mechanical means.

Rigging and erecting machinery and equipment: the unloading, moving, erection, and setting of machinery and equipment (except the setting of electric

motors) when rigging or power equipment, or both, is used, which includes hydraulic or electric jack stands or cable lift systems.

Unloading, handling, moving, and placing machinery and related steel framing, to be assembled, dismantled, erected, or installed to its approximate position (over the anchor bolts).

Offloading, staging, rigging, erecting, and dismantling (for maintenance or repair) wind turbine sections, blades, hubs, and nacelles and the torqueing of erection bolts.

Unloading, assembling, erecting, plumbing, leveling, rigging, jumping, signaling to hoisting equipment operator, maintaining, and disassembling lattice boom cranes, tower cranes, buck hoists, Chicago booms, gin poles, guy and stiff leg derricks, manlifts, material hoists

and towers, overhead travelers and traveling sheaves, and securing of same to buildings and structures where required.

Installing monorails, bridge cranes, and underslung bridge cranes, including crane rails. Loading, unloading, moving, placing, and final setting of electrical transformers.

Curtain wall, window wall, and windows: erecting and installing metal punched windows and enclosures, preglazed window units, strip windows (excluding storefront display windows), curtain-wall and window-wall systems and associated structural framing, panels and brackets related thereto, and installation of related cover plates, sills, stools molding, and trim work. Caulking, sealing, and weather stripping joints that abut those materials. Installing window washing systems including related guides, tracks, hooks, tiebacks, davits, and safety equipment.

Doors: installing or erecting curtain type doors (overhead rolling-type doors), heavy industrial doors when made of metal, fire doors, and exterior metal hinged doors that carry a fire underwriters label, rolling grills and shutters (horizontal-sliding or vertical-drop), hangar doors, and related framing and installation of tracks, guides, sills, and thresholds.

Sheeting and decking: installing structural metal sheeting (exterior or interior, corrugated or flat, insulated or noninsulated), structural metal floor decking and structural metal roof decking (including standing seam), structural metal ceiling and wall panel systems, insulated metal wall panel systems (so-called sandwich panels), and smoke curtains which are attached to a steel frame or to the metal, masonry, or concrete framework of a building or structure. Installs related purlins, girts, clips, brackets, fascia, soffits, and trim work.

Pre-engineered metal buildings: erecting, installing, and retrofitting of the structural steel for pre-engineered buildings when they come in packaged units,

such as Butler, Delta, Varco Pruden, or other name brand packaged buildings. Installing balconies, mezzanines, stairs and nonwood handrails, doors, windows (including Vista Wall and related systems), skylights, and insulation (when installed in conjunction with sheeting) in the packaged buildings.

Structural and architectural precast or prestressed concrete and stone: unloading, installing, and erecting precast concrete columns, beams, single Ts, double Ts raker beams, spandrel beams, top panels, tilt-up slabs, and wall panels and the erection and welding of corbels, haunches, and other related components supporting gravity loads. Erecting precast and prestressed wall and roof panels and architectural stone (granite, limestone, marble, or composite materials) by bolting, clamping, or welding at the bottom

to footing and at the top to steel joints as needed. Erecting buildings utilizing lift-slab or jack-slab constructions.

Other: installing detention security equipment and materials, including the erection of prefabricated or modular steel or precast concrete cells, associated with guardhouses, jail cells, police station holding cells, prison cells, and detention facilities utilizing central locking systems. Installing furniture and fixtures, including, but not limited to, beds and bunks, benches, chairs, food hatch doors, pass-throughs, food tray shelves, grills, mirrors, and tables (excluding sanitary facilities such as sinks and toilets); detention security doors, frames, and hinges including sliding doors and related guides, hardware, devices, and grouting of door frames); detention security hardware and locks; detention security gates, ceilings, and hatchway doors; detention security windows of glass, acrylic, and similar materials; detention security partitions (including woven wire partitions) and detention security caulking; and secure rooms, security and storerooms, and cages related to security doors and door frames.

Installing theater equipment such as drapery and fire curtains and related tracks and guides, backdrop and scenery equipment, back stage lifts, counter weight systems and stage rigging (cabling and reaving-up included), and structural framing, grids, and related catwalks that support any state and theater equipment-related components such as stage lighting and sound systems.

Installing and erecting ornamental, cast iron, wrought iron, chain, and cable link fences, security fences, gates (excluding site clearing, boring of holes and placing of concrete) and blast deflector fences, including layout and erection of related structural framework, baffles, and sheeting.

Installing dry storage bins, hoppers, silos, chutes, and conveyors where ash, coal, lime, ore, sand, or any dry component is stored or transferred.

Erecting, altering, retrofitting, and repairing bridges, viaducts, cableways, tramways, and monorail transportation systems and the dismantling of same if for reuse or re-erection.

Erecting geodesic and other domes supported by structural steel or air or cable supported and related fabric installation.

Erecting, installing, repairing, removing, and dismantling locks, gates, sluice gates and bulkheads, weirs and weir plates, lift-station buildings, metal forms and railing (including pipe) on waterways, locks, dams, and flood control projects.

Erecting pump station buildings on pipelines (excluding mechanical, piping, or electrical work). Erecting or installing frames in support of boilers, if part of the building structure.

Assembling and erecting communication towers, (TV, radar, satellite, and microwave); installing related antennas and wave guide and other types of structural steel towers such as self-supporting towers, guyed towers, or monopoles (excluding electrical power transmission towers).

Unloading and setting modular or prefabricated buildings, excluding mechanical, piping, or electrical work.

Installing metal guardrails with metal posts and erecting highway informational signs.

Erecting, trimming, and fitting together by means of bolts and clamps, iron grills, grating, and special stairways.

Erecting ornamental enclosures and other ironwork not included in structural ironwork;

Erecting safes and vaults (assembled and unassembled), vault doors, plates, and trim.

Fastening ironwork to walls of buildings by means of bolts, brackets,

or anchors.

Installing pallet racks, speed racks, and associated shelving. Installing

fall protection systems and related safety equipment for use by ironworkers.

Typical tools used: spud wrenches, sleaver bars, hammers, alignment pins, wedges, hydraulic jacks, rams, pliers, wire reels, tape measures, thickness gauges, various clamps, optical instruments such as Total Station and Pacific Laser System, transits, plumb bob, gas saws, drills, hammer drills, porta-bank, torsion control gun, welders (gas and electric), grinders, screw guns, tugger, chain fall, come-along, porta-power, roust-a-bout, genie lifts, J.L.G., scissors lift, sawzall, impact wrenches, torque wrenches, air compressors, stressing rams and equipment, jacking systems, power lifts, metal shears, torching equipment (acetylene, plasma, propane, and oxygen), cable cutters, automatic rebar typing machine, various types of rope, nylon slings, wire rope chokers, and shackles.

18. Lineman

Nature of work: erecting, maintaining, and repairing transmission poles (wood, metal, or other), fabricated metal transmission towers, outdoor substations, switch racks or similar electrical structures, electric cables, and related equipment for high-voltage transmission and distribution power lines.

Typical duties:

1. Adhering to safety practices and procedures, such as checking equipment regularly and erecting barriers around work areas.
2. Opening switches or attaching grounding devices in order to remove electrical hazards from disturbed or fallen lines or to facilitate repairs.
3. Climbing poles or using truck-mounted buckets to access equipment.
4. Placing insulating or fireproofing materials over conductors and joints.
5. Installing, maintaining, and repairing electrical distribution and transmission systems, including conduits, cables, wires, and related equipment such as transformers, circuit breakers, and switches.
6. Identifying defective sectionalizing devices, circuit breakers, fuses, voltage regulators, transformers, switches, relays, or wiring using wiring diagrams and electrical-testing instruments.
7. Driving vehicles equipped with tools and materials to job sites.
8. Coordinating work assignment preparation and completion with other workers.
9. Inspecting and testing power lines and auxiliary equipment to locate and
10. identify problems using reading and testing instruments.
11. Stringing wire conductors and cables between poles, towers, trenches, pylons, and buildings; setting lines in place; and using winches to adjust tension.

Typical tools used: hand tools, power drills, conduit benders, saws, voltage or current meters, and wire or cable cutters.

19. Millwright

Nature of work: assembling, installing, aligning, and dismantling mechanical, hydraulic, pneumatic, power generation, and electrical machinery in commercial and industrial sites.

Typical duties:

1. Replacing or repairing defective parts of machine and adjusting clearances and alignment of machinery moving parts.
2. Aligning machinery and equipment using hoists, jacks, hand tools, squares, rules, micrometers, plumb bobs, lasers, optical equipment, and alignment wire.
3. Connecting power unit to machines or steam piping to equipment, and testing unit to evaluate its mechanical operation.
4. Repairing, revising, and lubricating machines and equipment.
5. Assembling and installing equipment using hand tools and power tools including welding and rigging incidental to that work.
6. Positioning steel beams to support bedplates of machinery and equipment using blueprints and schematic drawings to determine work procedures.
7. Signaling crane operator to lower basic assembly units to bedplate and align unit to centerline.
8. Inserting shims, adjusting tension mounts and bolts, or positioning parts using hand tools, measuring instruments, and power tools to set specified clearances between moving and stationary parts.
9. Moving machinery and equipment using hoists, dollies, rollers, and trucks.
10. Attaching moving parts and subassemblies to basic assembly unit using hand tools and power tools.

Typical tools used: gauges or inspection fixtures, hammer, hoists, levels, precision measuring equipment, micrometers, pullers, punches or nail sets, drill press, and hand tools necessary to perform work.

20. Painters

Nature of work: Applying coats of primer, paint, sealer, stain, varnish, enamel, lacquer, and special coatings to decorate and protect interior or exterior surfaces, trimmings, and fixtures of buildings and structures. Applying wall coverings both paper and vinyl, and carpet to walls and ceilings.

Typical duties:

1. Preparing, applying, and removing all types of coatings and coating systems in relation to all painting, decorating, protective coatings, coating and staining of concrete floors, toppings, waterproofing, masonry restoration, fireproofing, fire retarding, metal polishing, refinishing, sealing, lining, fiber glassing, E-Glass fiberglass, carbon fiber, encapsulating, insulating, metalizing, and flame spray.
2. Each and all such applications, and similar or substitute applications, on all surfaces, interior and exterior, to include, but not be limited to: residences; buildings; structures; industrial, power, chemical, and manufacturing plants; bridges; tanks; vats; pipes; stacks; light- and high-tension poles; parking, traffic, and air strip lines; trucks; automobile and railroad cars; ships; aircraft; and all machinery and equipment.
3. Any and all material used in preparation, application, or removal of any paint, coatings, or applications, including, but not limited to: the handling and use of thinners, dryers, sealers, binders, pigments, primers, extenders, air and vapor barriers, emulsions, waxes, stains, mastics, plastics, enamels, acrylics, alkyds, epoxies, epoxy injection and T-Lock welding, sheet rubber, foams, and seamless and tile-like coatings.
4. All preparation for and removal of any and all materials for finishes, such as deep cleaning, patching, all levels of finishing, taping and finishing, skim coating, pointing, caulking, high-pressure water, chemical, and abrasive blasting, environmental blasting, wet/dry vacuum work, chemical stripping, scraping, air tooling, bleaching, and steam cleaning.
5. Wall covering work including, but not limited to: all material applied to walls or ceilings with adhesive, staples, or tacks, by stretching or adhered by any other method, including all papers, vinyl, flexible woods, fabrics, borders, metals, upholstered wall systems, the fabric-covered panels made of plastic, wood, or prefinished products of micro fiberglass, acrovin, and various plastic wall coverings such as wainscot, caps, corner moldings, and accessories.
6. Any and all preparation of walls and ceilings such as scraping or any methodology for removal of existing materials, including patching, leveling, skim coating, and priming.

7. Mixing, testing, preparing, and manufacturing of paint, coating, caulking, putty, and sealants, and handling of lead, color, oil, lacquer, varnish, synthetic resin, and acrylic paints and coatings, including any and all materials for the same.
8. All processes and procedures for decontamination of all contaminated areas and all cleanup of any type of debris caused by or during the preparation or application of any work described in this classification.
9. Pavement marking including hand-brushed, hand-sprayed, and the hand taping of pavement markings, and the operation of compressors for purposes of hand spraying for pavement marking.

Typical tools used: Hand tools, hopper guns, pneumatic spray texture guns, spray texture guns, stucco patching guns, compressors, pasting machines, heat guns, sandblasting equipment, paint sprayers, airless spray equipment, power brushes, spray guns, electrostatic sprayers, power sanders, disk sanders, electric paint removers, paint stripping equipment, sanders, pressure or steam cleaners, hydro blasters, pressure washers, steam cleaning equipment, wallpaper steamers, putty knives, drywall taping knives, patching knives, spackling knives.

21. Piledriver

Nature of work: performing pile work and driving piles of any type, including, but not limited to, wood, steel, concrete, and composite materials. Includes bridge work, bridge demolition, and pile driving work related to waterfront and marine installations. Set up and operation of vibratory equipment.

Typical duties:

1. Handling, laying out, driving, cutting, and splicing of wood, metal, or concrete piling regardless of purpose or materials (for example, sheets, I-beams, helical and soil anchors of all material, pile caps, and welding to piling).
2. Setting up hoisting equipment for raising and placing wooden or concrete piles or steel sheeting sections to cable of hoist, using chain, cable, or rope. Pumping of material into piling.
3. Signaling worker operating hoisting equipment to lift and place the wooden or concrete pile or steel sheeting section. Installing safety equipment incidental to pile driving work.
4. Guiding wooden or concrete pile or steel sheeting section using tab line (rope) or rides on.
5. Pile or steel sheeting to guide it into position. Pulling, pushing, or prying wooden concrete pile or steel sheeting into place while pile or sheeting is supported by hoisting equipment. Bracing forms in place with timbers, tie rods, and anchor bolts, for use in building concrete piers, footings, and walls and falsework in bridge construction.
6. Assembling, disassembling, and rigging of the pile driving equipment and hoisting equipment when used in pile driving.
7. Conducting underwater diving that is incidental to pile driving work. Diving below water to perform welding and other work incidental to pile driving, highway and commercial construction, and the tending and assisting of divers by performing such tasks as monitoring divers, handing material to divers, and handling of equipment used while driving.

Tools used: operating pile drivers mounted on skids, barges, crawler treads, or locomotive cranes or any hoisting equipment to drive pilings for retaining walls, bulkheads, and foundations of structures, such as buildings, bridges, and piers. Torches, cable cutters, chain saws, and all necessary welding equipment. Vibratory driver or extractor for piling and sheeting operations.

22. Pipefitters – steamfitters

Nature of work: performing and assisting in fabricating, assembling, installing, altering, dismantling, maintaining, and replacing pipe systems, pipe supports, and related hydraulic and pneumatic equipment for steam, hot water, heating, cooling, lubricating, and industrial production and processing systems (ammonia, refrigerant, steam, hot water, chilled water, process piping, etc.).

Typical duties:

1. Fabricating, assembling, and installing piping and tubing systems that are to conduct steam, air, and other fluids, solids, or gases in and around buildings and structures, including hangers, restraints, and supports for such systems.
2. Cutting, threading, and hammering pipe to specifications using tools such as saws, cutting torches, and pipe threaders and benders.
3. Assembling and securing pipes, tubes, fittings, and related equipment according to specifications by welding, brazing, cementing, soldering, and threading joints.
4. Attaching pipes to walls, structures, and fixtures such as radiators or tanks using brackets, clamps, tools, or welding equipment.
5. Measuring and marking pipes for cutting and threading.
6. Installing vacuum piping systems with manufacturing or industrial facilities.
7. Installing and maintaining pneumatic components of machines and equipment, such as pumps and cylinders, using hand tools.
8. Joining ductile iron and plastic pipes when such pipes will be under pressure and used as distribution lines for water mains and sewers.
9. Installing piping systems for refrigeration, cooling, and heating equipment, including, but not limited to, compressors, coils, pumps, tanks, gauges, valves, tubes, and pipes. See "Sheet Metal Worker" for the installation of sheet metal duct work.
10. Performing welding and burning which is incidental to the work of pipefitting or steam fitting.
11. Locating, cutting, and boring holes in structures, such as bulkheads, decks, walls, and mains, prior to pipe installation, using hand and power tools. Setting sleeves in the penetrations.
12. Dismantling piping systems and equipment, including, but not limited to, heating, cooling, process, refrigeration, and HVAC systems.
13. Installing, removing, altering, maintaining, and repairing solar panels and piping, or parts thereof, that are related to the heating or cooling system.
14. Installing, removing, altering, maintaining, and repairing geothermal piping, or parts thereof, used in relation to the heating or cooling system.

15. Testing and balancing hydronic equipment and piping.
16. Labeling and stenciling piping and equipment under this trade classification.
17. Unloading, moving, handling, rigging, placing, and setting of piping and equipment related to work under this classification.
18. Installing, repairing, or replacing flue pipe and breaching when made of steel or plastic pipe.
19. Laying out mechanical pads, curbs, and bases.
20. Installing instrumentation and controls as they pertain to HVAC equipment.
21. Starting up, servicing, and commissioning HVAC systems.
22. All low-voltage wiring and controls as it relates to HVAC equipment.
23. Installing, removing, altering, maintaining, and repairing combustible and noncombustible gas systems and piping, or parts thereof, relating to heating, cooling, and process equipment.
24. Increasing pressure in pipe systems and observing connected pressure gauges to test system for leaks. Performing other work in connection with the installation and testing of heating and cooling apparatus and control devices.

Typical tools used: Automatic levels, laser levels, pocket levels, two-hole pins, offset grinders, pedestal grinders, portable grinders, stationary grinders, flat screwdrivers, impact screwdrivers, Phillips-head screwdrivers, dies, drophead dies, taps, alternating-current/direct-current (AC/DC) welders, arc welders, welding machines, cutting torches, brazing torches, combination wrenches, pipe wrenches, channel locks, crescent wrenches, sockets and ratchets, vise grips, tri-squares, framing squares, ball-peen hammers, rubber hammers, framing hammers, Sawzalls, band saws, drills, drill presses, screw guns, core drills

23. Plasterers

Nature of work: applying coats of plaster or stucco to interior or exterior walls, ceilings, and partitions of buildings and structures to produce a finished surface. Installing exterior insulation finish systems (EIFS). Fireproofing building assemblies with plaster materials, sprayed fiberglass, or other similar materials, whether applied to gypsum, metal lath, or directly.

Typical duties:

1. Applying plaster to lath, masonry, drywall, or other bases; applying stucco to exterior walls using trowels, brushes, or spray guns. Sealing joints between plasterboard or other wallboards to prepare the wall surface for veneer plaster system.
2. Spraying fireproof insulation onto gypsum, lath, or other surfaces.
3. Creating decorative textures in finish coat systems using brushes, trowels, sand, pebbles, or stones.
4. Applying insulation to building exteriors by installing prefabricated insulation systems over existing walls or by covering the outer wall with insulation board, reinforcing mesh, and a base coat.
5. Skim coating various manufacturers' brand names of thin coat or plaster veneer.
6. Applying bonding agents; cleaning and preparing surfaces for applications of plaster, cement, stucco, or similar materials.
7. Grouting and filling of door bucks and similar installations.
8. Applying and setting stone imitation, any patent material when cast, crushed stone, marble, ceramic chips, broken glass embedded in plaster, or similar materials.
9. Applying malleable plastic materials and epoxy materials.
10. Applying weatherproof, decorative coverings to exterior surfaces of buildings such as troweling or spraying on coats of stucco.
11. Spraying acoustic materials or texture finish over walls and ceilings.
12. Molding and installing ornamental plaster pieces, panels, and cornices.
13. Applying plaster or stucco siding materials.

Typical tools used: corner tools, inside step tools, ornamental cut-and-shape tools, outside step tools, darbies, claw hammers, plasterers' hammers, stilts, plaster spraying machines, spray guns, hand saws, keyhole saws, featheredgers, hand trowels, power trowels, scratcher trowels, trimming knives

24. Plumbers

Nature of work: performing or assisting at the business, trade, or work having to do with the installation, removal, alteration, or repair of plumbing and drainage systems or parts thereof, which include, but are not limited to, plumbing fixtures, plumbing appliances, and plumbing appurtenance.

Typical duties:

1. Installing, removing, altering, maintaining, and repairing all potable and nonpotable water supplies and distribution pipes, all plumbing fixtures and traps, all drainage and vent pipes, all building drains, and their associated parts, including their respective joints and connections; devices and appurtenances including potable and nonpotable water treatment or using equipment.
2. Any worker assisting a plumber shall be classified as a plumber.
3. Locating and marking position of pipe, pipe connections, and passage holes, and installing sleeves for pipes in walls and floors using all tools, hand or powered, to complete this task.
4. Cutting openings in walls and floors to accommodate pipe and pipe fittings using hand and power tools.
5. Joining pipes with screws, bolts, couplings, clamps, cement, fittings, solder, brazing, welding, plastic solvent, caulk joints, push gasket, o-ring connection, compression, and similar materials.
6. Testing all piping, fixtures, appliances, and appurtenances
7. Installing, removing, altering, maintaining, and repairing drainage and sewage lines and their parts.
8. Dismantling piping systems to be replaced or reconditioned.
9. Installing, removing, altering, maintaining, and repairing supports for all piping, equipment, appurtenances, appliances, fixtures, and their parts for the proper installation of the plumbing system.
10. All drip pans that are installed in conjunction with the plumbing or piping system.
11. All low voltage used to operate the plumbing or piping systems.
12. All erection and dismantling of any equipment used to access a plumbing or piping system for installation, removal, alteration, maintenance, or repair.
13. Installing, removing, altering, maintaining, and repairing piping and facilities that receive or treat the discharge from plumbing fixtures and their associated parts.
14. Back filling and compacting ditches and excavations using hand-operated machines where plumbing systems are installed.
15. Removing dirt, concrete, bituminous, or similar materials for installation, removal, alteration, maintenance, or repair of a plumbing system.

16. Installing, removing, altering, maintaining, and repairing medical gas or gases used in the medical industry, or parts thereof.
17. Installing, removing, altering, maintaining, and repairing vacuum piping systems, vacuum cleaning and dust collection systems, and their parts in a nonmanufacturing facility.
18. Installing, removing, altering, maintaining, and repairing combustible and noncombustible gas systems and piping and their parts, including venting.
19. Rigging, lifting, loading, unloading, and stockpiling, by hand or machine, all equipment fixtures, appliances, appurtenances, and piping related to the plumbing system.
20. Labeling or stenciling piping, valves, equipment, and their parts under this trade classification.
21. Backing used for support for all plumbing fixtures, appliances, and accessories.
22. Installing plumbing accessories.
23. Installing sheetlead and other like materials to protect workers and the general public.
24. Installing, removing, altering, maintaining, and repairing solar panels, piping, and their parts related to the plumbing system.
25. Installing, removing, altering, maintaining, and repairing geothermal piping and their parts used in relation to the plumbing system.
26. Installing material used to protect the building from smoke and fire damage as related to the plumbing and piping systems. Special materials are applied where the piping for the plumbing system has penetrated through floors, walls, and ceilings in order to protect from smoke and fire damage in case of fire.
27. Venting of subsoils, from the lowest finished floor to the atmosphere, for removal of gases.
28. Installing plates or equivalent to protect all plumbing pipe and tubing.
29. Installing, removing, altering, maintaining, and repairing associated with setting and connecting to the plumbing system all house tanks, surge tanks, pressure tanks, hot water heaters, or their parts.
30. Installing, removing, altering, maintaining, and repairing piping and the setting of all equipment, appliances, and appurtenances in connection with water booster, pumping stations, and water filtration plants, or parts thereof inside the structure.
31. Installing, removing, altering, maintaining, and repairing water pumps and piping, such as water lifts, hydraulic rams, and water boosters worked by water, electric, or air power used in the plumbing system, or parts thereof.

32. Installing, removing, altering, maintaining, and repairing suction and discharge of central distributing and boosting stations in connection with water or fire lines, or parts thereof.
33. Installing, removing, altering, maintaining, and repairing fire pumps, tanks, or water main connections and standpipes with hose connections and cabinets, or parts thereof.
34. Installing, removing, altering, maintaining, and repairing multipurpose potable water systems
35. Installing, removing, altering, maintaining, and repairing sterilizing systems and sterilizing equipment, or parts thereof.
36. Installing, removing, altering, maintaining, and repairing piping, equipment, appliances, and appurtenances for gasoline, oil, and lubricating systems, or parts thereof.
37. Installing, removing, altering, maintaining, and repairing piping for Ozone systems, or parts thereof.
38. Installing, removing, altering, maintaining, and repairing soda fountains, bars, restaurant equipment, piping, or parts thereof.
39. Installing, removing, altering, maintaining, and repairing the wash down and drain piping for all chutes, or parts thereof.
40. Installing, removing, altering, maintaining, and repairing pipe made from any metal, tile, glass, wood, transits, plastic, rubber, or any other material or products manufactured into pipe, usable in the piping industry, regardless of size, shape, or method of making joints, whether or not the piping is installed inside or outside, above the ground or below ground, encased or exposed, or pressure or nonpressure.

Typical tools used: drain cleaning cables, hand spinners, sectional drain cleaning machines, toilet augers, pipe cutters, power pipe cutters, ratcheting polyvinyl chloride (PVC) cutters, tubing cutters, end pipe wrenches, offset pipe wrenches, straight pipe wrenches, air pressure gauges, heavy-duty water pressure gauges, maximum-reading water pressure gauges, water pressure gauges, chain wrenches, spud wrenches, strainer wrenches, water heater element removal wrenches

25. Roofer/waterproofer

Nature of work: applying and installing any and all types of roofing materials. For sheet metal roofs see "Sheet Metal Workers."

Typical duties:

1. Installing slate and tile and all substitute materials taking the place of slate and tile used for roofing, such as asbestos slate or tile, cement, composition or Spanish tile, composition or wood shingles, or shakes, metal shingles or tile, or other substitute materials used on steep, with necessary metal flashing to make watertight. All solar or photovoltaic cell-type shingles used to transform solar energy to electrical energy.
2. Cementing in, on, or around slate and tile roofs. The laying of felt, paper, or substitute material beneath the slate and tile or substitute materials. The dressing, punching, and cutting of all roof slate or tile, either by hand or machinery.
3. Installing all forms of plastic, slate, slag, and gravel; asphalt and composition roofing; rock asphalt mastic when used for damp and waterproofing; prepared paper; compressed paper and chemically prepared paper; and burlap with or without coating. Installing all damp resisting preparations regardless of the method of application in or outside of building. Installing damp courses, sheeting, or coating on foundation work and tarred roofs. Laying of the tile or brick when laid in asphalt or pitch tar.
4. Installing and applying new materials used in roofing, waterproofing, encapsulation, and containment process, including all forms of elastomeric or plastic (elastoplastic), or both, roofing systems, both sheet and liquid applied, whether single-ply or multi-ply. Installing or vacuuming of aggregates, vegetative materials, or stone, used as a ballast for inverted roofing membrane assembly, or roof of similar construction where insulation is laid over the roofing membrane. Sealing and caulking seams and joints on these elastoplastic systems to ensure watertightness. Applying liquid-type elastoplastic preparation for roofing, damp, or waterproofing when applied with a squeegee, trowel, roller, or spray equipment whether applied inside or outside of a building. Priming surfaces to be roofed, damp, or waterproofed, whether done by roller, mop, swab, three-knot brush, or spray systems. Waterproofing all types of preformed panels. All air barriers that are applied with materials that are traditionally used for roofing, waterproofing, and dampproofing systems including, but not limited to, sprays, epoxies, membranes, and bituminous products.
5. Applying all types of spray-in-place such as urethane or polyurethane, and the coatings that are applied over them.

6. Applying roof insulation when the insulation material is applied as an integral part of the roofing system, whether the insulation material is applied as the first, last, or any other layer in between.
7. Operating and servicing kettles, bulk tankers, stationary heating tankers, other types of equipment and tools used to accomplish this work (including heating systems for the operation of the equipment), compressors for applying roofing material components, roof and mop carts, hydraulics, hand or power tools and equipment needed to apply waterproofing, and insulation and roofing materials.
8. Handling, hoisting, and storing of all roofing, damp, and waterproofing materials and ballast. Set up ladders and scaffolding to provide safe access to work site.
9. Tearing off or removing, or both, of any type of roofing, including ballast, all spudding, sweeping, drying, vacuuming, cleanup, or a combination of these, of any areas of any type where a roof is to be replaced.
10. All cleaning, wire brushing, priming, and sealing of roof decks and surfaces that receive roofing, damp, or waterproofing.

Typical tools used: double-lock seamers, propane torches, single seamers, torches, claw hammers, plastic hammers, seaming hammers, slate hammers, carpenters' hatchets, metro roofing hatchets, standard roofing hatchets, wood shingling hatchets, roofing spades, shingle rippers, tear-off bars, tear-off shovels, slate cutters, clipping shears, foot squaring shears, membrane slitters, heat welders, seam welders, rollers, scissors, insulation knife, roofing knife, trowels, awls, tin snips, pneumatic nail guns, powder-actuated nail guns, air nail guns, screw guns, power saws, power drills

26. Sheet metal workers

Nature of work: fabricating onsite, assembling, installing, and replacing sheet metal products and equipment, including control boxes, drainpipes, ductwork, furnace casings, and other ferrous and nonferrous products of varying degrees of gauge thickness, including PVC or fiberglass ductwork (typically nonstructural in nature). This does not include sheeting work performed by carpenters or ironworkers.

Typical duties:

1. Installing, repairing, and altering such assemblies as ductwork for heating, ventilation, air conditioning, and exhaust systems, rain gutters and downspouts, furnace casings, air-to-air exchangers (HRV), and heat recovery systems and under floor systems.
2. Installing panel and structures for refrigeration equipment. See subpart 17, Pipefitter – Steamfitter for installation of refrigeration units or systems.
3. Maneuvering completed units into position for installation and anchoring the units.
4. Installing sheet metal roofing and siding materials including soffit and fascia, except as installed by a carpenter or ironworker.
5. Setting up and operating fabricating machines to cut, bend, and straighten sheet metal.
6. Shaping metal over anvils, blocks, or forms, using hammers.
7. Fastening seams and joints together with welds, bolt cement, rivets, and solder, caulks metal drive clips, and bonds to assemble components into products or to repair sheet metal items.
8. Operating soldering and welding equipment to join sheet metal parts, inspecting assemblies, and smoothing seams and joints of burred surfaces.
9. Removing sheet metal roofing when reroofing with sheet metal materials will occur.
10. Testing and balancing air handling equipment and ductwork.
11. Digging and backfilling for all underground duct systems.
12. Insulating ductwork, plenums, and other air handling components.
13. Installing lockers.
14. Installing metal toilet partitions.
15. Installing trash chutes.
16. Installing laundry chutes.
17. Installing metal shelving.
18. Installing solar panels and solar shingle panels.
19. Fabricating, installing, repairing, or replacing siding and panels.
20. Fabricating, installing, repairing, or replacing all blowpipe, dust
21. collection, and material handling systems.

22. Fabricating, installing, repairing, or replacing all stainless steel kitchen equipment including, but not limited to, countertops, sinks, coolers, bars, exhaust hoods, ovens, and cabinets.
23. Fabricating, installing, repairing, or replacing all cornice work.
24. Installing, repairing, or replacing skylights.
25. Fabricating, installing, repairing, or replacing all chimney liners, flue pipes, and breechings.
26. Fabricating, installing, repairing, or replacing all flashings, counter flashings, or coping.
27. Demolishing HVAC systems and ductwork when reused.
28. Sealing HVAC systems and ductwork.
29. Laying out mechanical pads, curbs, and bases.
30. Installing, repairing, or replacing radiation covers.
31. Fabricating, installing, repairing, or replacing all drip pans.
32. Fabricating, installing, repairing, or replacing all brackets, hangers, or fasteners.
33. Installing and wiring instrumentation and controls as they pertain to HVAC equipment.
34. Installing duct-mounted smoke detectors.
35. Starting up, servicing, and commissioning HVAC systems.
36. Fabricating, installing, repairing, or replacing air filtration systems.
37. Installing air exchanger systems and heat recovery systems.
38. Fabricating, installing, repairing, or replacing sheet metal lagging over insulated pipes, ducts, tanks, and equipment.
39. Cutting openings in walls and floors to accommodate equipment using necessary tools and equipment.
40. Fabricating, installing, repairing, or replacing louvers.
41. Installing walk-in coolers.

Typical tools used: ball peen hammers, bumping hammers, setting hammers, tinners hammers, aviation snips, bull snips, hand notchers, power notchers, V-notchers, center punches, prick punches, punches, rotary punches, bar folders, bending machines, spiral duct machines, wiring machines, power shears, ring and circular shears, squaring shears, unishears, drill presses, hand brakes, power presses, rivet presses, screw guns, cleatlock tools, sockets and ratchets, hand seamers, screwdrivers, hand crimpers, drive pullers, dividers

27. Sprinkler fitters

Nature of work: installing, inspecting, and maintaining fire protection and fire control systems, including water mains (overhead and underground), fire hydrants, hydrant mains, standpipes, hose connections to sprinkler systems, sprinkler tank heaters, air lines and thermal systems used in connection with sprinkler and alarm systems, and all tanks and pumps connected thereto, including CO2 and Cardox systems, dry chemical systems, foam systems, Halon, and all other fire protection systems.

Typical duties:

1. Installing piping, tubing, appurtenances, and equipment.
2. Locating and marking position of pipe and pipe connections and passage holes for pipes in walls using ruler, level, and plumb bob.
3. Cutting openings in walls and floors to accommodate pipe and pipe fittings using hand and power tools. Cutting and threading pipe using pipe cutters, cutting torch, and pipe-threading machine.
4. Assembling and installing valves, pipe fittings, and pipes composed of metals such as iron, steel, copper, and brass, and nonmetals such as plastic using hand and power tools.
5. Joining pipes by use of screws, bolts, couplings, clamps, cement, fittings, solder, brazing, welding, and plastic solvent.
6. Filling pipe with water or air and reading pressure gauges to determine whether system is leaking.
7. Dismantling piping systems to be replaced or reconditioned.
8. Inspecting fire protection systems to ensure deficiencies are identified and corrected.

Typical tools used: power drills, hand drills, core drills, automatic levels, laser levels, pocket levels, two-hole pins, pipe cutters, power pipe cutters, ratcheting polyvinyl chloride (PVC) cutters, tubing cutters, offset pipe wrenches, straight pipe wrenches, offset grinders, pedestal grinders, portable grinders, stationary grinders, air pressure gauges, water pressure gauges, flat screwdrivers, Phillips screwdrivers, impact screwdrivers, chain wrenches, dies, drophead dies, taps, alternating-current/direct-current (AC/DC) welders, arc welders, welding machines

28. Terrazzo workers

Nature of work: installing durable and decorative surfaces on floors, walls, and ceilings. Terrazzo work includes the following and similar materials: venetian enamel and terrazzo, cement terrazzo, magnesite terrazzo, Dex-O-Tex terrazzo, epoxy matrix terrazzo, exposed aggregate, and polished, honed, or sand finished materials.

Typical duties:

1. Installing marble, mosaic, venetian enamel, and terrazzo; cutting and assembling of mosaics and art ceramics; casting terrazzo on the job site; and rolling of terrazzo work.
2. Carving, cutting, and setting marble, slate, including slate blackboards, stone, albereen, carrara, sanionyx, vitrolite, and similar opaque glass, scagliola, marbleithic, and all artificial, imitation, or cast marble of whatever thickness or dimension. This applies to all interior work, such as sanitary, decorative, and other purposes inside of buildings of every description wherever required, including all polished, honed, or sand finished; cutting and fitting of those materials after they leave mills or shops, all accessories in connection with such work, and laying marble tile, slate tile, and terrazzo tile.
3. All scratch coat on walls and ceilings where terrazzo is to be applied shall be done by plasterers, with an allowance of not less than a one-half inch bed to be conceded to terrazzo workers.
4. All bedding above concrete floors or walls, the preparing, cutting, laying, or setting metal, composition, or wooden strips and grounds, and the laying and cutting of metal strips, lath, or other reinforcement, where used in terrazzo work.
5. Rustic or tough washed for exterior or interior of buildings placed either by machine or by hand, and any other kind of mixtures of plastics composed of chips or granules of marble, granite, blue stone, enamel, mother of pearl, quartz, ceramic-colored quartz, and all other kinds of chips or granules when mixed with cement, rubber, neoprene, vinyl, or magnesium chloride.
6. Applying resinous or chemical substances used for seamless flooring systems.
7. Applying binding materials when used on walls, floors, ceilings, stairs, saddles, or any other part of the interior or exterior of the building; other work not considered a part of the building such as, but not limited to, fountains or swimming pools; and all other substitutes that may take the place of terrazzo work.
8. Finishing cement floors where additional aggregate of stone is added by spreading or sprinkling on top of the finished base and troweled or rolled into the finish and then the surface ground by grinding machines.

9. A terrazzo finisher's work consists of assisting, helping, or supporting the terrazzo mechanic by performing historic and traditional work assignments required to complete the proper installation of the work.

Typical tools used:

1. Laying out stone and tile projects; maneuvering heavy objects; mixing and matching paints, stains, and pigments; mixing materials such as mortar, grout, concrete, plaster, and stucco to proper consistency, and preparing surface and site for masonry work.
2. Reading blueprints and technical drawings, repair work orders, and schematics and specifications; and using measuring devices in construction work such as transits or measuring tapes, and using tile and masonry adhesives.

29. Tile setters

Nature of work: applying tile to floors, walls, ceilings, stair treads, promenade of roof decks, garden walks, swimming pools, and all places where tiles may be used to form a finished surface for practical use, sanitary finish, or decorative purpose, in the following materials: burned clay products (used in the tile industry, glazed or unglazed), terra cotta tile, unit tile, ceramic veneer, machine-made terra cotta, and similar materials.

Tile setters set tile, repair and patch tile, lay out the work, and install substrates; install showers, countertops, floors, and steps; lay quarry tile; and install ceilings, mantels, hearths, swimming pools, domes, columns, and arches.

Typical duties:

1. Laying, cutting, or setting tile where used for floors, walls, ceilings, walks, promenade roofs, stair treads, stair risers, facings, hearths, fireplaces, and decorative inserts, together with any marble plinths, thresholds, or window stools used in connection with any tile work.
2. Preparing and setting all concrete, cement, brickwork, or other foundation or materials that may be required to properly set and complete such work; setting or bedding all tiling, stone, marble, composition, glass, mosaic, or other materials forming the facing, hearth, or fireplace of a mantel, or the mantel complete, together with the setting of all cement, brick work, or other materials required in connection with that work.
3. Slabbing and fabricating tile mantels, counters, and tile panels of every description, and the erection and installation of same; building, shaping, forming, constructing, or repairing fireplace work, whether in connection with a mantel hearth facing or not, and setting and preparing material, such as cement, plaster, mortar, brickwork, iron work, or other materials necessary for the proper and safe construction and completion of such work, except that a mantel made exclusively of brick, marble, or stone, shall be conceded to be bricklayers', marble setters', or stonemasons' work, respectively.
4. The term "tile" means burned clay products, as used in the tile industry, either glazed or unglazed, and to all composition materials made in single units up to 15" x 20" x 2", except quarry tiles larger than 9" x 9" x 1-1/4", also to mixtures in tile form of cement, plastics, and metals that are made for and intended for use as a finished floor surface, whether upon interior or exterior floors, stair treads, promenade roofs, garden walks, interior walls, ceilings, swimming pools, and all places where tile may be used to form a finished surface for practical use, sanitary finish, or

decorative purposes, for setting all accessories in connection therewith, or for decorative inserts in other materials.

5. All terra cotta called unit tile in sizes of 6" x 12" or less, regardless of method of installation, quarry tile 9" x 9" x 1-1/4" or less; split brick or quarry tile or similar materials where the bed is floated or screeded and the joints grouted. Where the work is installed by tile layers, the grouting and cleaning shall be supervised by the mechanic. The bedding, jointing, and pointing of the above materials shall be the work of the craft installing the same. All clay products known as terra cotta tile, unit tile, ceramic veneer, machine-made terra cotta, and like materials in sizes 6" x 12" and less, regardless of the method of installation. Where the preponderance of materials to be installed comes within
6. the provisions of this classification and when there is also some material in excess of the sizes provided for in this classification, the tile setter shall install all such materials.
7. Measuring and cutting metal lath to size for walls and ceilings with tin snips. Tacking lath to wall and ceiling surfaces with staple gun or hammer for purposes of applying tile to the area.
8. Spreading concrete on subfloors with trowel and leveling it with screed for purposes of applying tile to the area.
9. Spreading mastic or other adhesive base on roof deck, using serrated spreader to form base for promenade tile.
10. Cutting and shaping tile with tile cutters and biters.
11. Positioning tile and tapping it with trowel handle to affix tile to plaster or adhesive base.

Typical tools used: bull floats, grout floats, magnesium floats, wood floats, claw hammers, rubber hammers, builders' levels, laser levels, water levels, colloidal mixers, mixing drills, portable mixers, vertical shaft mixers, angle grinders, base grinders, mini grinders, stone grinders, grout saws, power tile saws, power undercut saws, wet saws, ladder jacks, mechanical scaffolds, rolling scaffolds, stationary scaffolds, buttering trowels, grouting trowels, notch trowels, point trowels

30. Tile finishers

Nature of work: finisher work includes mixing grout, grouting, and surfacing all types of tile, cutting tile, and sealing surfaces. Tile finishers work primarily after the tile is set and adhered to the floor or wall by tile setters. Tile finisher work also includes mixing mortars, epoxy resins, and adhesives and cleaning, treating, and sealing surfaces.

Typical duties:

1. Mixing grout.
2. Grouting.
3. Surfacing all types of tile.
4. Cutting tile.
5. Sealing surfaces.
6. Mixing mortars, epoxy, and adhesives.
7. Cleaning, treating, and sealing surfaces.
8. Preparing floors.

Typical tools used: sponges, rubber floats, cleaning brushes, foam brushes, wheel barrow, tile cutter, cutting boards, tile saw, brooms, floor scrapers, margin trowels

31. Drywall taper

Nature of work: drywall tapers perform seal joints between plasterboard and other wallboards to prepare wall surface for painting or papering or any type of wall finishing system.

Typical duties:

1. Handling all materials after the initial unloading at the job site, including the distribution to the points of application.
2. Erecting, moving, and dismantling all scaffolding.
3. All preparatory work of taping, sealing, finishing, and sanding joints between plasterboard or other wallboard.
4. Spotting, caulking, pointing, and sealing cracks and holes in walls and ceilings.
5. Applying protective coverings prior to the application of the finish materials.
6. Spackling surfaces and applying texture finishes where adhesive materials are used.
7. Installing metal moldings at corners instead of sealant and tape.
8. Removing all drywall material scraps and all cleaning work, including scraping of floors.

Typical tools used: spray guns (hand-operated), hopper guns, patch guns, texture sprayers, drywall stilts, corner rollers, texture rollers, drywall mud mixers, corner knives, joint knives, pivoting drywall knives, wipedown knives, drywall saws, drywall trowels, radius trowels, banjos, corner bead tools, corner tools, feather edge drywall derbies, joint tape dispensers, mesh tape, mud pans, hawks, drywall floor scrapers, drills, automatic tapers, angle boxes, angle beads, angle head handles, flat boxes, flat box handles, extendable handles, nail spotters, loading pumps, goosenecks, filler adapters, dustless drywall sanders, pole sanders, hand sanders, dust barrier systems

32. Low Voltage Technician

Nature of Work: Installing, inspecting, repairing, servicing, and supporting electronic, low-voltage, and telecommunications wiring systems and devices. This includes full-system installation and service, from pulling and splicing wire to configuring devices, panels, and distribution frames, but excludes head-end systems unless specified.

Typical Duties:

1. Installing, repairing, servicing, or inspecting radio, television, recording systems, paging systems, public address systems, intercoms, clocks, wired music systems, and security/surveillance systems.
2. Installing, repairing, and maintaining fire alarm and burglar alarm systems.
3. Wiring low-voltage systems using surface wiring, nonmetallic conduit, and incidental shielded metallic conduit.
4. Installing and servicing telephone systems, including:
5. Main Distribution Frames (MDF) – Terminating outside lines and originating subscriber cabling.
6. Intermediate Distribution Frames (IDF) – Allocating subscriber numbers and connecting equipment.
7. Subpanels (Blocks) – Connecting large feed cables to distribution frames.
8. Common Equipment/Key Service Units – Including backboard assemblies and external telephone connections.
9. Subscriber Terminals/Instruments – Installing and servicing user-end equipment (phones, sets, terminals).
10. Ancillary Equipment – Bells, buzzers, headsets, speaker phones, dialers, recorders, etc.
11. Telephone Cable Work – Network channel service cable, riser cables, floor distribution cabling, and external wires.
12. Pulling, splicing, terminating, and connecting communications cables, including low-voltage and data cables, to “dead ends.”
13. Installing peripheral devices, such as wall jacks, plates, and modules.

Typical Tools Used: Copper testers, fiber testers, level, pliers, wire cutters, measuring tape, wrenches, wire strippers, needle nose pliers, power hand drills, soldering irons, and electric screw guns.

33. Asbestos abatement worker or environmental remediation worker

Nature of work: removing asbestos from ceilings, walls, beams, boilers, mechanical equipment, and other structures following standards for handling and removal requirements. Performing lead abatement and mold removal.

Typical duties:

1. Erecting scaffolding related to abatement and remediation and seals off work area using plastic sheeting and duct tape.
2. Positioning mobile decontamination unit or portable showers at entrance of work area.
3. Building connecting walkway between mobile unit or portable showers
4. and work area using hand tools, lumber, nails, plastic sheeting, and duct tape.
5. Positioning portable air evacuation and filtration system inside work area.
6. Spraying chemical solution over asbestos-covered surfaces using tank with attached hose and nozzle to saturate asbestos.
7. Cutting and scraping asbestos from surfaces using knife and scraper.
8. Shoveling asbestos into plastic disposal bags and seals bags using duct tape.
9. Cleaning work area of loose asbestos using vacuum, broom, and dustpan.
10. Placing asbestos in disposal bags and seals bags using duct tape.
11. Dismantling scaffolding and temporary walkway using hand tools and places plastic sheeting and disposal bags into transport bags.
12. Sealing bags using duct tape and loads bags into truck for disposal.
13. Disinfecting structures or surfaces exposed to mold.
14. Performing air sampling.
15. Removing lead from surfaces by the use of sandblasting, water blasting, or other equipment.

Typical tools used: personal protective suits that completely isolate workers from the hazardous material. Most workers are also required to wear respirators while working, to protect them from airborne particles or noxious gases. The respirators range from simple versions that cover only the mouth and nose to self-contained suits with their own air supply. A variety of hand and power tools, brooms, ladders, cutting torches, vacuums and scrapers, putty knife, sandblasters, and high-pressure water sprayers.

34. Sign erector

Nature of work: sign makers and sign installers fabricate, install, repair, alter, maintain, and dismantle commercial signs, fluorescent signs, neon signs, billboards, bulletins, poster panel signs, post and panel signs, and vinyl letter signs.

Typical duties:

1. Installing and servicing signs, designing, lettering, and pictorial work of any kind, including vinyl signs and vinyl substrates, and the preparing or the finishing of same, be it by hand brush, roller, spray, mechanical, or computer-aided, and by any other method or process pertaining to same electric, neon, and luminous tube signs.
2. Manufacturing luminous tubes, which includes the coating and processing of tubes and the bending, repairing, and pumping for all tubes (on the project work site).
3. Assembling, installing, altering, repairing, and dismantling signs, displays, electric and neon sign displays, fluorescent lighting fixtures, fluorescent lighting signs, neon signs, and neon letters.
4. Wiring, assembling, servicing, and electrical maintenance of such signs and displays.
5. Installing and servicing painted, computer-generated, and photographed signs.
6. Preparing sign surfaces, patterns, and layouts.
7. Applying vinyl lettering, decals, and cutout letters.
8. Preparing and pouncing patterns and tracing all patterns.
9. Designing and cutting out letters made of wood or like materials, such as plastic, Masonite, wallboard, cardboard, sheet metal, aluminum, and vinyl.
10. Priming, finishing, and gilding letters.
11. All pictorial work on signs and screen process work in its entirety, including photography and operation of projector.
12. Repainting signs, including painting of capping on billboards, bulletins and poster panels, and banners by spraying and use of rollers.
13. Computer-generated layout and application of vinyl letters printed on surfaces.

Typical tools used: hand tools and power tools, post-hole digger, shovel, operate air hammer, operate banding machine, utility knife, sandblaster, stencil knife, paint brushes, computer, and ink jet printer.