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Department of Technology, Management and Budget
State Facilities Administration
Design and Construction Division

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Department/Agency: US Court of Appeals

Cadillac Place 15th Floor – Build Three (3)

Judicial Suites

3044 W Grand Blvd,
Detroit, Michigan 48202

Construction Documents

December 20, 2024

Michigan Department of Technology, Management and Budget
State Facilities Administration, Design & Construction Division
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This is a Cover Sheet to the State’s Owner and Contractor Standard Construction Contract, known as the MICHSPEC™ Division 0 Specifications. The MICHSPEC™ Division 0 Specifications have been developed from the FORMSPEC™ Michigan Model, 1997 Edition. Although the State’s 2008 Version of the Division 0 Specifications are written as simply as practical, it is nonetheless advisable to consult with companion Guide to Specifiers when preparing specifications for a specific project. These Division 0 Specifications were developed by incorporating provisions and requirements furnished by the State into the FORMSPEC™ Michigan Model. These Division 0 Specifications have undergone detailed technical reviews by Department of Technology, Management and Budget, State Facilities Administration representatives and detailed legal reviews by the Department of the Attorney General for the State of Michigan. Specifiers are encouraged to consult with a Division 0 specifications specialist or an attorney knowledgeable in public contracts when preparing specifications for a specific project.

STATE OF MICHIGAN
DEPARTMENT OF TECHNOLOGY, MANAGEMENT AND BUDGET
STATE FACILITIES ADMINISTRATION

MICHSPEC™ 2008 VERSION, OWNER AND CONTRACTOR
STANDARD CONTRACT FORMS AND CONDITIONS OF THE CONTRACT

MICHSPEC™ No. 97.0820 – 00020 THROUGH 97.0820 – 00440

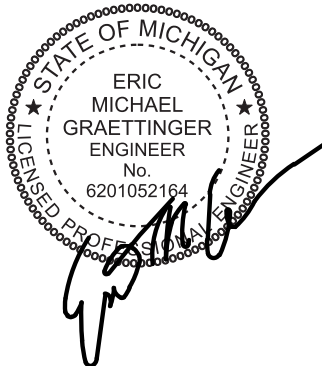
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Developed from
Contract Forms and Conditions of the Contract
FORMSPEC™ Michigan Model
and suggested for use with
Bidding Requirements

File #: 950/22357.MNB
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Construction Documents
December 20, 2024
1997 Edition/Rev 02/22 Version

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SECTION 00020 GLOSSARY**1.1 Defined Terms:**

1.1.1. The following terms or relative pronouns used in Division 0 of the Specifications have these intent and meanings:

Activity– An element in the Progress Schedule establishing a requisite step, or the time and resources required, for completing the part of the Work associated with that Activity.

Addenda– Written instruments that are used by the **Owner** and/or **Professional** to incorporate interpretations or clarifications, modifications, and other information into the Bidding Documents. An Addendum issued after Bid opening to those Bidders who submitted a Bid, for the purpose of rebidding the Work without re-advertising, is referred to as a post-Bid Addendum.

Agreement– The written agreement between the **Owner** and **Contractor** covering the Work to be furnished and performed.

Alternate– Refers to Work specified in the Bidding Documents for which the Bidder shall bid a Bid Price in the space provided in the Schedule of Alternates in Section 00300 Bid Form.

Apparent Low Bidder– Those Bidders whose Base Bid, when added to those specific Alternates the Owner intends to accept, yields the three lowest sums of Base Bid and Alternates. Additional Bidders may be considered Apparent Low Bidders if their Base Bid, when added to those specific Alternates the Owner intends to accept, yields a sum within 10% of the lowest of the Apparent Low Bidder's sum. If a qualified disabled veteran meets the requirements of the contract solicitation and with the veteran's preference is the lowest Bidder is considered the Apparent Low Bidder.

Archaeological Feature– Any prehistoric or historic deposit of archaeological value, as determined by a representative of a State agency that is duly authorized to evaluate such findings and render such judgments. An Archaeological Feature deposit may include, but is not limited to Indian habitations, ceremonial sites, abandoned settlements, treasure trove, artifacts, or other objects with intrinsic archaeological value and that relate to the history and culture of the State of Michigan.

As-Planned Schedule– The **Contractor's** Revision 0 Progress Schedule returned to the **Contractor** as "Resubmittal Not Required," with or without comments or objections noted.

Authorized Technical Data– Information and data contained in a report of exploration and tests of subsurface conditions that are expressly designated in paragraph 2.0 of Section 00210 Information for Bidders. Also, any physical data (dimension, location, conditions, etc.) contained in those drawings of physical conditions of existing surface and subsurface facilities identified in paragraph 3.0 of Section 00210 Information for Bidders.

Bar Chart Schedule– Activity schedule, in a bar chart format, that accounts for the entire Work at a level of detail

commensurate with the Progress Schedule requirements of the Contract Documents.

STATE OF MICHIGAN MODEL

Developed from FORMSPEC™ Michigan Model.

Bid– Written offer by a Bidder for the Work, as specified, which designates the Bidder's Base Bid and Bid Prices for all Alternates. The term *Bid* includes a *Rebid*.

Bidder– The Person acting directly, or through an authorized representative, who submits a Bid directly to the **Owner**.

Bidding Documents– The proposed Contract Documents as advertised, and all Addenda issued before Bid opening, and after Bid opening, if the Work is rebid without re-advertising.

Bid Price– The Bidder's price for a lump sum item of Work, or the product of the Bidder's unit price for an item of Unit Price Work times the quantity given on the Bid Form for that item.

Bid Security– A security serving as a guarantee that the Bidder will conform to all conditions requisite for its return or as liquidated damages in the event of failure or refusal to conform.

Bidding Requirements– The Advertisement, Instructions to Bidders (including Attachment A), Supplementary Instructions, Information for Bidders, Bid Form, Bid Form Attachments and Qualification Submittals, as advertised and as modified by Addenda, and any other Section included within Division 0 of the Bidding Documents for the purpose of governing bidding and award of the Contract.

***AD Board**– The Administrative Board of the State of Michigan.

Bonds– Section 00310 Bid Bond, Section 00610 Performance Bond and Section 00620 Payment Bond are security furnished by the **Contractor**, as required by the Contract Documents.

Business Day– Any Day except Saturdays, Sundays and holidays observed by the **Owner**.

Bulletin– A standard **DTMB** or other **PSC** form used by the **PSC & Owner** to describe a change in the Work under consideration by the **Owner** and to request the **Contractor** to submit a proposal for the corresponding adjustment in Contract Price and/or Contract Time, if any.

Calendar Day– Every day shown on the calendar, Saturdays, Sundays, and holidays included.

Cash Allowance– An **Owner**-specified sum included within the Contract Price to reimburse the **Contractor** for the actual purchase/furnished cost of materials and/or equipment or other designated items, as specifically provided in the Contract Documents. Although the scope (e.g., the required quantity) of any Work covered by a Cash Allowance is sufficiently

detailed in the Contract Documents for the purposes of bidding the required labor costs, Subcontract costs, construction equipment costs and general conditions costs and Fee, it is understood that the required materials, equipment or other designated items are of uncertain purchase cost at the time of Bid or are yet to be specified in more detail by the **Professional** as to quality, appearance, durability, finish and such other necessary features affecting purchase price.

Change Authorization– A written order issued and signed by the **Professional**, which directs changes in the Work that require no adjustment in Contract Price or Contract Time, or which allows for variations in the quantities of Unit Price Work.

Change Order– A written order issued and signed by the **Owner**, which amends the Contract Documents for changes in the Work or an adjustment in Contract Price and/or Contract Time, or both.

Contact Person– Individual in the employ of the **Professional** or the **Owner** who is designated as the sole point of contact for prospective Bidders for requests or inquiries concerning the Work and/or the Bidding Documents.

Contract– Refer to the definition in paragraph 1.1 of Section 00500 Agreement. The term “Contract” encompasses the legal obligations of the **Owner** and **Contractor**, as defined by the Contract Documents.

Contract Award– The official action of the **Board**, the **Director-SFA** or the **Director-DCD** awarding the Contract to the **Contractor**.

Contract Documents– Those documents itemized or designated in paragraphs 2.2 through 2.4 of Section 00500 Agreement.

Contract Float– Calendar Days between the **Contractor's** anticipated date for early completion of the Work, or of a specified portion of the Work, if any, and the corresponding Contract Time.

Contract Price– The Contract price for the Work, or a designated portion of the Work, as designated in Section 00500 Agreement or elsewhere in the Contract Documents, is the total compensation, including authorized adjustments, payable by the **Owner** to the **Contractor** (subject to provisions for Unit Price Work).

Contract Times– The Contract Times for the entire Work are the periods allowed, including authorized adjustments, for Substantial Completion and final completion of the Work. The Contract Times for a designated portion of the Work are the periods allowed for Substantial Completion and final completion of any such portion of the Work, as specified in the Contract Documents.

Contractor– Person named “the **Contractor**” in Section 00500 Agreement with whom the **Owner** has entered into the Contract.

Correction Period– The period during which the **Contractor** shall, in accordance with the Contract Documents, (a) correct

or, if rejected, remove, and replace Defective Work, and (b) maintain warranties for materials and equipment in full force and effect.

Cost of the Work Involved– The sum of all costs that would be, or were, necessarily incurred by the **Contractor** in providing any Work Involved with the related change, less the costs that would be, or would have been, incurred by the **Contractor** to provide such Work without the related change.

CPM Schedule– Computerized, Activity-based Progress Schedule, using Critical Path Method (CPM) techniques, and accounting for the entire Work at a level of detail commensurate with the Progress Schedule requirements of the Contract Documents.

Critical Path Method (CPM)– The Critical Path Method of planning and scheduling. The term “Critical Path” denotes a sequence of Activities controlling achievement of a specified Contract Time.

Date of Commencement of the Contract Time– The date when the Contract Time starts to run.

Defective– An adjective which when referring to or when applied to the term “Work” refers to (a) Work not conforming to the Contract Documents or not meeting the requirements of any inspection, test, or approval, or (b) Work itemized in a Punch List which the **Contractor** fails to complete or correct within a reasonable time after issuance of the Punch List by the **Professional**.

Defective Work/Non-Compliance Notice – A DTMB-0499 form or equivalent issued to identify defective or non-compliant conditions requiring response and remedy by the **Contractor**.

Delay– Any act or omission or other event that in any manner adversely affects or alters the schedule, progress or completion of all or any part of the Work. Delay is a generic term intended to include deferral, stoppage, slow down, interruption and extended performance, and all related hindrance, rescheduling, disruption, interference, inefficiency and productivity and production losses.

***Department (DTMB)**– Department of Technology, Management and Budget of the State of Michigan. **Director** is the Director of the **Department**.

Director-SFA- The Director of **DTMB** State Facilities Administration.

Director-DCD- The Director of **DTMB** State Facilities Administration, **Design and Construction Division**

Division– Each of the numbered, distinct parts (starting with Division 0) into which the Specifications are divided.

Drawings– Part of the Contract Documents showing the Work. Drawings shall neither serve nor be used as Shop Drawings.

Early (Late) Dates– Early (late) times of performance for the Activities.

Emergency– A condition affecting the safety or protection of persons, or the Work, or property at or adjacent to the site.

Fee for the Work Involved (Fee)– A negotiated, percentage mark-up on the Cost of the Work Involved which is allowed to the **Contractor** for (a) reasonable administrative costs, and (b) negotiated, reasonable profit on the Cost of the Work Involved.

General Requirements– Division 1 of the Specifications.

Hazardous Material– Asbestos, ACBMs, PCBs, petroleum products, such construction materials as paint thinners, solvents, gasoline, oil, etc., and any other like material the manufacture, use, treatment, storage, transportation, or disposal of which is regulated by federal, State, or local Laws governing the protection of public health, natural resources, or the environment.

State Facilities Administration- Entity in the **Department** of Technology, Management and Budget responsible for design, construction, and operations and maintenance of facilities and capital renewal.

State Facilities Administration Representative- Designated DTMB-SFA **Design and Construction Division Project Director** (a) Responsible for directing and supervising the **Professional's** services during the period allowed for completion of the Work; and/or (b) Acting as representative for the **Owner** and for the enforcement of the Contract Documents, approving payment to the **Contractor** and coordinating the activities of the State, **Owner**, **Professional** and **Contractor**.

Law(s)– Means federal, state, and local statutes, ordinances, orders, rules and/or regulations.

MCL– The Michigan Compiled Laws of the State of Michigan.

Means and Methods– Includes means, methods, techniques, sequences and/or procedures applicable to the Work.

Notice of Award– Written notice accepting the Bid to the lowest responsive, responsible Bidder and designating the Contract Price (and establishing the Alternates accepted by the **Owner**).

Notice to Proceed– Written notice authorizing the **Contractor** to proceed with the Work, or a designated portion of the Work, and establishing the Date of Commencement of the Contract Time.

On-Site Inspection– The **Professional's** on-site examination of the **Contractor's** completed or in progress Work to determine and verify to the **State Facilities Administration Representative** that the quantity and quality of all Work is in accordance with the requirements of the Contract Documents.

Owner– The State of Michigan, named "the **Owner**" in Section 00500 Agreement, with whom the **Contractor** has entered into the Contract and for whom the Work is to be provided. The State of Michigan includes its departments, agencies, boards, commissions, officers, employees, and agents.

Partial Use– The use, by the **Owner**, of a designated portion of the Work before accomplishing Substantial Completion of the entire Work. Partial Use does not implicate or refer to Substantial Completion of the portion of the Work placed in use by the **Owner**.

Person– Individuals, partnerships, corporations, receivers, trustees, joint ventures, and any combinations of any of them.

Political Subdivision– Any county, city, village, or other local unit of the State, including any agency, department, or instrumentality of any such county, city, village, or other local unit.

Pre-Award Schedule– A Qualification Submittal required of the Apparent Low Bidder before Contract Award, and which is used by the **Owner** in the evaluation of the Apparent Low Bidder's Bid.

Professional Services Contractor (Professional)– The Person or its authorized representative licensed to practice architecture and/or engineering, named as "**Professional**" in Section 00500 Agreement, who has the right and authority assigned in the Contract Documents. The term **Professional** includes the **Professional's** consultants practicing the disciplines required by the Contract Documents. If the **Owner** will function as the **Professional**, such information will be noted in Section 00800 Supplementary Conditions or at the pre-construction conference.

Progress Schedule– Work Schedule that shows the **Contractor's** approach to planning, scheduling, and execution of the Work and that accurately portrays completed Work as to sequencing and timing, as provided in the Contract Documents.

Project– The total construction, which includes the Work and possibly other work, as indicated in the Contract Documents.

Project Field Representative– A **DTMB-SFA Design and Construction** employee or consultant, acting in collaboration and with direction from the **DTMB-SFA-DCD Project Director**, providing on-site, periodic observation and documentation of the Work for compliance with the Contract Documents.

Project Manual– The Book of Specifications, containing Division 0 of the Specifications and the technical Specifications.

Provisionary or Contingency Allowance– An amount included within the Contract Price to reimburse the **Contractor** for the cost to furnish and perform Work that is uncertain, i.e., may not be required, or is of indeterminate scope, i.e., design information and quantities, complexity, etc. are neither shown nor detailed in the Contract Documents. Work authorized under any Provisionary Allowance may consist of (a) changes required by actual conditions, as determined by the **Professional**, that are incorporated into the Work in accordance with Section 00700 General Conditions, and (b) any other Work authorized and completed under the pertinent provisions of the Contract Documents. Unlike a Cash Allowance, payments under a Provisionary Allowance shall include not only the purchase/furnished cost of the materials

and equipment involved, but also all related labor costs, Subcontract costs, construction equipment costs, general conditions costs and Fee, provided they are calculated in accordance with the requirements of Articles 10 and 11 of Section 00700 General Conditions.

Public Utility– Any utility company, utility department or agency of a Political Subdivision, natural gas pipeline company, cable TV company, or any other owner/operator of utilities that are operated or maintained in, on, under, over or across public right-of-way or public or private easements and which is defined as “Public Utility” under the provisions of 1974 PA 53, as amended, MCL 460.701.

Punch List– A list of minor items to be completed or corrected by the **Contractor**, any one of which do not materially impair the use of the Work, or the portion of the Work inspected, for its intended purpose. A Punch List shall be prepared by the **Professional** upon having decided that the Work, or portion of the Work inspected, is substantially complete and shall be attached to the respective certificate of Substantial Completion.

Qualification Submittals– Data concerning a Bidder's qualifications and eligibility, as specified in the Bidding Requirements.

Rebid– A revised or new Bid submitted by a Bidder on the Section 00300 Bid Summary and Bid Form and the Bid Form Attachments made available through post-Bid Addenda, in the event the Work is rebid without readvertising, as allowed by post-Bid Addenda.

Record Documents– Drawings, Specifications, Addenda, Change Orders, Change Authorizations, Bulletins, inspection, test and approval documentation, photographs, written clarifications and interpretations and all other documents recording, or annotated to show, all revisions and deviations between the as-built installation and the Contract Documents, all approved Submittals and all clarifications and interpretations.

Records– Books, reports, documents, and other evidence relating to the bidding, award and furnishing and performance of the Work.

Record Schedule– A Progress Schedule Revision Submittal returned to the **Contractor** as “Resubmittal Not Required,” with or without comments or objections noted.

***Recycled Material**– Recycled paper products, structural materials made from recycled plastics, refined lubricating oils, reclaimed solvents, recycled asphalt and concrete, recycled glass products, retreaded tires, ferrous metals containing recycled scrap metals and all other materials that contain (a) waste materials generated by a business or consumer, (b) materials that have served their intended purpose, and/or (c) materials that have been separated from solid waste for collection, recycling and disposition in the percentage determined by the State as provided by Law.

Request for Payment– The form provided by the **Owner** (Payment Request DMB-440) to be used by the **Contractor** in requesting payment for Work completed, which shall enclose

all supporting information required by the Contract Documents.

Resident Project Representative– The authorized representative of the **Professional** who is assigned to the site.

Schedule of Values– A schedule of pay items, which subdivides the Work into its various parts and which details, for each itemized part, cost and pricing information required for making payments for Work performed. The sum of all pay item costs in the Schedule of Values shall equal the Contract Price for the Work.

Shop Drawings– Includes drawings, diagrams, illustrations, standard schedules, performance charts, instructions and other data prepared by or for the **Contractor** to illustrate some part of the Work, or by a Supplier and submitted by the **Contractor** to illustrate items of material or equipment.

Soil Erosion and Sedimentation Control– The planning, design and installation of appropriate Best Management Practices designed and engineered specifically to reduce or eliminate the off-site migration of soils via water runoff, wind, vehicle tracking, etc. Soil erosion and sedimentation control in the State of Michigan is regulated under The Natural Resources Environmental Protection Act; Soil Erosion and Sedimentation Control, 1994 PA 451, Part 91, as amended, MCL 324.9101 et seq. Soil erosion and sedimentation control associated with this Contract is monitored and enforced by the **Department of Technology, Management and Budget, State Facilities Administration.**

Specifications– Parts of the Contract Documents organized into Divisions. “Technical Specifications” means Divisions of the Specifications consisting of technical descriptions of materials, equipment, construction systems, standards, and workmanship.

State– The State of Michigan in its governmental capacity, including its departments, agencies, boards, commissions, officers, employees, and agents. Non-capitalized references to a state refer to a state other than the State of Michigan.

***State Construction Code**– The Michigan State Construction Code Act, 1972 PA 230, as amended, MCL 125.1501 et seq.

Sub agreement– A subcontract or purchase order awarding a part of the Work to a Subcontractor or Supplier.

Subcontractor– A Person having a Sub agreement for providing labor at the site, or for providing labor at the site and furnishing materials and/or equipment for incorporation into the Work.

Submittals– Includes technical Submittals, Progress Schedules and those other documents required for submission by the Contract Documents. The term “technical Submittal” includes Shop Drawings, brochures, samples, Operation and Maintenance (O&M) Manuals, test procedures and any other Submittal the Contract Documents require the **Contractor** to submit to demonstrate how the items covered, after installation or incorporation into the Work, will conform to the information given in the Contract Documents and be

compatible with the design of the completed Work as a functioning whole as indicated in the Contract Documents.

Substantial Completion– The Work, or a portion of the Work designated in the Contract Documents as eligible for separate Substantial Completion, has been completed in accordance with the Contract Documents, to the extent that the **Owner** can use or occupy the entire Work, or the designated portion of the Work, for the use intended without any outstanding, concurrent Work at the site, except as may be required to complete or correct Punch List items. Prerequisites for Substantial Completion, over and above the extent of Work completion required, include (a) receipt by the **Owner** of operating and maintenance documentation, (b) all systems have been successfully tested and demonstrated by the **Contractor** for their intended use, and (c) the **Owner** having received all required certifications and/or occupancy approvals from the State and those Political Subdivisions having jurisdiction over the Work. Receipt of all certifications and/or occupancy approvals from those Political Subdivisions with jurisdiction in and of itself does not necessarily connote Substantial Completion.

Supplementary Conditions– Section 00800 within Division 0 of the Specifications that amends and/or supplements Section 00700 General Conditions and other designated Contract Documents.

Supplementary Instructions– Section 00120 within Division 0 of the Specifications that amends and/or supplements Section 00100 Instructions to Bidders and any other designated Bidding Requirement.

Supplier– A manufacturer or fabricator, or a distributor, material man or vendor representing a manufacturer or fabricator, who has a Sub agreement for furnishing materials and/or equipment.

Target– A point of progress for a key part of the Work, which is identified for monitoring progress of the Work. Target Times are not Contract Times.

Total Float– Number of Calendar Days by which the Work or any part of the Work may be delayed from its Early Dates without necessarily causing an overrun in a pertinent Contract Time. Total Float is by definition at least equal to Contract Float.

Underground Utilities– Pipelines, piping, conduit, duct, cables, wells, tanks, tunnels and appurtenances, or other similar facilities, installed underground to convey or support conveyance of potable water, sprinkler or irrigation water, fire protection systems, electricity, gases, steam, petroleum products, sewerage and drainage removal, telephone, communications, cable TV, traffic, or control systems.

Unit Price Work, Contingent– Work involving specified but undefined quantities (i.e., related Work quantities are not detailed in the Contract Documents) which when performed is

measured by the **Professional** and paid using the measured quantities and unit prices contained in the Contract Documents. Performance of such Unit Price Work is contingent upon conditions encountered at the site, as determined, and authorized by the **Professional**.

Unit Price Work, Specified– Work of specified and defined quantities (i.e., quantities are detailed in, and can be taken-off from, the Contract Documents) that when performed is measured by the **Professional** and paid based on the measured quantities and unit prices contained in the Contract Documents.

Work (as in “the Work,” “the entire Work)– The entire *completed Construction* required by the Contract Documents. The Work results from furnishing and performing all services, obligations, responsibilities, management, supervision, labor, materials, equipment, construction equipment, general conditions, permits, taxes, patent fees and royalties, testing, inspection and approval responsibilities, warranties, temporary facilities, small tools, field supplies, Bonds, insurance, mobilization, close-out, overhead and all connections, devices and incidental items of any kind or nature required and/or made necessary by the Contract Documents.

Work Involved, any Work Involved–Existing or prospective Work (a) reflected in any notice, proposal, or claim, or (b) reflected in changes ordered or in process, or (c) affected by Delay.

1.1.2. Other defined terms used in Division 0 but not assigned intent and meanings in this Section 00020 Glossary have the intent and meanings set forth in MCL or Section 00800 Supplementary Conditions.

1.1.3. Terms defined in this Section 00020 Glossary and used in other Specifications and/or in the Drawings in lower cases, or as capitalized terms, have the intent and meanings assigned to them in this Section 00020 Glossary if the context will permit.

1.2 Division 0 Rules of Construction:

1.2.1. Each Article in a Section in Division 0 contains “sub-articles,” numbered as this sub-article 1.2 is numbered; “parts,” numbered as this part 1.2.1 is numbered, and “sub-parts,” all of which are considered “paragraphs.” A reference to a paragraph means a reference to the sub-article, part or sub-part, or any combination of any of them, if the context will permit.

1.2.2. Any reference to an Article or a paragraph in a Section within Division 0 means a reference to an Article or a paragraph in the very Section in which the reference is made, unless that reference specifically names another Section.

1.2.3. Whenever the context of any provision requires, the singular number includes the plural number and vice versa, and the use of any gender includes all genders

END OF SECTION 00020

SECTION 00030 ADVERTISEMENT

1. Invitation to Bid (ITB) – Your firm is invited to submit a Bid. The State of Michigan as the Owner will receive bids electronically through the SIGMA VSS website at <https://sigma.michigan.gov/webapp/PRDVSS2X1/AltSelfService> until 2:00 p.m., ET, on 2/19/2025. The State reserves the right to cancel this Invitation to Bid (ITB) or change the date and time for submitting Bids by announcing same at any time before the established date and time for Bid opening. Bids must remain open for acceptance by the Owner for no less than the Bid hold period. Contractor may agree to extend the Bid hold period. However, any such extension must be based upon no increase in the Bid Price and/or Contract Time.

2. Work Description – The Work, Cadillac Place 15th Floor – Build Three Judicial Suites, File No. 950/ 22357.MNB includes, but is not necessarily limited to THE DEMOLITION OF AN EXISTING OFFICE SPACE BUILT OUT IN 2013 AND CONSTRUCTION OF (3) NEW JUDGES SUITES. TWO SUITES WILL SHARE A WING OF THE BUILDING WHILE THE THIRD SUITE IS TO BE CONSTRUCTED IN THE SPLINE OF THE BUILDING. EACH JUDGES SUITE WILL INCLUDE OFFICE SPACE APPROXIMATELY 4 EMPLOYEES INCLUDING THE JUDGES. The project is located at 3044 W. Grand Blvd, Detroit, MI, 48202, as described on the Drawings.

3. Bidding Documents – Sets of Bidding Documents may be obtained at:
<https://sigma.michigan.gov/webapp/PRDVSS2X1/AltSelfService>

4. Bid Security – Each Bid shall enclose Bid Security, as specified in Section 00100 Instructions to Bidders (and as specified in Section 00310 Bid Bond, if a Bid Bond is enclosed), in the amount of five percent (5%) of the Bidder's Base Bid. *If Bid Security is by check or money order, such certified or cashier's check or money order must be delivered in original copy before the Bid Due Time to:*

State Facilities Administration
Design & Construction Division
3111 W. St. Joseph Street
Lansing, Michigan 48917

All other Bid information must be submitted via SIGMA as per standard bidding procedure.

5. Pre-Bid Conference – A mandatory voluntary pre-bid conference will be held at 3044 W. Grand Blvd, Detroit, MI, 48202, on 2/4/2025 at 10:00am ET. A tour of the project area will will not be held on the same day, immediately following the conference. All prospective Bidders and other parties interested in the Work are required encouraged to attend the tour, if held. Addenda may be issued, in response to issues raised at the pre-bid conference and tour,

or as the **Owner** and/or **Professional** may otherwise consider necessary.

An individual is only permitted to represent one bidder at a mandatory Pre-Bid Conference.

FOR CORRECTIONAL FACILITIES ONLY: N/A

6. SIGMA VENDOR NUMBER: If you are bidding a State job for the first time, visit the State of Michigan SIGMA website, <https://sigma.michigan.gov/webapp/PRDVSS2X1/AltSelfService>, and follow the "SOM VSS User Guide for New Vendors" instructions, located under Forms and Reference Documents. Registration is required for bid submission. **Do not wait until the last minute to submit a proposal**, as the SIGMA system requires the creation of an account and entry of certain information, in addition to uploading and submitting the materials. The SIGMA system **will not** allow a proposal to be submitted after the proposal deadline, even if a portion of the proposal has been updated.

Questions on how to submit information or how to navigate in the SIGMA VSS system can be answered by calling **(517) 373-4111 or (888) 734-9749**.

7. Equal Employment Opportunity – Covenants not to discriminate in employment by contractors, subcontractors and suppliers required by Law are contained in paragraph 14.12 of Section 00100 Instructions to Bidders and paragraph 7.12 of Section 00700 General Conditions and are applicable to the Work and any Sub agreement under the Contract.

8. Contract Times – The Contract Times and the associated liquidated damages are specified in Article 4 of Section 00500 Agreement.

9. Contact Person – All requests or inquiries concerning the Bidding Documents, or the Work shall be addressed to Scott Goodsell at sgoodsell@ghfaa.com and Daniel Jacobson at djacobson@ghfaa.com Subject: Cadillac Place (3) Judges Suites.

10. Award – Subject to any agreed extension of the period for holding Bids, Bids shall remain valid for acceptance by the **Owner** for Ninety (90) Calendar Days after the date of Bid opening. In addition, the **Owner** expressly reserves the right, within the **Owner's** sole discretion, to reject any or all Bids, to waive any irregularities, to issue post-Bid Addenda and rebid the Work without re-advertising, to re-advertise for Bids, to withhold the award for any reason the **Owner** determines and/or to take any other appropriate action.

END OF SECTION 00030

SECTION 00100 INSTRUCTIONS TO BIDDERS

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STATE OF MICHIGAN MODEL

Developed from FORMSPEC™ Michigan Model.

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ARTICLE 1 BIDDING DOCUMENT INTERPRETATIONS

1.1. Section 00020 Glossary assigns specific intent and meanings to capitalized terms and to other defined terms used in Section 00030 Advertisement, this Section 00100 Instructions to Bidders and Section 00210 Information for Bidders. The Glossary also provides specific rules for construing any reference to any Article or paragraph that is made in this Section 00100.

1.2. The deadlines and submission requirements imposed on the Bidders by the provisions of Articles 3 and 4 also shall apply to any prospective subcontractor or supplier seeking access to the site or needing to submit written questions or inquiries.

1.3. Except as otherwise noted, the deadlines and other requirements imposed upon the "Apparent Low Bidder" by the provisions of Articles 2, 5, 8 and 13 also shall apply to any other Bidder remaining or wishing to remain in contention for the award.

1.4. Neither the **Owner** nor **Professional** assumes any responsibility for errors or misinterpretations resulting from the use of incomplete sets of Bidding Documents in preparing Bids. The **Owner** and **Professional** make Bidding Documents available only for obtaining Bids, and neither the **Owner** nor **Professional** grants a license for any other use of the Bidding Documents.

ARTICLE 2 QUALIFICATIONS OF BIDDERS

2.1. The Apparent Low Bidder shall submit to the **Professional**, within two (2) Business Days after receipt of the **Professional's** request, Section 00430 List of Subcontractors. The Apparent Low Bidder also shall submit to the **Professional**, within five (5) Calendar Days after the **Professional's** request, a Pre-Award Schedule and those other Qualification Submittals noted in Sections 00410, 00420 and 00440. The Apparent Low Bidder(s) may be required to attend a pre-award conference(s).

2.2. The Pre-Award Schedule shall consist of a time-scaled CPM Schedule or a Bar Chart Schedule, as designated by the **Professional**. The Pre-Award Schedule shall (a) identify start and completion dates for the Work in summary form, (b) show the sequencing in which the Bidder plans to perform the Work to conform to the Contract Times and sequences of Work indicated in or required by the Bidding Documents, and (c) include a plot with percentages of completion for the Work correlating to the start and completion dates.

2.3. Unless otherwise determined by the **Owner**, in its sole discretion, failure, neglect or refusal by the Apparent Low Bidder to submit Qualification Submittals when and as requested justifies the **Owner's** refusal to consider the Apparent Low Bidder's Bid and the Apparent Low Bidder's Bid Security will be forfeited to the **Owner** as liquidated damages. However, in the case of any other Bidder remaining or wishing to remain in contention for the award, such failure, neglect, or refusal will not constitute grounds for forfeiting that other Bidder's Bid Security.

ARTICLE 3 BIDDING DOCUMENTS; SITE CONDITIONS. SAFETY REQUIREMENTS; LAWS

3.1. It is the responsibility of each Bidder, before submitting a Bid, to: (a) examine the Bidding Documents thoroughly; (b) visit the site and, if necessary, record conditions at the site (through logs/notes, photographs, video or any other means); (c) study and correlate the Bidder's observations with the Bidding Documents; and (d) submit written questions or inquiries about the Bidding Documents or the Work, as provided in Article 4, immediately after discovering any conflicts, ambiguities, errors or omissions in the Bidding Documents.

3.2. It is also the responsibility of each Bidder, in the preparation of its Bid, to take those steps that are reasonably necessary to (a) ascertain and satisfy itself of the physical conditions under which the Work will be performed and the condition of existing facilities, including those which may not be a part of the Work, but could be affected by the performance of the Work, and (b) account for all general, local and prevailing conditions at or near the site that may in any manner affect the cost, schedule, progress, performance or furnishing of the Work. Examples of such conditions include, but are not limited to: (a) the nature and location of the Work; (b) conditions related to the transportation, disposal, handling and storage of materials; (c) the availability and suitability of labor, materials, water, electric power, telephone, sanitary services and roads; (d) daily and monthly weather variations, including any related subsurface conditions, river stages, or similar conditions; (e) the character, quality and quantity of surface and subsurface conditions at the site, including but not limited to ground water table variations, and the location, configuration and condition of existing facilities and Underground Utilities; (f) the character of equipment and facilities needed preliminary to and during Work performance; (g) conditions related to maintaining the uninterrupted operation/occupancy of existing services or facilities; and (h) the extent to which the nature, characteristics and use of any adjacent or nearby lands, rights-of-way and easements, and facilities (in all cases, inclusive of real and personal property) may affect the Bidder's activities.

3.3. It is the responsibility of each Bidder to inform itself of, and the Bidder awarded the Contract shall comply with, all applicable Laws, including, but not limited to Laws affecting cost, schedule, progress, performance or furnishing of the Work. Examples of those Laws include, but are not limited to, those relating to nondiscrimination in employment, prevailing wages, protection of public and employee health and safety, environmental protection, building codes, fire protection, grading and drainage, use of explosives, vehicular traffic, restoration of lands and property under the control of the State or a Political Subdivision, taxes, permits and licensing.

3.4. Section 00210 Information for Bidders identifies (a) reports of explorations and tests of subsurface conditions, and (b) drawings of physical conditions of existing surface and subsurface facilities that have been used by the **Professional** in the preparation of the Bidding Documents. Bidders may rely upon such expressly stated technical information and data contained in those reports which are expressly designated as Authorized Technical Data in Section 00210 Information for Bidders, but those reports and drawings are not part of the Bidding Documents.

3.4.1. Any conclusions or interpretations made by any Bidder based on such Authorized Technical Data shall be at the Bidder's own risk. Reliance by any Bidder on any Non-technical Information or Data, interpretations or opinions contained in those reports or drawings also shall be at the Bidder's own risk. The **Owner**, **Professional** and their respective consultants assume no responsibility for any understanding reached or representation made about subsurface conditions and physical conditions of existing facilities, except as otherwise expressly shown in or represented by the Authorized Technical Data made available.

3.4.2. Section 00210 Information for Bidders also identifies additional reports of explorations and tests of subsurface conditions and reference documents reflecting physical conditions of existing surface and subsurface facilities that have not been used by the **Professional** in the preparation of the Bidding Documents. Any such reports and documents are not part of the Bidding Documents and are made available solely to allow Bidders to have access to the same information available to the **Owner** and **Professional**. Neither the **Owner** nor **Professional** warrants the accuracy or completeness of any such information nor do they warrant that Section 00210 Information for Bidders identifies all such existing relevant reports and/or documents.

3.5. Section 00210 Information for Bidders also identifies information and data shown or indicated in the Bidding Documents or Underground Utility drawings about Underground Utilities. Such information and data about existing Underground Utilities is based on information and data obtained from record documents of previous construction or furnished to the **Owner** by the owners of those Underground Utilities or by others.

3.6. Section 00700 General Conditions contain provisions concerning (a) responsibilities for Underground Utilities, (b) changes that may be ordered because of incidents with differing site conditions, and (c) the adequacy and completeness of the Authorized Technical Data of subsurface conditions and existing subsurface and surface facilities made available to Bidders.

3.7. To the extent that any Bidder considers that additional Authorized Technical Data is necessary for determining its Bid, it is the responsibility of that Bidder to request from the **Owner** the necessary additional Authorized Technical Data. In the event the **Owner** does not have the requested additional Authorized Technical Data, it shall be the responsibility of the Bidder, at the Bidder's sole cost, to undertake reasonable examinations of the site and any other pertinent available information and data that the Bidder considers necessary for determining its Bid.

3.8. If requested by a Bidder at least seven (7) Calendar Days before the date of Bid opening (or as otherwise agreed to by the **Owner**), the **Owner** will provide access to the site, when and as designated by the **Owner**, to allow that Bidder to conduct those reasonable explorations and tests that Bidder considers necessary for preparation and submission of the Bidder's Bid. Any such explorations and/or tests conducted by that Bidder shall comply with the requirements of the **Owner**, any Public Utilities involved and any Political Subdivisions with jurisdiction. If access to the site is granted, that Bidder shall fill all holes and clean up and restore the site to its former

condition, to the **Owner's** satisfaction, upon completion of those explorations and/or tests.

3.9. The Bidder awarded the Contract shall be responsible for obtaining any lands, areas, properties, facilities, rights-of-way, and easements, in addition to those furnished by the **Owner**, that the Bidder considers necessary for temporary facilities, storage, disposal of spoil or waste material or any other similar purpose. Neither the **Owner** nor **Professional** assumes any responsibility for site conditions at any lands, areas, properties, facilities, rights-of-way, and easements obtained by any Bidder.

*3.10. With respect to any earth disturbance associated with this Contract, the Bidder awarded the Contract shall comply with The Natural Resources and Environmental Protection Act; Soil Erosion and Sedimentation Control, 1994 PA 451 Part 91, as amended, MCL 324.9101 *et seq.* **State Facilities Administration** is the designated "Authorized Public Agency" under the provisions of Section 9110 of 1994 PA 451, Part 91 as amended.

3.11. Each Bid shall include and be deemed to have included all (a) Michigan sales and use taxes and other similar taxes applicable to the Work that are required by Law as of the date of Bid opening, and (b) the cost of all permits, approvals, licenses, and fees necessary for the commencement, prosecution, and completion of the Work. Section 00700 General Conditions contain provisions concerning responsibilities of the Bidder for sales and use taxes and other similar taxes and for obtaining permits, approvals, licenses, and fees applicable to the Work.

3.12. To the extent the **Owner** or **Professional** has knowledge of other work at the site, which may be ongoing during the period allowed for the Work, the Bidding Documents shall identify such other work. Before submitting a Bid, each Bidder shall evaluate: (a) the effect that any such other work operations (e.g., dewatering, blasting, etc.) may have on the Work, (b) related conditions and sequences of Work contained in the Bidding Documents, (c) the requirements for coordination and cooperation between the Work and other work, and (d) related Contract Times.

3.13. The submission of a Bid constitutes a binding representation by the Bidder that: (a) the Bidder has complied with every requirement of this Article and the Bidding Documents; (b) the Bidder has examined and agrees with the Progress Schedule requirements contained in the Specifications, including, but not limited to, requirements concerning the administration of early completion schedules; (c) without exception, the Bid is premised upon performing and furnishing the Work required by the Bidding Documents and in accordance with those Means and Methods indicated in or required by the Bidding Documents; and (d) the Bidder considers the Bidding Documents to be sufficient in scope and detail to indicate a clear understanding of all terms and reasonably foreseeable conditions applicable to the Work, and how such terms and conditions may affect the cost, schedule, progress, performance and furnishing of the Work.

3.14. Any failure of a Bidder to take the actions described and acknowledged in this Article will not relieve that Bidder of the responsibility for (a) properly estimating the difficulty, cost of and schedule for successfully performing and

furnishing the Work, or (b) upon award, performing and furnishing the Work successfully at no increase in Contract Price or Contract Time.

3.15. Neither the **Owner** nor **Professional** assumes any responsibility for any conclusions or interpretations made by any Bidder based on the information made available by the Bidding Documents. Nor does the **Owner** or **Professional** assume any responsibility for any understanding reached or representation made about conditions that may in any way affect cost, schedule, progress, furnishing or performance of the Work, unless that understanding, or representation is expressly stated or indicated in the Bidding Documents (including written Addenda).

ARTICLE 4 INTERPRETATIONS; ADDENDA

4.1. All requests for clarification or interpretation of the Bidding Documents, all proposals for any modifications to the Bidding Documents, all requests for information and all other questions or inquiries about the Bidding Documents and/or the Work shall be submitted in writing to the Contact Person identified in Section 00030 Advertisement, Article 8. Requests or inquiries received less than eight (8) Calendar Days before the date of Bid opening will be answered only if (a) the response can be given through Addenda made available at least seventy-two (72) hours before Bid opening (counting Business Days only), (b) the Bid opening is postponed by Addendum, or (c) the Work is rebid without re-advertising following the issuance of post-Bid Addenda.

4.2. Any interpretation or clarification, modification to the Bidding Documents (whether by correction, addition, deletion, or other revision) and/or information given will be binding only if given by Addenda. Interpretations, clarifications, corrections, additions, deletions or other revisions or information given orally or in any other manner are not binding on the **Owner** and if relied upon by any Bidder, shall be relied upon at the Bidder's own risk. Addenda will be provided by posting to and may be obtained by bidders at: <https://sigma.michigan.gov/webapp/PRDVSS2X1/AltSelfService>

4.3. In the **Owner's** sole discretion, subsequent to the opening of Bids, post-Bid Addenda may be issued setting a new date for the receipt and opening of sealed Rebids.

4.4. Any quantities of Unit Price Work given on the Bid Form, whether detailed in the Drawings or Specifications or contingent upon actual conditions, are approximate only, and are to be used solely for comparing Bids and establishing the Contract Price. Neither the **Owner** nor **Professional** represents that the actual quantity for any item of Unit Price Work performed will equal the quantity given. Payments will be made only for actual quantities of Unit Price Work completed in accordance with the Contract Documents. Actual quantities of Unit Price Work may overrun or underrun those in the Bid Form without necessarily invalidating the unit prices bid (except as provided in paragraph 10.6 of Section 00700 General Conditions).

ARTICLE 5 BID SECURITY

5.1. Bid Security shall be made payable to the "State of Michigan" in the form of a certified or cashier's check or money

order drawn upon a bank insured by an agency of the Federal Government or consist of a duly executed Bid Bond. A Bid Bond shall be duly executed by the Bidder and by a surety authorized to do business in the State by the Department of Energy, Labor and Economic Growth and listed on the current U.S. Department of the Treasury Circular 570. Bidders shall attach a certified copy of Power of Attorney to sign Bid Bonds as the Attorney-in-Fact. Copies of the current Circular listing of approved bonding/insurance companies and interim changes may be obtained through the Internet web site <https://www.fiscal.treasury.gov/fsreports/ref/suretyBnd/c570.htm>.

5.2. Failure by a Bidder to enclose with its Bid a certified or cashier's check or money order or a duly executed Bid Bond signed by Bidder and Surety shall disqualify that Bidder from any consideration for the award. *If Bid Security is by check or money order, such certified or cashier's check or money order must be delivered in original copy before the Bid Due Time to:*

State Facilities Administration
Design & Construction Division
3111 W. St. Joseph Street
Lansing, Michigan 48917

All other Bid information must be submitted via SIGMA as per standard bidding procedure.

5.3. The Bid Security of the Bidder recommended for award will be retained until that Bidder has fulfilled all the following: (a) submitted Qualification Submittals and required information, (b) executed and delivered Section 00500 Agreement, (c) delivered evidence of insurance, and (d) furnished the required Section 00610 Performance Bond and Section 00620 Payment Bond (including separate certifications). If that Bidder fails to do so when and as specified, the **Director-DCD or his/her designee**, may annul the Notice of Award recommendation, and the Bid Security of that Bidder will be forfeited to the **Owner** as liquidated damages. If the **Owner** incurs any collection costs in the enforcement of the Bid Security requirement, that Bidder and its surety, if any, agree jointly and severally to reimburse the **Owner's** costs of collection, which shall include reasonable fees and charges of attorneys and others, court or hearing costs incurred with or without suit and interest.

5.4. If the Apparent Low Bidder gives a certified or cashier's check or money order as Bid Security, and the **Owner** requests a certification by an acceptable surety stating that the Bidder will furnish the Section 00610 Performance Bond and Section 00620 Payment Bond if awarded the Contract, that Bidder shall furnish such certification within seven (7) Calendar Days after the **Owner's** request.

5.5. The Bid Securities of the Apparent Low Bidder and of any other Bidder remaining in contention for the award will be retained by the **Owner** until the end of the period during which Bids shall remain open, or seven (7) Calendar Days after the **Owner** executes Section 00500 Agreement, whichever last occurs.

ARTICLE 6 CONTRACT TIME; LIQUIDATED DAMAGES

6.1. The Contract Times, i.e., the number of Calendar Days within, or dates by, which the Work or any part of the Work shall be completed, are specified in Section 00500

Agreement, and may be supplemented, as provided in Section 00500 Agreement. As stated in Section 00500 Agreement, the Contract Times are of the essence of the Contract. If any Bidder believes that any of the Contract Times are insufficient or excessive, that Bidder shall advise the **Owner** in accordance with the requirements of Article 4.

6.2. Liquidated damages are specified in Section 00500 Agreement and may be supplemented, as provided in Section 00500 Agreement.

ARTICLE 7 MATERIALS AND EQUIPMENT

7.1. Named or Specified Materials and Equipment – Materials and equipment described in the Specifications by naming a brand, make, supplier or manufacturer or by using a specification shall establish a standard and shall be intended to convey function, necessary design features, general style, type, materials of construction, character and quality, serviceability, and other essential characteristics. A number of Specifications, if any, using named or specified materials and equipment are *listed* in Schedule 1.6 of Section 00440 Schedule of Materials and Equipment.

7.2. Proposal for Adding Products by Addenda – For those Specifications *listed* in paragraph 1.6 in Section 00440 Schedule of Materials and Equipment, the **Professional** will, up to nine (9) Calendar Days before the date of Bid opening stated in Section 00030 Advertisement, accept written proposals from non-named manufacturers and suppliers seeking to have the **Professional** add their products to Schedule 1.6. The **Professional** will consent to any such proposal by Addendum if, in the **Professional's** judgment, the proposed material or equipment also may be used as a named or specified product. Lack of adequate time or information needed to evaluate a proposal, as determined in the sole discretion of the **Professional**, may justify its rejection.

7.2.1. Any such proposal shall clearly identify differences between the proposed and named or specified material or equipment and demonstrate objectively that the proposed material or equipment: (a) has the same essential characteristics of the item named or specified, (b) will equally perform the functions and achieve the results called for by the general design concept, (c) is suited to the same use as the item named or specified, (d) is at least of equal materials of construction, quality and necessary essential design features to the material or equipment named or specified, (e) conforms substantially to the desired detailed requirements, including, but not limited to durability, strength, appearance and aesthetics (if aesthetics are significant), safety, service, life, reliability, economy of operation and ease of maintenance, and (f) offers a proven record of performance and service for at least three (3) years before the date of Bid opening.

7.2.2. Any such proposal shall further include (a) a list of installations that have been in service for at least three (3) years before the date of Bid opening (including the name, address, and telephone number of a person familiar with and at the installation), and (b) sufficient drawings, diagrams, brochures, schedules, performance charts, instructions, samples, and other data as may be necessary to allow the **Professional** to make a determination.

7.3. Each Bidder is responsible for notifying the **Professional** in writing if the Bidder knows or has reason to know that any material or equipment *listed* in Section 00440 Schedule of Materials and Equipment, which the Bidder intends to bid requires changes in the Work. Any such notice shall be provided no later than eight (8) Calendar Days before Bid opening. This requirement applies but is not limited to changes in any testing requirements or Means and Methods indicated in or required by the Bidding Documents. However, this requirement is not intended to make the Bidder responsible for correcting design errors or omissions.

7.3.1. If any Bidder fails to provide such notice, and is awarded the Contract, that Bidder assumes responsibility for its proportionate share of any excess costs and Delay. Excess costs and Delay are those resulting from changes in the Work that would not have been incurred had that Bidder not failed to provide written notice to the **Professional**.

7.4. Bidding Requirement – For those Specifications *listed* in paragraph 1.6 of Section 00440 Schedule of Materials and Equipment, each Bidder shall bid one of the *listed* materials and equipment only. This requirement to not bid "or equal" or substitute materials and/or equipment for the *listed* Specifications applies even if the Bidding Documents state that an "or equal" or substitute may be furnished or used for any *listed* Specification.

7.5. Contract Condition – For those Specifications *listed* in paragraph 1.6 of Section 00440 Schedule of Materials and Equipment, the Contract will be awarded on the basis that only *listed* named or specified materials and equipment will be furnished. If an "or equal" or a substitute may be furnished for any *listed* Specification, if acceptable to the **Professional**, application for acceptance will not be considered until after Contract Award.

7.6. Section 00700 General Conditions contains provisions requiring each Supplier (a) to be bound to the requirements of the Contract Documents, (b) to assume toward the **Contractor** all obligations that the **Contractor** assumes toward the **Owner** and **Professional**, and (c) to furnish Work under a Sub-agreement containing waiver of rights of subrogation provisions.

ARTICLE 8 SUBCONTRACTORS

8.1. For each Division, Section of the Specifications and/or trade itemized in Section 00430 List of Subcontractors, the Apparent Low Bidder shall, when requested by the **Professional**, nominate the Subcontractor(s) to be awarded a Sub-agreement(s). When completing Section 00430, the Apparent Low Bidder shall provide licensing data for trades for which contractors' licensing is required and, if applicable, indicate minority, woman, or handicapped status. One Subcontractor shall be nominated for each Specification or trade, unless the Apparent Low Bidder, directly or through a Subcontractor, intends to award more than one Sub-agreement for the listed Specification or trade.

8.2. If the **Owner** objects, for good cause, to any nominated Subcontractor, the **Owner**, before issuing the Notice of Award, may request replacement of that Subcontractor. In that event, the Apparent Low Bidder shall

nominate a substitute Subcontractor or the Bidder itself, if qualified for the Work involved. In such case, there will be no extension in the Bid hold period nor any increase in the Bidder's Bid or Alternates. If the Bidder declines, that Bidder shall not be recommended for the award; however, such declining will not constitute grounds for forfeiting the Bidder's Bid Security.

8.3. Except as provided in paragraph 8.2, no removal or replacement of a nominated Subcontractor will be considered by the **Owner**, except for good cause. Before Contract Award, any removal, replacement, or addition of a nominated Subcontractor shall be responsive to the requirements of the Bidding Documents only to the extent it permits the timely evaluation of the newly nominated Subcontractor. After Contract Award, if the Apparent Low Bidder, as the **Contractor**, nominates *for the first time* a Subcontractor for any Division, Specification and/or trade listed in Section 00430 List of Subcontractors, and the **Owner** objects for good cause to any such newly nominated Subcontractor, the **Contractor** shall provide a replacement Subcontractor at no increase in Contract Price and/or Contract Time.

8.4. Section 00700 General Conditions contains provisions requiring each Subcontractor (a) to be bound to the requirements of the Contract Documents, (b) to assume toward the **Contractor** all obligations that the **Contractor** assumes toward the **Owner** and **Professional**, and (c) to provide Work under a Sub-agreement containing waiver of rights of subrogation provisions.

8.5. These provisions shall not be construed to create any third-party beneficiary or joint employer status with respect to the **Owner** and/or **Professional** and any Subcontractor. Furthermore, these provisions shall not be construed to create or impose any duty or liability on the **Owner** to exercise this authority for the benefit of any Bidder, nominated or newly nominated Subcontractor or any other third party.

ARTICLE 9 BID FORM AND BID FORM ATTACHMENTS

9.1. All bid forms should be uploaded as attachments to SIGMA, including the Section 00300 Bid Summary, Section 00300 Bid Form and Bid Form Attachments (Section 00310 Bid Bond Form and Section 00320 Non-collusion Affidavit. If any forms are revised by Addendum, the latest revision of the appropriate Bid Summary, Bid Form and/or Bid Form Attachment shall be used. All blank spaces shall be legibly and properly printed in ink or typed as required in these Instructions to Bidders and each form. All Bid prices shall be printed or typed in both words and figures.

9.2. Bids by individuals shall be signed by the person making that Bid, or the Bid shall enclose a Power of Attorney evidencing authority to sign the Bid in the individual's name.

9.3. Bids by partnerships shall be signed in the name of the partnership. The partner authorized to sign shall be named and sign where indicated. A certified copy of power of attorney authorizing that partner to bind all partners shall be attached to Section 00300 Bid Form. If a certified copy of the partnership's certificate attached to Section 00300 Bid Form indicates that all partners have signed, no separate authorization is required.

9.4. Bids by corporations shall be signed in the legal corporate name. The signature of the president or authorized officer shall be entered below the corporate name, followed by the attesting signature of the corporation secretary or of an authorized officer other than the officer signing the Bid. A certified copy of a pertinent Board Resolution authorizing that individual to bind the corporation shall be attached to Section 00300 Bid Form.

9.5. Bids by joint ventures shall be signed by all or one of the joint venturers. If not all joint venturers sign, a certified copy of Power of Attorney authorizing the individual(s) signing to bind all joint venturers shall be attached to Section 00300 Bid Form. If a certified copy of the joint venturer's certificate attached to Section 00300 Bid Form indicates that all joint venturers have signed, no separate authorization is required.

9.6. The Bidder shall acknowledge receipt of all Addenda by completing the blank spaces in the table provided for that purpose in paragraph 2.1 of Section 00300 Bid Form.

ARTICLE 10 PREPARATION AND SUBMISSION OF BIDS

10.1. Left Blank Intentionally

10.2. Bids must be submitted electronically through the SIGMA VSS website at <https://sigma.michigan.gov/webapp/PRDVSS2X1/AltSelfService>

10.3. Each bid requesting the Qualified Disabled Veterans (QDV) preference, in accordance with Public Act 22 of 2010, MCL 18.1241(3), shall include a DD 214 Proof of Service and Discharge, a Veterans Administration rating decision letter, proof of disability (if the disability is not indicated on the DD 214), and appropriate legal documents setting forth the 51% natural persons QDV ownership.

10.4. If Unit Price Work is specified, the Bidder shall, for each Unit Price Work item listed separately on Article 6 of Section 00300 Bid Form, bid a unit price, and enter, in the appropriate column, the computation of the respective quantity multiplied by the respective Bidder's bid unit price. Bid prices for each lump sum or "One Each" item listed on the Bid Form shall be printed or typed only in the appropriate "Bid Price" column. The Bidder shall show the sum representing the Bidder's Base Bid and, if Alternates are listed, the Bid prices for all Alternates, in the spaces provided for those purposes.

10.5. For each Cash Allowance, the Bidder shall include, within the Bid, all labor costs, construction equipment costs, insurance and Bond premiums and other general conditions costs and Fee (Bidder's and Subcontractors') to complete Work associated with the material, equipment, or other designated item to be furnished under the Cash Allowance. For each Provisionary/Contingency Allowance, the Bidder shall include, within the Bid, insurance premiums (not recoverable as labor burden) and Bond premiums required to complete Work that may be ordered under the Provisionary/Contingency Allowance. Cash Allowances and Provisionary/Contingency Allowances are defined in Section 00020 Glossary and are further described in paragraph 10.7 of Section 00700 General Conditions.

10.6. The Bidder's Base Bid and Alternate Bid prices shall include, and payment for completed Work shall be compensation in full for, all services, obligations, responsibilities, management, supervision, labor, materials, devices, equipment, construction equipment, general conditions, permits, patent fees and royalties, testing, inspection and approval responsibilities, warranties, temporary facilities, small tools, supplies, Bonds, insurance, taxes, mobilization, close-out, overhead and profit and all connections, appurtenances and any other incidental items of any kind or nature, as are necessary to complete the Work, in a neat, first quality, workmanlike and satisfactory manner in accordance with the Drawings and Specifications and as otherwise required to fulfill the requirements of the Bidding Documents.

10.7. Neither the Section 00300 Bid Form nor any Bid Form Attachment made available to the Bidders and submitted with the Bid shall be altered in any way. Bids shall not contain any qualifications or conditions or any recapitulations of the Work whatsoever. No Alternate will be considered, unless any such Alternate is itemized in paragraph 6.2 Schedule of Alternates in Section 00300 Bid Form and specified in the Bidding Documents.

10.8. Before and after Bid submission, and before the time for receiving Bids has expired, any Bidder may alter or revise any price or information the Bidder has entered on its Bid Form or any Bid Form Attachments by: (a) crossing out the entry, (b) legibly printing in ink or typing the new price or information, and (c) placing the initials of the person who signs the Bid adjacent to each change. After Bid opening, the **Owner** may require a Bidder to verify any such alteration or revision. Ambiguities arising from any alterations or revisions made by any Bidder may be resolved against that Bidder, in the **Owner's** sole discretion.

10.9. Neither the **Owner** nor **Professional** assumes any responsibility for any costs any Bidder incurs, however caused, in preparing and submitting its Bid, in withdrawing its Bid, or in objecting to the award or to being disqualified for the award.

10.10. In the event of any conflict between Attachment A to Section 00100–Bidder's Checklist and any requirements specified in any other parts of the Bidding Documents; the requirements of the Bidding Documents taken as a whole shall be binding on the Bidders.

10.11. All bonds, insurance, and other required documents shall be issued in the name of the bidder.

ARTICLE 11 BID WITHDRAWAL

11.1. Any Bidder may withdraw its Bid before Bid opening by submitting to the **Owner** a document requesting the withdrawal in the manner in which a Bid shall be signed and submitted to the **Owner**. Withdrawal of a Bid before Bid opening will not prejudice the right of that Bidder to submit a new, modified Bid. After the time for receiving Bids has expired, the following will apply: (a) no Bid may be modified, altered, or reformed, except to resolve irregularities on the Bid Form or Bid Form Attachments, as provided in paragraph 14.6,

and (b) no Bid withdrawal will be accepted by the **Owner**, except as provided in paragraphs 11.2 through 11.6.

11.2. After the time for receiving Bids has expired, no Bid may be withdrawn, unless that Bidder lodges a written claim of a mathematical or clerical error in the Bidder's Bid with the **Owner** within two (2) Business Days after the date of Bid opening. The claim shall describe in detail the mathematical or clerical error, include a signed affidavit stating the facts of the alleged error and request that the Bidder be released from the Bidder's Bid.

11.3. If any Bidder's claim to withdraw its Bid due to an alleged mathematical or clerical error is timely filed, the **Director-DCD**, or his/her designee, will determine the validity of the claim and, as he/she deems necessary within his/her sole discretion, will provide an opportunity to the Bidder making the withdrawal to present its verification claim at a hearing/review session within ten (10) Calendar Days after the **Owner** received the claim.

11.4. At the Bid withdrawal claim review, the **Director-DCD**, or his/her designee shall, within his/her discretion, informally hear testimony and receive evidence as to whether (a) the Bid contains an obvious mathematical or clerical error not involving lack of good faith or fair dealing, (b) the error is subject to objective certification and is of such grave consequences that to enforce the Contract would be unconscionable, (c) the error relates to a material feature of the Contract, and (d) the error was not caused in any way by the Bidder's violation of positive legal duty or culpable negligence.

11.5. Upon completion of the claim review process and before any award recommendation, the **Director-DCD**, or his/her designee, will enter findings and render a determination on the Bidder's withdrawal claim. The **Owner** will notify the Bidder within a reasonable time after such determination.

11.6. If the **Director-DCD**, or his/her designee, concurs with the Bid withdrawal claim and the **Owner** suffers no serious prejudice, except loss of bargain, the **Owner** will allow the Bidder to withdraw its Bid will return the Bidder's Bid Security within a reasonable time. However, that Bidder will not be allowed to submit another Bid for the Work. The decision of the **Director-DCD**, or his/her designee, shall be final and binding on any such Bidder.

ARTICLE 12 BID OPENING; OBJECTION TO THE AWARD

12.1. Each Bidder bears sole responsibility to submit their bid electronically through the SIGMA VSS website at <https://sigma.michigan.gov/webapp/PRDVSS2X1/AltSelfService>

12.2. Within reasonable time after the date of Bid opening, the **Owner** will make available a "Bid tabulation" listing the Bids opened and the Apparent Low Bidder. If any Bidder listed in the Bid tabulation has any objection to the Apparent Low Bidder, the objecting Bidder shall file a written protest with the **Owner** within seven (7) Calendar Days after the date of Bid opening. The protest shall describe in detail the basis for the protest and request a determination under this Article.

12.3. If a written protest is timely filed, the **Director-DCD**, or his/her designee, will review the protest and if he/she determines in his/her sole discretion that a claim review process is necessary, such proceeding shall be conducted within ten (10) Calendar Days after receipt of the written protest.

12.4. The **Owner** will notify the Bidders involved within a reasonable time of the **Director-DCD's**, or his/her designee's, recommendation to dismiss or uphold the protest. If the protest has been denied, the **Owner** will notify those Bidders of the time and date on which the **Board's** Building Committee will meet to consider the **Director-DCD's**, or his/her designee's recommendation of award. The objecting Bidder and the Apparent Low Bidder will be given an opportunity to be heard at the Building Committee meeting and, at the discretion of the **Board**, at any subsequent **Board** meetings. The Building Committee and **Board**, at its discretion, will review or hear the protest under such terms and conditions as either deems proper.

12.5. Upon reviewing the protest, the Building Committee and/or the **Board** will either (a) dismiss the protest, or (b) uphold the protest and send the Bid back to the **Director-DCD**, or his/her designee, for a new Bid evaluation or rebid, consistent with the determination of the Building Committee or **Board's** findings. The decision of **Board** as to the protest shall be final and binding.

ARTICLE 13 BIDS TO REMAIN OPEN

13.1. Bids shall remain open for acceptance by the **Owner** for no less than the period during which Bids shall remain valid (i.e., the Bid hold period) stated in Section 00030 Advertisement.

13.2. The **Owner**, by written notice, may elect to request the Apparent Low Bidder and any other Bidder remaining or wishing to remain in contention for the award to hold their Bids beyond the Bid hold period. Any such Bidder who fails or refuses to agree to the **Owner**-requested extension may be disqualified for further consideration for the award. However, no such Bidder shall forfeit the Bidder's Bid Security due to its failure or refusal to hold its Bid.

13.3. Any such Bid hold extension request by the **Owner** and consent by any Bidder shall be based upon no increase in (a) the Bidder's Base Bid, (b) any of the Bidder's Alternate Bid Prices, and (c) any Contract Times stated in Calendar Days. However, in the event none of the Bidders involved consent to extending their Bids, as conditioned in this paragraph, the **Owner** will issue a post-Bid Addendum specifying an additional Alternate for the sought extension in the Bid hold period.

ARTICLE 14 AWARD OF THE CONTRACT

14.1 If the Owner elects to award the Contract, the Owner will make the award to the responsive and responsible best value bidder except as provided below relative to veteran's preference.

14.1.1 The Apparent Low Bidders will be evaluated for responsiveness and responsibility based on the following:

- Compliance with the bid specifications and requirements.
- The Bidder's financial resources.
- The Bidder's technical capabilities.
- The Bidder's technical experience.
- The Bidder's past performance.
- The Bidder's insurance and bonding capacity.
- The Bidder's business integrity.

If a qualified disabled veteran meets the requirements of the contract solicitation, provides acceptable responses to both Part One and Part Two of the Best Value Construction Bidder Evaluation to achieve a Best Value recommendation and with the veteran's preference is the lowest responsive, responsible, best value Bidder the Owner will award the contract to the qualified disabled veteran bidder.

A determination as to whether the requirements of the bid solicitation have been met will be based solely on the Owner's and Professional's evaluation of the Section 00300 Bid Form, Bid Form Attachments, Bidder-provided documents, Best Value Evaluation by the PSC, interview, and Bidder Qualification Submittals received in a timely basis. Each bid requesting the Qualified Disabled Veterans (QDV) preference, in accordance with Public Act 22 of 2010, MCL 18.1241.3 shall include a DD 214 Proof of Service and Discharge, a Veterans Administration rating decision letter, proof of disability (if the disability is not indicated on the DD 214), and appropriate legal documents setting forth the 51% natural persons QDV ownership.

The bids will be evaluated for best value based on price and qualitative components by comparing the qualitative components of the three lowest responsive and responsible Bidders. The comparison may also include other Bidders whose bids are within 10% of the lowest responsive and responsible Bidder. Determination of the lowest three Bidders shall be based on the sum of the Base Bid and any additive and deductive Alternates the Owner accepts. Alternates shall be accepted in the order listed in paragraph 6.2 Schedule of Alternates in Section 00300 Bid Form only. The Owner will accept an Alternate only if all other previously listed Alternates are also accepted unless acceptance by the Owner of Alternates in a different order does not affect determination of the lowest three bidders in any way.

Some qualitative components that may be evaluated are:

- Technical approach.
- Quality of proposed personnel.
- Management plans.
- ADD ANY OTHER PROJECT SPECIFIC

For contracts under \$250,000, best value will primarily be based on the lowest responsive and responsible bid.

14.1.2. For determining the lowest, responsive, and responsible bid, when a Qualified Disabled Veterans (QDV) preference is requested, 10% of the lowest responsive and responsible bid (the bid that would otherwise receive the contract award if the preference were not being considered) will be deducted from all QDV bids. If the low responsive and responsible QDV bid, less the 10% preference, is less than the

lowest responsive and responsible bid, then the QDV bid will be declared the official lowest responsive and responsible bid. The original QDV bid amount will be the basis of the contract award.

14.1.3. Bid irregularities with respect to the Bidding Documents, for which corrective action is not already provided in paragraph 14.6 or elsewhere in the Bidding Documents, may be waived at the sole discretion of the **Owner**, unless the irregularity was due to the Bidder's lack of good faith or fair dealing, or where the waiver would lead to a determination obviously in error or inconsistent with the Bidding Documents.

14.1.4. For Bids over \$100,000.00, Bidders that self-certify to be a Michigan business shall be given a preference over an out of state Bidder in the same manner in which an out-of-state Bidder would be preferred in its home state. Bidders that neither self-certify as a Michigan business in their Bid nor authorize the Michigan Department of Treasury to release information necessary to verify entitlement will be deemed to have waived their right to claim entitlement to any preference.

14.2. No Bidder shall be considered responsible under the requirements of the Bidding Documents, unless that Bidder delivers the information required in paragraph 2.1 that the **Owner** considers necessary to the evaluation of the Bid.

14.3. The following may be considered examples of sufficient grounds for determining that a Bidder is not responsible, or for objecting to any of the Bidder's Subcontractors (even if holding a valid license) or Suppliers: *(a) being listed on the Michigan Department of Labor's register of employers who have been found in contempt of court by a Federal Court of Appeals for failure to correct an unfair labor practice as prohibited by Section 8 of Chapter 372 of the National Labor Relations Act, 29 U.S.C. 158 (1980 PA No. 278, as amended, MCL 423.321 et seq.); *(b) being debarred from participation in the bid process pursuant to Section 264 of 1984 PA 431, as amended, MCL 18.1264, or debarred or suspended from consideration for award of contracts by any other State or any federal Agency; (c) a felony conviction in any state (including this State) within the last three (3) years before the date of Bid opening; (d) lack of adequate experience or demonstrated qualifications or capability to perform the trades or classifications of the Work specified in the Bidding Documents; (e) reasonable doubt concerning the ability to maintain adequate construction equipment, quality control, schedule control or financing to meet contractual obligations under the Bidding Documents; (f) a previous termination for cause by the **Owner** within the last five (5) years before Bid opening; (g) failure to comply with all requirements for foreign corporations; (h) concealment, misrepresentation or misstatement of any material facts; or (i) failure to pay any federal, State or local taxes.

14.4 If the Owner, either through the Director-DCD or his/her designee, or the Board, intends to disqualify any Bidder under consideration for award, written notice of the impending disqualification will be provided by the Owner (including reasons for the disqualification) to that Bidder and those Bidders remaining under consideration to the award. If the disqualified Bidder has any objection to the disqualification that Bidder shall, within two (2) Business Days, file a written protest, as provided in paragraph 12.2, and follow the protest

procedures in paragraphs 12.3 through 12.5. The decision of the Board shall be final and binding on the disqualified Bidder.

14.5. Except in circumstances leading to a determination obviously in error or inconsistent with the Bidding Documents, irregularities on any Bid shall be resolved using the rules provided in paragraph 14.6. Except as stated in paragraph 14.6(e), any Bid Form and Bid Form Attachment having any such irregularity shall be modified, altered, or revised to reflect the resolution of the irregularity, however, no Bidder-provided sum or extension shall be modified, altered, or revised and the Bidder's Bid shall be binding on the Bidder and the Bidder's surety, subject to the provisions governing Bid withdrawals stipulated in Article 11.

14.6. The following irregularities on any Bid Form or Bid Form Attachment shall be resolved as follows: (a) between SIGMA entry and signed Bid Summary attachment, the signed Bid Summary attachment will be used; (b) between words and figures, the words shall be used; (c) between any sum, computed by the Bidder, and the correct sum, the sum computed by the Bidder shall be used; (d) between the product, computed by the Bidder, of any quantity and bid unit price and the correct product of the unit price and the quantity of Unit Price Work, the product extended by the Bidder shall be used; (e) between a stipulated Allowance and the amount entered, the Allowance shall be used; (f) any mobilization pay item exceeding the maximum specified shall be ignored and the Bid shall remain unchanged; (g) if any Bidder fails or neglects to bid a unit price for an item of Unit Price Work but shows a "Bid Price" for that item, the missing unit price shall be computed from the respective quantity and the Bid Price shown; (h) if any Bidder fails or neglects to show a "Bid Price" for an item of Unit Price Work but bids a unit price, the missing Bid Price shall remain as "zero"; and (i) if any Bidder fails or neglects to enter a Bid price in both words and figures, the Bid price printed or typed, whether in words or figures, shall be used.

14.7. If there are reasonable grounds for believing that collusion or unlawful agreements exist between any Bidders, that a Bidder is interested in more than one Bid, or that any Bids are not genuine, those Bidders will be disqualified, and their Bids will be rejected without consideration.

14.8. All costs of the Bidder awarded the Contract and that are incurred in responding to requests from the **Owner** or **Professional**, whether or not sufficient, shall neither justify any increase in Contract Price or Contract Time nor provide any basis for subsequent consideration by the **Owner** of a proposal or claim for any increase in Contract Price or Contract Time.

*14.9. Michigan and Recycled Products – The Bidder awarded the Contract and all Subcontractors and Suppliers shall use (a) Michigan-made products whenever possible where price, quality and performance are equal to or better than non-Michigan products, and (b) supplies, materials and equipment made from Recycled Materials if there is a readily identifiable source or market as determined by the **Director-DCD, or his/her designee**, and the cost does not exceed one hundred ten percent (110%) of supplies, materials or equipment not containing Recycled Materials (Sections 261 and 261a of the Management and Budget Act, 1984 PA 431, as amended, MCL 18.1261 and MCL 18.1261a).

*14.10. Subcontractor and Supplier Businesses Owned by Minorities, Women and Persons with Physical or Mental Disabilities – Bidders are urged to utilize as Subcontractors and Suppliers, businesses owned by minorities, women, and persons with physical or mental disabilities. For assistance in locating and identifying certified businesses, contact the Michigan Department of Civil Rights, Business and Community Affairs, Cadillac Place, 3054 W. Grand Boulevard, Suite 3-600, Detroit, MI 48202, 1-800-482-3604.

*14.11. Unfair Labor Practice - Bidders who have been found in contempt of court by a Federal Court of Appeals on not less than three occasions involving different violations during the preceding seven (7) years for failure to correct an unfair labor practice prohibited by Section 8 of Chapter 372 of the National Labor Relations Act, 29 U.S.C. 158 are not eligible to be awarded the Contract. A register of employers in violation of this requirement is compiled by the Michigan Department of Energy, Labor and Economic Growth pursuant to 1980 PA 278, MCL 423.321 et seq. Further, the Bidder awarded the Contract shall not use any Subcontractors or Suppliers on the Work whose name appears on the register. According to Section 4 of 1980 PA 278, any contract entered into by the State may be declared void and rescinded to the extent the Bidder awarded the Contract or any Subcontractor, manufacturer, or Supplier awarded Work under the Contract subsequently appears in the register compiled by the Department of Consumer and Industry Services.

*14.12. Nondiscrimination – The Bidder awarded the Contract, and each Subcontractor and Supplier awarded a Sub agreement covenants that it will comply with the nondiscrimination requirements described in paragraphs 7.12.1 through 7.12.3 of Section 00700 General Conditions.

*14.12.1. A breach of the covenants set forth in paragraph 7.12 of Section 00700 General Conditions shall be regarded as a material breach of the Contract.

*14.12.2. The Bidder awarded the Contract shall include or incorporate by reference paragraph 14.12.1 (above) and the provisions of paragraphs 7.12.1 through 7.12.3 of Section 00700 General Conditions in every Sub agreement, unless exempted by rules, regulations, or orders of the Michigan Civil Rights Commission. Each Sub agreement shall provide that those provisions shall be binding upon the Subcontractor or Supplier.

*14.13. Bidders are further directed to Article 7 of Section 00700 General Conditions for terms and conditions concerning the following Michigan legal requirements applicable to this Contract: (a) Laws and permits, paragraph 7.1, (b) taxes, paragraph 7.2, (c) safety and protection, paragraph 7.3, (d) unfair labor practice, paragraph 7.10, (e) Michigan Right-to-Know Law, paragraph 7.11, and (f) Michigan residency for employees, paragraph 7.13.

ARTICLE 15 EXECUTION OF THE AGREEMENT

15.1. Upon acceptance of a Bid for the Work by the **Board** or by the **Director** of the **Department** of Technology, Management and Budget, the **Director-DCD** or his/her designee will send the Notice of Award to the Bidder awarded the Contract. The Notice of Award will (a) designate the

Contract Price and itemize the Alternates that the **Owner**, in its sole discretion, has accepted, (b) enclose completed, unsigned Section 00500 Agreement forms and blank Section 00610 Performance and Section 00620 Payment Bond forms, and (c) outline the procedures to be followed and information to be provided by the **Contractor** for execution of Section 00500 Agreement.

15.2. Unless otherwise designated in the Notice of Award, within fifteen (15) Calendar Days after receipt of the Notice of Award, the Bidder recommended for award shall (a) sign Section 00500 Agreement; (b) execute Section 00610 Performance Bond and Section 00620 Payment Bond (and attach to each Bond separate, certified copy of Power of Attorney); and (c) return to the Owner the executed Section 00500 Agreement, Section 00610 Performance Bond and Section 00620 Payment Bond forms, evidence of original certificates of insurance and any other documents required for submission by the Notice of Award.

15.3. Evidence of insurance shall consist of certificates of insurance confirming that the policies of insurance that the **Contractor** has obtained, including the limits of coverage and endorsements provided, are in compliance with the insurance requirements specified in paragraphs 7.4 through 7.7 of Section 00700 General Conditions. Certificates of insurance shall contain a statement confirming that coverage will not be canceled, adversely changed or renewal refused until at least thirty (30) Calendar Days' prior written notice has been delivered or mailed to the **Owner** and **Contractor**.

15.4. The **Owner** will execute the Section 00500 Agreement retain one hard copy and compile a complete electronic copy of the Contract Documents upon two conditions: (a) receipt of the executed Section 00500 Agreement, Section 00610 Performance Bond and Section 00620 Payment Bond (with each Bond enclosing a separate certified copy of Power of Attorney and a separate certificate of principal) and evidence of insurance; and (b) a determination by the **Owner** that the Section 00610 Performance Bond and Section 00620 Payment Bond, required certifications and evidence of insurance received conform to the requirements of the Contract Documents and are acceptable to the **Owner**.

15.5. Each full set of the executed Contract Documents shall consist of: (a) two (2) or more volumes containing the executed Agreement (conformed Section 00500); executed Performance and Payment Bond and certifications (conformed Section 00610 and Section 00620); the **Contractor's** Bid Form and Non-Collusion Affidavit (conformed Sections 00300 and 00320); and the remainder of the Bidding Documents, including Addenda; and (b) a separate volume with Qualification Submittals submitted by the **Contractor** that the **Owner**, in its sole discretion, chooses to include as part of the Contract Documents. The **Contractor** will receive one full set of the executed Contract Documents.

15.6. Bid prices in the "Schedule of Change Order Prices" on the **Contractor's** Bid Form accepted by the **Owner** upon evaluation of the **Contractor's** Bid will be incorporated into the Contract as provided in paragraph 3.2 of Section 00500 Agreement.

15.7. The Notice to Proceed shall be authorized by the **Director-DCD** or his/her designee. Subject to the provisions of Article 13 and compliance with paragraphs 15.2 through 15.4, the Notice to Proceed shall designate a Date of Commencement of the Contract Time no later than sixty (60) Calendar Days after the date ending the Bid hold period, or thirty (30) Calendar Days after receipt by the **Owner** of the executed Section 00500 Agreement and acceptable, executed Section 00610 Performance Bond and Section 00620 Payment Bond, whichever last occurs, unless otherwise directed in writing by the **Owner**.

15.8. Within fifteen (15) Calendar Days after receiving the Notice to Proceed, the **Contractor** shall submit to the **Owner** any additional Change Order cost and pricing data requested with the Notice to Proceed. The **Contractor's** submittal shall be itemized in a breakdown acceptable to the **Owner**, and shall be certified as accurate, current, and complete by a duly authorized financial representative of the **Contractor**. The **Contractor** shall meet with the **Owner** to review the cost and pricing data submittal. The **Owner** shall incorporate into the Contract Documents any acceptable cost and pricing data by Change Authorization issued within a reasonable time after the Notice to Proceed.

ARTICLE 16 MOBILIZATION PAY ITEM

16.1. The mobilization pay item, if designated in the Specifications and/or the Bid Schedule in Section 00300 Bid Form, shall be intended to cover, at least in part, up-front costs incurred by the **Contractor** from Contract Award until sixty (60) Calendar Days after the **Contractor** starts the Work. Allowable mobilization items shall be as itemized in the Schedule of Values approved by the **Professional**, and may include costs incurred by the **Contractor** (a) in establishing temporary site offices and other facilities specified in the Specifications, (b) in obtaining permits required to commence the Work, (c) for premiums for the required Section 00610 Performance Bond and Section 00620 Payment Bond, (d) for insurance obtained by the **Contractor** to comply with the requirements of the Contract Documents, and (e) in complying with the Revision 0 Schedule and Cost Submittal requirements.

16.2. Total payments to the **Contractor** under the mobilization pay item shall not exceed four percent (4%) of the Base Bid, unless otherwise expressly provided in the Bidding Documents. If the **Contractor** incurs costs, which the **Contractor** considers within the scope of the mobilization pay item, more than the four percent (4%) limitation, those excess costs will not be reimbursed under the mobilization pay item and will be deemed to have been included in other parts of the **Contractor's** Bid.

16.3. To the extent practicable, the basis of measurement for payment shall be proof of actual payment by the **Contractor**. Where actual payment by the **Contractor** does not apply, as in the case of premiums for the Section 00610 Performance Bond, the Section 00620 Payment Bond and the insurance policies the **Contractor** is required to furnish under the provisions of Article 15, or in connection with the **Contractor** costs to comply with the Revision 0 Progress Schedule and Cost Submittal requirements of the Contract Documents, the basis of measurement for payment shall be

as stipulated in the Schedule of Values approved by the **Professional**. Payments to the **Contractor** shall be based on the requirements of the Bidding Documents, subject to the following:

16.3.1. Approval by the **Professional** of the Schedule of Values (required by paragraph 12.1 of Section 00700 General Conditions) shall be a condition precedent to making any payment under the mobilization pay item. Partial payments shall be based on the breakdown itemized in the Schedule of Values and the extent of completion, as determined by the **Professional**.

16.3.2. Full payment of the amount corresponding to the Revision 0 Schedule and Cost Submittals shall be paid by with the Request for Payment following return to the **Contractor** of the Revision 0 Submittal, or Revision 0A Submittal (i.e., first resubmission), Revision 0B Submittal (i.e., second resubmission), etc. of the Progress Schedule marked "Resubmittal Not Required."

ARTICLE 17 SOIL EROSION AND SEDIMENTATION CONTROL —FINE FOR NON-COMPLIANCE

17.1. All Work within this Contract must comply with the applicable soil erosion and sedimentation control rules and regulations (Soil Erosion and Sedimentation Control – 1994 PA 451, Part 91, as amended, MCL 324.9101 et seq.) and specific provisions for same within the Contract Documents. Soil erosion and sedimentation control will be monitored and enforced by the Department of Technology, Management and Budget, **State Facilities Administration**.

17.2. Soil erosion and sedimentation control on **Department** Projects will be monitored and enforced by **State**

Facilities Administration through the review of **Contractor** implementation plans and site inspections by Soil Erosion and Sedimentation Control Unit personnel and/or **State Facilities Administration** Representative.

17.2.1. In the event, the **Owner** determines through site inspections by the **State Facilities Administration** Representative or by notification by regulatory authorities that the **Contractor** has not met the soil erosion requirements of the Project and/or is in violation of the applicable soil erosion and sedimentation control statutes, the **Contractor** shall be notified in writing and stop work orders may be issued by **State Facilities Administration** in conjunction with paragraph 2.3 of Section 00700 General Conditions.

17.3. In the event, the **Owner** determines through site inspections by the **State Facilities Administration** Representative or by notification by regulatory authorities that the **Contractor** has not met the soil erosion requirements of the Project and/or is in violation of the applicable soil erosion and sedimentation control statutes, the **Contractor** shall be notified in writing and corrective actions undertaken by **State Facilities Administration** in conjunction with paragraph 9.4 of Section 00700 General Conditions.

17.4. In the event, the **Contractor** fails to respond to written notice from **State Facilities Administration** regarding noncompliance with the provisions of the Contract Documents and/or soil erosion and sedimentation control regulations applicable to this Work, **State Facilities Administration** has the right to assess a fine to the **Contractor**. Fines shall be in addition to any other remediation costs or liquidated damages applicable to the Project and may exceed the value of the Contract.

END OF SECTION 00100

ATTACHMENT A TO SECTION 00100 – BIDDER'S CHECK LIST**PROFESSIONAL** – G.H. Forbes Associates Architects

WORK – Cadillac Place 15th Floor – Build (3) Judicial Suites

FILE No. – 950/ 22357.MNB

BEFORE BID OPENING:

2/10/2025 – Due date for delivery to the **Professional** of written proposals seeking to have the **Professional** consent to naming additional materials or equipment by Addenda. (Reference: Section 00100, Paragraph 7.2).

2/11/2025 – Bidder inquiries received after this date will not be answered, unless answered through Addenda issued at least seventy-two (72) hours before Bid opening (Business Days only), the Bid opening is postponed by Addendum, or the Work is rebid following post-Bid Addenda. (Reference: Section 00100, paragraph 4.1).

CONTENTS SHALL BE UPLOADED AS A PDF DOCUMENT TO/THROUGH SIGMA VSS (ITEMS 1 THROUGH 5.3 BELOW):

NOTE 1: THE BIDDER SHALL USE THE BID SUMMARY, BID FORM AND BID FORM ATTACHMENTS INCLUDED WITH THE BIDDING DOCUMENTS, UNLESS REVISED BY ADDENDUM, IN WHICH CASE THE LATEST REVISION OF THE BID SUMMARY, BID FORM AND/OR BID FORM ATTACHMENTS ISSUED BY ADDENDUM SHALL BE USED.

NOTE 2: THE BIDDER IS NOT REQUIRED TO INCLUDE THE PROJECT MANUAL OR DRAWINGS IN THE PDF BID DOCUMENT PACKAGE UPLOADED TO SIGMA VSS, ONLY THE COMPLETED BID SUMMARY, BID FORM AND BID FORM ATTACHMENTS!

- 1. Completed Bid Summary provided with Section 00300 Bid Form.
- 2. Completed Section 00300 Bid Form, which requires (a) completing the acknowledgment of Addenda in paragraph 2.1, (b) filling out Article 6 Bid Schedule and, if any prices are designated, completing Article 7 Change Order Prices, and (c) completing Article 8, that is, entering the date the Bid is submitted, completing paragraphs 8.1 through 8.4, and, if the Bidder is a joint venture, paragraph 8.5, and signing, as appropriate, in the spaces provided.
- 2.1 Completed Certificate of Principal or other equivalent acceptable certificate or authorization document, which certificate shall be attached to the completed Section 00300 Bid Form.
- 3. If the Bid includes a Bid Bond, ensure that the surety is authorized to do business in the State by the Department of Licensing and Regulatory Affairs – Insurance Bureau and is listed on the current U.S. Department of the Treasury Circular 570. Also, ensure that the completed Section 00310 Bid Bond is dated, is signed by both the Bidder and surety, and attaches Power of Attorney. If the Bid includes a certified or cashier's check or money order, that check, or money order shall be delivered in original copy before the Bid Due Time to:

State Facilities Administration
Design & Construction Division
3111 W. St. Joseph Street
Lansing, Michigan 48917

All other Bid information must be submitted via SIGMA as per standard bidding procedure.

- 4. Completed Section 00320 Non-collusion Affidavit.
- 5. Qualified Disabled Veterans Preference Documentation (if preference requested).
- 5.1 DD 214 – Proof of Service/Discharge.
- 5.2 Veterans Administration Rating Decision Letter – Proof of Disability, if not indicated in the DD 214.
- 5.3 Legal Proof of 51% QDV Ownership

This Bidder's Check List is provided solely to aid the Bidder in submitting a Bid. It shall not be relied on to include all items necessary to insure a complete Bid. The Bidder is solely responsible for including all items as required by the Bidding Documents, including any items required by Addenda, which may not be listed in this Bidder's Check List.

END OF ATTACHMENT A TO SECTION 00100

SECTION 00120 – SUPPLEMENTARY INSTRUCTIONS

PROFESSIONAL – G.H. Forbes Associates Architects
WORK – Cadillac Place 15th Floor – Build (3) Judicial Suites
FILE No. – 950/ 22357.MNB

The provisions of this Section 00120 Supplementary Instructions amend or supplement Section 00100 Instructions to Bidders and those other provisions of the Bidding Requirements that are indicated below. All other Bidding Requirements that are not so amended or supplemented remain in full force and effect.

Modify Specification Section 00700 Paragraph 4.6.2 to add the following paragraphs:

Final Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program. Comply with manufacturer's written instructions.

1. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion for entire Project or for a portion of Project:
 - a. Clean Project site, yard, and grounds, in areas disturbed by construction activities, including landscape development areas, of rubbish, waste material, litter, and other foreign substances.
 - b. Sweep paved areas broom clean. Remove petrochemical spills, stains, and other foreign deposits.
 - c. Rake grounds that are neither planted nor paved to a smooth, even-textured surface.
 - d. Remove tools, construction equipment, machinery, and surplus material from Project site.
 - e. Remove snow and ice to provide safe access to building.
 - f. Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.
 - g. Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.
 - h. Sweep concrete floors broom clean in unoccupied spaces.
 - i. Vacuum carpet and similar soft surfaces, removing debris and excess nap; shampoo if visible soil or stains remain.
 - j. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other noticeable, vision-obscuring materials. Replace chipped or broken glass and other damaged transparent materials. Polish mirrors and glass, taking care not to scratch surfaces.
 - k. Remove labels that are not permanent.
 - l. Touch up and otherwise repair and restore marred, exposed finishes and surfaces. Replace finishes and surfaces that cannot be satisfactorily repaired or restored or that already show evidence of repair or restoration.
 - 1) Do not paint over "UL" and other required labels and identification, including mechanical and electrical nameplates.
 - m. Wipe surfaces of mechanical and electrical equipment and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.
 - n. Replace parts subject to operating conditions during construction that may impede operation or reduce longevity.
 - o. Clean plumbing fixtures to a sanitary condition, free of stains, including stains resulting from water exposure.
 - p. Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills.
 - q. Clean ducts, blowers, and coils if units were operated without filters during construction or that display contamination with particulate matter upon inspection.
 - 1) Clean HVAC system in compliance with NADCA Standard 1992-01. Provide written report upon completion of cleaning.

- r. Clean light fixtures, lamps, globes, and reflectors to function with full efficiency. Replace burned-out bulbs, and those noticeably dimmed by hours of use, and defective and noisy starters in fluorescent and mercury vapor fixtures to comply with requirements for new fixtures.
- s. Leave Project clean and ready for occupancy.

END OF SECTION 00120

SECTION 00210 – INFORMATION FOR BIDDERS

PROFESSIONAL – G.H. Forbes Associates Architects
WORK – Cadillac Place 15th Floor – Build (3) Judicial Suites
FILE No. 950/ 22357.MNB

1.0 RELATED PROVISIONS

1.1. Paragraphs 3.4 through 3.7 of Section 00100 Instructions to Bidders, which contain terms and conditions governing the information made available to Bidders in this Section, are made part of this Section 00210 Information for Bidders by this reference.

2.0 SUBSURFACE CONDITIONS

2.1. The reports of explorations and tests of subsurface conditions itemized immediately below have been used by the **Professional** in the preparation of the Bidding Documents.

[Click or tap here to enter text.](#)

2.1.1. Information or data contained in those reports that may be properly considered Authorized Technical Data concerning subsurface conditions include (NOTE: All other information or data excluded from the list below represent Non-Technical Information or Data, interpretations, or opinions):

NA

2.2. The reports of explorations and tests of subsurface conditions itemized immediately below have not been used by the **Professional** in the preparation of the Bidding Documents. Those reports are available at the office of the **Professional** for review or purchase. Neither the **Owner** nor **Professional** warrants that this list identifies all existing relevant documents.

3.0 OTHER PHYSICAL CONDITIONS

3.1. The Drawings and technical Specifications and those drawings itemized immediately below contain information or data that have been used by the **Professional** in the preparation of the Bidding Documents, and that may be properly considered Authorized Technical Data concerning physical conditions of existing surface and subsurface facilities.

NA

3.2. The reference documents itemized immediately below have not been used by the **Professional** in the preparation of the Bidding Documents and are available at the office of the **Professional** for review or purchase. Information and data contained in those reference documents, including, but not limited to dimensions, locations and conditions of existing surface and subsurface structures, roadways, piping, raceways, equipment, etc. may not accurately or reliably reflect actual conditions. Neither the **Owner** nor **Professional** warrants that this list identifies all existing relevant documents.

NA

4.0 UNDERGROUND UTILITIES

4.1. Information or data about physical conditions of existing Underground Utilities, that have been used by the **Professional** in the preparation of the Bidding Documents, is shown or indicated in the Drawings and technical Specifications and those Underground Utility drawings itemized immediately below.

NA

5.0 PERMITS, APPROVALS, LICENSES AND FEES

5.1. To the extent that the **Owner** has secured or will secure any permits, approvals and licenses and has paid or will pay any associated charges and fees, any such permits, approvals and licenses are itemized in this paragraph.

NA

5.2. In the event any permits, approvals and licenses itemized in paragraph 5.1 have been obtained by the **Owner** and the fees have been paid, copies of those permits, approvals, licenses, and corresponding fee receipts, will be attached by the **Professional** as a PDF copy with the SIGMA posting or will otherwise be made available for contractor to download.

5.3. Except for any permits, approvals, licenses, and fees identified in paragraph 5.1, the **Contractor** shall be responsible for all permits, approvals, licenses, and fees applicable to Work.

6.0 SEQUENCING REQUIREMENTS

6.1. Refer to the technical Specifications, including, but not limited to the General Requirements, for information, data, and criteria on sequences of Work restraints, constructability, and maintenance of service to existing facilities, which, if provided, shall govern the selection of Work sequences.

6.2. Each Bidder shall be responsible for any conclusions or interpretations the Bidder makes related to the selection of sequences and Means and Methods, based on the technical data made available, and/or those additional investigations or studies made or obtained by that Bidder.

END OF SECTION 00210

SECTION 00300 – BID SUMMARY

DTMB-0401M (R 03/21)

BID SUMMARY
DEPARTMENT OF TECHNOLOGY, MANAGEMENT AND BUDGET

STATE FACILITIES ADMINISTRATION
 DESIGN AND CONSTRUCTION DIVISION
 3111 W. St. Joseph Street
 Lansing, Michigan 48917

Bids must be submitted electronically through the SIGMA VSS website at
<https://sigma.michigan.gov/webapp/PRDVSS2X1/AltSelfService>

FILE NUMBER 950/ 22357.MNB	FUNDING CODE	DEPARTMENT/AGENCY 950
CONTRACT TIME(S) 180 Calendar Days – Substantial 210 Calendar Days – Final	PROJECT NAME Cadillac Place 15 th Floor – Build (3) Judicial Suites	LOCATION 3044 W. Grand Blvd Detroit, MI, 48202
BID OPENING DATE 2/19/2025	FOR AN EXAMINATION OF THE SITE CONTACT: Jerry Zimmer, JZIMMER@courts.mi.gov	
SEE SECTION 00100 INSTRUCTIONS TO BIDDERS AND SECTION 00700 GENERAL CONDITIONS PROVIDED WITH THE BIDDING DOCUMENTS. BID: WE PROPOSE TO FURNISH, PERFORM AND COMPLETE THE ENTIRE WORK IN ACCORDANCE WITH THE CONTRACT DOCUMENTS IN CONSIDERATION OF THE BID PRICE (S) STATED BELOW.		
FIRM NAME AND COMPLETE ADDRESS		TELEPHONE NUMBER and E-MAIL ADDRESS
<input type="checkbox"/> Qualified Disabled Veteran BIDDER'S SIGNATURE AND TITLE _____ DATE _____		<u>SIGMA VENDOR NUMBER</u> <small>(protected information required for processing payments)</small>
		WITNESS' SIGNATURE _____ DATE _____

By signing this bid above, bidder certifies their enclosed Qualified Disabled Veteran and Michigan-Based Business Certifications.

BASE BID FROM BID SCHEDULE (Include specified Provisionary Allowance of \$75,000):

_____ Dollars \$ _____
(use words) (in figures)

A PERFORMANCE BOND AND A PAYMENT BOND ARE REQUIRED FOR ALL BIDS OVER \$50,000.00. EACH BID MUST BE ACCOMPANIED BY A FIVE (5) PERCENT BID GUARANTEE. BUILDERS RISK INSURANCE IS REQUIRED TO BE PROVIDED BY THE CONTRACTOR UNLESS OTHERWISE INDICATED IN THE BID DOCUMENTS.

BIDDERS ARE ALSO CAUTIONED TO FAMILIARIZE THEMSELVES WITH ALL OF THE OTHER CONDITIONS OF THE CONTRACT.

Project Scope of Work:

THIS PROJECT INCLUDES THE DEMOLITION OF AN EXISTING OFFICE SPACE BUILT OUT IN 2013 AND CONSTRUCTION OF (3) NEW JUDGES SUITES. TWO SUITES WILL SHARE A WING OF THE BUILDING WHILE THE THIRD SUITE IS TO BE CONSTRUCTED IN THE SPLINE OF THE BUILDING. EACH JUDGES SUITE WILL INCLUDE OFFICE SPACE APPROXIMATELY 4 EMPLOYEES INCLUDING THE JUDGES. THERE ARE EXISTING HAZARDOUS MATERIALS WITHIN THE PROJECT AREA THAT WILL BE INCIDENTALLY ENCOUNTERED AND WILL REQUIRE REMEDIATION. REFER TO THE DRAWINGS AND APPROPRIATE SPECIFICATION SECTIONS FOR DETAILS.

The Bidder must figure its Base Bid on the specified, or Addendum-approved, materials and equipment **only**. No "or equal" or substitution proposals will be permitted after Bid opening, except as provided in the General Conditions.

Addenda: Bidder acknowledges receipt of Addenda: No. ___ dated: _____, No. ___ dated: _____ No. ___ dated: _____

SECTION 00300 BID FORM

PROFESSIONAL – G.H. Forbes Associates Architects

WORK – Cadillac Place 15th Floor – Build (3) Judicial Suites

AGENCY No. –950 FUNDING CODE. _____ FILE No. 950/22357.MNB

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7 SCHEDULE OF CHANGE ORDER PRICES	—
8 BID SUBMITTED	—

ARTICLE 1 THIS BID IS SUBMITTED TO THE STATE OF MICHIGAN ("the Owner").

1.1. The undersigned Bidder proposes and agrees, if this Bid is accepted, to enter into an agreement with the **Owner** on the form in Section 00500 Agreement and to furnish and perform the Work as specified or indicated in the Bidding Documents for the Bid prices in the "Bid Schedule" on this Section 00300 Bid Form, within the Contract Times specified in Section 00500 Agreement, and in accordance with all other provisions and terms and conditions of the Bidding Documents, including, without limitation, those dealing with the disposition of the Bid Security.

1.2. The undersigned Bidder agrees to hold this Bid open for acceptance by the **Owner** for the period specified in Article 9 of Section 00030 Advertisement.

STATE OF MICHIGAN MODEL

Developed from FORMSPEC™ Michigan Model

1.3. The Bidder will provide a signed original of Section 00500 Agreement, the executed Section 00610 Performance Bond, the executed Section 00620 Payment Bond, and appropriate evidence of insurance within the times and in the manner specified in the Bidding Documents.

ARTICLE 2 THE BIDDER'S REPRESENTATIONS

2.1. The Bidder has examined the Bidding Documents, including the Addenda acknowledged in the table below. The Bidder has verified that the Addenda acknowledged below include all issued Addenda. Except for Addenda, which solely revise the date of Bid, opening, failure by the Bidder to acknowledge receipt of all Addenda correctly, by either failing to complete or incorrectly completing the table below, shall justify the Owner's refusal to read the Bid and automatically disqualify the Bidder from any consideration for award of the Contract.

No. ___ Dated _____ No. ___ Dated _____

No. ___ Dated _____ No. ___ Dated _____

No. ___ Dated _____ No. ___ Dated _____

2.2. The Bidder has taken those steps that are reasonably necessary to (a) ascertain and become familiar with the Work, site, and locality; (b) account for all applicable federal, state, and other local Laws and all general, local, and prevailing conditions that may in any manner affect cost, schedule, progress, performance or furnishing of the Work; and (c) study and account for the terms and conditions of the Bidding Documents. The Bidder has carefully correlated the Bidder's observations with the Bidding Documents.

2.3. The Bidder has studied carefully all reports concerning subsurface conditions and drawings of physical conditions of existing surface and subsurface facilities that have been used by the **Professional** and all documents of physical conditions of existing Underground Utilities facilities that have been used by the **Professional** – in both cases as identified in Section 00210 Information for bidders. The Bidder assumes responsibility for carefully and accurately locating existing Underground Utilities in a manner consistent with paragraph 10.3 of Section 00700 General Conditions and as required by 1974 PA 53, as amended, MCL 460.701 et seq. The Bidder accepts the determinations set forth in the Bidding Documents as to the extent of such Authorized Technical Data and Underground Utilities information and data contained in those reports, drawings, documents, or the Bidding Documents, as applicable, upon which the Bidder may rely.

2.4. To the extent Additional Technical Data has been considered by the Bidder as necessary for determining the Bid in Article 6 Bid Schedule, and the **Owner**, upon request, did not have the necessary Additional Technical Data, the Bidder assumes responsibility for having undertaken or undertaking reasonable examinations of the site and any other pertinent available information and data. The Bidder agrees to perform and furnish the Work affected by the conditions involved, at no increase in Contract Price and Contract Time, to the extent the information and data necessary for determining the Bid could have been discovered through reasonable examinations of the site and any other pertinent information and data available (including, but not limited to the

information and data designated in Section 00210 Information for Bidders).

2.5. The Bidder has carefully correlated the results of its observations, examinations, and studies of those reports of explorations and all that information and data in studies, drawings, and specifications, referred to in paragraphs 2.3 and 2.4, with the terms and conditions of the Bidding Documents.

2.6. The Bidder has examined all information and data shown or indicated in the Bidding Documents concerning other work, including, but not limited to provisions in Section 00700 General Conditions. The Bidder assumes responsibility for all reasonably foreseeable terms, conditions and consequences resulting from other work that may in any manner affect cost, schedule, progress, performance or furnishing of the Work.

2.7. The Bidder has carefully examined the terms and conditions of the Bidding Documents concerning Delay, Activity Float times and early completion. The Bidder agrees that increases in Contract Price and/or Contract Time for Delay shall be as provided in Section 00700 General Conditions. The Bidder has correlated those terms and conditions with the Bidder's schedule for the Work and its Base Bid and Alternates.

2.8. The Bidder represents that each unit price covering Specified or Contingent Unit Price Work, whether bid on Article 6 – Bid Schedule or on Article 7 – Schedule of Change Order Prices, includes sufficient amounts to cover (a) all labor costs, Subcontractor costs, material and equipment costs, construction equipment costs and general conditions costs, and (b) all administrative costs and home office overhead), and (c) profit. The **Owner** reserves the right to reject any unit prices bid on paragraph 6.2 Schedule of Alternates or in Article 7 Schedule of Change Order Prices, which, in the **Owner's** sole discretion, are not in the **Owner's** best interest.

2.9. The Bidder has given the **Professional** written notice of all conflicts, ambiguities, errors, or omissions the Bidder has discovered in the Bidding Documents, and the written resolution given by the **Professional** is acceptable to the Bidder.

2.10. This Bid is genuine, is not made in the interest of or on behalf of any undisclosed person and is not submitted in conformity with any agreement or rules of any group, association, organization, or corporation. To induce the **Owner** into consideration of this Bid, the Bidder reiterates and makes each of the representations made by the Bidder in Section 00320 Non-collusion Affidavit attached to this Section 00300 Bid Form.

2.11. The Bidder is aware of the **Owner's** requirements for business owned by minorities, women, and persons with physical or mental disabilities, and assumes responsibility for all conditions and consequences that may result from meeting those requirements and that may in any manner affect cost, schedule, progress, performance and furnishing of the Work.

2.12. The Bidder has read and studied each provision of the Bidding Documents. The Bidder has no expectations different from the terms and conditions of the Bidding Documents.

ARTICLE 3 TIME OF COMPLETION

3.1. The Contract Times are specified in paragraph 4.1 of Section 00500 Agreement. The Bidder has carefully correlated the provisions in paragraph 4.1 of Section 00500 Agreement with the other terms and conditions of the Bidding Documents and unequivocally accepts the Contract Times for the Work, and any other designated parts of the Work, as specified.

3.2. The Bidder unequivocally accepts the liquidated damage provisions specified in paragraph 4.2 of Section 00500 Agreement in the event of any failure, neglect, or refusal to complete the Work, or designated part of the Work, within the corresponding Contract Times specified in paragraph 4.1 of Section 00500 Agreement.

ARTICLE 4 ATTACHMENTS INCLUDED WITH THIS BID

4.1. Attachments to this Section 00300 Bid Form and made a condition of this Bid are:

4.1.1. Evidence of Authority to Sign the Bid.

4.1.2. Section 00310 Bid Bond, with the attached certified copy of Power of Attorney, or

Alternate Bid Security.

4.1.3. Section 00320 Non-collusion Affidavit.

TO BE PROVIDED POST BID WITH SECTION 00400 SUBMITTALS:

4.1.5 Current EMR Rating

4.1.6 Identification of the proposed project superintendent with a resume or list of similar projects handled by that individual.

4.1.7 A list of at least three (3) projects completed within the last three (3) years of similar size and complexity, with contact information for references for each.

4.2. Bidder-provided documents, made a condition of this Bid, are as required in the following Section(s) of the Bidding Documents:

ARTICLE 5 DEFINED TERMS

5.1. Section 00020 Glossary assigns specific intent and meanings to capitalized terms and to other defined terms used in (a) this Section 00300 Bid Form, (b) Section 00310 Bid Bond and Section 00320 Non-collusion Affidavit, and (c) Section 00410 Bid Breakdown, Section 00420 Questionnaire, Section 00430 List of Subcontractors and Section 00440 Schedule of Materials and Equipment.

ARTICLE 6 BID SCHEDULE

6.1 Base Bid Schedule - The Bidder will complete the Work and accept in full payment, for the Work items listed, the following unit prices and/or Bid Prices, as applicable:

Base Bid Item No.	Bid Quantity	Description (Bidder to write price in Words)	Unit Price	Item Bid Price
RENOVATION:				
Demolition				
Concrete				
Masonry				
Metals				
Wood + Plastics				
Thermal and Moisture				
Doors and Windows				
Finishes				
Toilet Accessories				
Plumbing				
HVAC				
Electrical				
Balance of Renovation Work				
		PROVISIONARY ALLOWANCE AMOUNT		\$75,000
TOTAL (This amount should equal the Base Bid amount on the Bid Summary Form)	\$			

Base Bid (Sum of Bid Prices for all Base Bid Items):

_____ Dollars and No/Cents \$ _____
 (use words) (in figures)

Name of the Bidder _____ Agency No. _____ Funding Code _____ File No. _____

Date _____

SIGMA VENDOR NUMBER _____

Telephone No. _____

6.2 Schedule of Alternates - The Bidder will complete (or deduct from the Contract) the parts of the Work designated by the Alternates that follow and accept in full payment (or allow in full credit) for those parts of the Work the following Bid Prices:

Alternate Item No.	Bid Quantity	Description	Unit Price	Item Bid Price

The Bidder further acknowledges and agrees that the separate prices bid on this "Schedule of Alternates," where they are applicable and deemed acceptable by the **Owner**, will be used if incorporated into the Contract when the **Owner** issues the Notice of Award.

Name of the Bidder _____ Agency No. _____ Funding Code _____ File No. _____

Date _____

SIGMA VENDOR NUMBER _____

Telephone No. _____

ARTICLE 7 SCHEDULE OF CHANGE ORDER PRICES

7.1 The Bidder shall use this "Schedule of Change Order Prices" to propose contingent prices. The proposed contingent Change Order prices set forth in this schedule, at the sole discretion of the **Owner**, may, or may not be incorporated into the Contract Documents. The **Owner** reserves the right to negotiate contingent Change Order prices set forth herein prior to their possible incorporation into the Contract Documents. Proposed Change Order prices will not affect determination of the lowest Bid.

7.2 Subject to their incorporation into the Contract Documents, as provided in the Agreement, the Bidder will add to, or deduct from, the Contract Work covered by the contingent prices that follow and accept in full payment, or allow in full credit, for that Work (a) those prices bid by the Bidder, or (b) if a particular price is not bid, the price proposed by the **Owner** (and shown in the appropriate column):

Item No.	Bid Quantity	Description	Unit Price	Item Bid Price
1	1 Sq Ft	Provide a unit cost per sq.ft. of asbestos-containing floor tile. The unit price shall be comprehensive to include all material, labor, equipment, legal disposal, documentation, required enclosures, PPE, subcontractor markups and OH&P costs.		
2	1 Sq Ft	Provide a unit cost per sq.ft. of asbestos-containing mastic. The unit price shall be comprehensive to include all material, labor, equipment, legal disposal, documentation, required enclosures, PPE, subcontractor markups and OH&P costs.		

Name of the Bidder _____ Agency No. _____

Funding Code _____ File No. _____

Date _____

SIGMA VENDOR NUMBER _____

Telephone No. _____

ARTICLE 8 BID SUBMITTED ON the _____ day of _____, 20_____.

8.1. Bid Security is in the form of a Bid Bond _____ Bid Bond form provided in Section 00310 has been duly executed _____; or

A Certified or Cashier's check ___ or Money Order ___ if a check or money order is provided as Bid Security, the original check/money order must be delivered before Bid Due Time to the issuing office as per Section 00100 paragraph 5.2 and Section 00110 item 3.

8.2. If the Bidder is an Individual:

Name of Individual: _____

Name & Title of Person _____

Authorized to sign: _____

Signature: _____

(If not the Individual, Attach Power of Attorney) _____ Date _____

Doing Business as: _____

Business Address: _____

SIGMA VENDOR NUMBER _____

County of registration _____

Telephone: _____ FAX: _____

8.3. If the Bidder is a Partnership:

By: _____

(True Name of the Partnership)

Partner Authorized to Sign _____ Date _____

Signature: _____

(Attach evidence of Authority to sign) _____ Date _____

Business Address: _____

SIGMA VENDOR NUMBER _____

County of registration _____

Telephone: _____ FAX _____

8.4. If the Bidder is a Corporation:

By: _____

(Legal Corporation Name)

Name & Title of _____

Authorized Officer: _____

Signature: _____

(Attach evidence of Authority to sign) _____ Date _____

Name & Title of _____

Officer Attesting: _____

Signature: _____

Date _____

Business Address: _____

SIGMA VENDOR NUMBER _____

Telephone: _____ FAX _____

(State of Incorporation): _____

8.5. If The Bidder is A Joint Venture: JOINT VENTURE SIGNATURES SHALL BE AS PROVIDED IN PARAGRAPH 9.5 OF SECTION 00100 INSTRUCTIONS TO BIDDERS. EACH JOINT VENTURER SIGNING THE BID SHALL SIGN IN THE MANNER INDICATED FOR AN INDIVIDUAL, A PARTNERSHIP OR A CORPORATION. IF MORE THAN TWO JOINT VENTURERS OF THE SAME TYPE ARE INCLUDED, USE ADDITIONAL PAGES. JOINT VENTURE STATE OF INCORPORATION _____ OR COUNTY OF REGISTRATION _____

CERTIFICATE OF PRINCIPAL

(BIDDER)

I, _____, certify that I am the Secretary of the Corporation _____, or a General Partner _____ or Managing Partner _____ or Partner _____ of the partnership, named as the Bidder in the attached Section 00300 Bid Form; that _____ who signed Section 00300 Bid Form on behalf of the Bidder, was then _____ of that corporation _____ or partnership _____; that I know the undersigned's signature, and the signature is genuine; and that Section 00300 Bid Form was duly signed, sealed and attested for and on behalf of that corporation ___ partnership ___ by authority of its governing body ___ or partners ___

Signed by the Secretary or Other Authorized Officer of the Corporation _____ Date _____
or By General Partner or Managing Partner or Authorized Partner Certifying

Name of the Corporation or True Name of the Partnership

Federal Identification (I.D.) No. or Social Security No. (LAST 4 ONLY) _____

Telephone No. _____

(Corporate Seal)

**VERIFICATION
(BIDDER)**

STATE OF MICHIGAN)
)
COUNTY OF _____)

Before me, a Notary duly commissioned, qualified and acting, personally appeared (enter name of person who signed the Bid Form on behalf of the Bidder), _____ to me well known to be the person described in and who signed Section 00300 Bid Form, who being by me first duly sworn upon oath, says that he/she is the Attorney-in-Fact for (enter the Bidder's name) _____ and that he/she has been authorized by (enter name of individual, partnership name, or that governing body of the Bidder named in the attached corporate resolution) _____ to execute the attached Section 00300 Bid Form on behalf of the named Bidder in favor of the STATE OF MICHIGAN.

Subscribed and sworn before me this _____ day of _____, 20_____.

Notary Public, State of: _____
My Commission Expires: _____

END OF SECTION 00300

SECTION 00310 BID BOND

AGENCY No. 511 Funding Code: _____

FILE No. 511/21236.CAK SURETY COMPANY REFERENCE No. _____

KNOW ALL PERSONS BY THESE PRESENTS: That we, "the Bidder," _____, a corporation _____, individual _____, partnership _____, joint venture _____, of the State of _____, qualified to do business in the State of Michigan, as Principal, and "the Surety," _____, of the State of _____, as surety, are hereby held and firmly bound unto the State of Michigan, "the Owner," as Obligee, in the amount of _____ Dollars (\$ _____), and if no amount is entered, in the amount of five percent (5%) of the Bidder's Base Bid designated in paragraph 6.1 Base Bid Schedule in Section 00300 Bid Form, for the payment of which the Bidder and the Surety hereby bind ourselves, our respective heirs, successors, legal representatives and assigns, jointly and severally, firmly by these presents in accordance with Michigan Law.

WHEREAS, the Bidder has submitted to the Owner a Bid, to which this Bond is attached, to enter into the Contract with the Owner for _____ covered by Bidding Documents prepared by the Professional, which Bidding Documents are incorporated into this Bid Bond by this reference:

NOW, THEREFORE: THE CONDITION OF THIS OBLIGATION IS THAT, if the Bidder faithfully performs and fulfills all the understandings, covenants, terms and conditions of the Bidding Documents governing the bidding and award of the Contract (including Addenda issued before Bid opening and any post-Bid Addenda) within the time specified or any extension thereof, with or without notice to the Surety or fails to do so but pays to the Owner the full amount of the sum set forth in this Section 00310 Bid Bond as liquidated damages - then THIS OBLIGATION SHALL BE NULL AND VOID, OTHERWISE THIS OBLIGATION SHALL REMAIN IN FULL FORCE AND EFFECT.

but not be limited to reasonable fees and charges of architects, engineers, attorneys and others, court or hearing costs incurred with or without suit, and interest.

A. If the Owner makes demand on the Surety to perform in accordance with the Surety's obligations under this Section 00310 Bid Bond, the full amount of the sum set forth in this Section 00310 Bid Bond shall be immediately due and payable to the Owner, and the Surety shall pay that sum without delay. Additionally, the Surety shall reimburse the Owner all costs of collection, which shall include,

B. The Surety, for value received, stipulates, and agrees that the obligations of the Surety and this Section 00310 Bid Bond shall be in no way impaired or affected by any extension of the time within which the Owner may accept the Bid, and the Surety does, by this agreement, waive notice of any such extension.

C. It is the intention of the Bidder, Surety and Owner that the Surety shall be bound by all terms and conditions of the Bidding Documents and this Section 00310 Bid Bond. However, if any provision(s) of this Section 00310 Bid Bond is/are illegal, invalid, or unenforceable, all other provisions of this Section 00310 Bid Bond shall nevertheless remain in full force and effect, and the Owner shall be protected to the full extent provided by Michigan Law.

IMPORTANT: The Surety shall be authorized to do business in the State by the Department of Consumer and Industry Services – Insurance Bureau and listed on the current U.S. Department of the Treasury Circular 570 and shall be otherwise acceptable to the Owner.

Address and Telephone of Surety

Address and Telephone of Agent

Signed and sealed this _____ day of _____, 20____ (NOTE: Use the date entered on Article 8 of Section 00300 Bid Form).

THE BIDDER: (Print Full Name and Sign)

THE SURETY: (Print Full Name and Sign)

By: _____

By Agent: _____

Name & Title: _____

By Attorney-in-Fact: _____
(Attach Certified Copy of Power of Attorney)

Signature: _____

Signature: _____

WITNESS: _____

WITNESS: _____

Telephone No. _____

Telephone No. _____

END OF SECTION 00310

SECTION 00320 NONCOLLUSION AFFIDAVIT

PROFESSIONAL – G.H. Forbes Associates Architects

WORK – Cadillac Place 15th Floor – Build (3) Judicial Suites

AGENCY No. – 950 FUNDING CODE: FILE No. 950/22357.MNB

Affiant, _____, being first duly sworn, deposes and says that:

(1) Affiant is (enter title) _____ of _____, "the Bidder." Affiant has personal knowledge of the matters set forth in this Affidavit and is competent to testify about them.

(2) The Bidder has submitted to the Owner a "Bid" to enter into the above referenced Contract, also referred to in this Affidavit as "the Work."

(3) This Section 00320 Non-collusion Affidavit is executed by Affiant for inclusion with the submission to the Owner of the Bid and may be relied upon by the Owner in considering the Bid.

(4) Affiant is fully informed about the preparation and contents of the Bid and of all pertinent circumstances surrounding the Bid, has not entered into any contract, combination, conspiracy, or other act prohibited by federal, State or any other local Law. The Bid is genuine and is not a collusive or sham Bid.

(5) Neither the Bidder nor any of the Bidder's owners, officers, partners, directors, agents, representatives, employees or parties in interest, including this Affiant, have in any way entered or proposed to enter into any combination to prevent the making of any Bid, or to fix any prices (including overhead, profit or other costs) for the Bid; or have made any agreement, or given or promised any

By: _____

consideration to induce any other person not to Bid for the Work, or to Bid at a specified price; or have secured, proposed or intended to secure through any agreement an unlawful advantage against the Owner or any other person interested in the Work.

(6) No officer or employee of the State of Michigan is personally or financially interested, directly or indirectly, in the Bid, or any Contract which may be under it, or in the purchase or sale of any materials, equipment or supplies for the Work to which it relates, or any portion of any expected profits thereto.

(7) The Bid is not intended to secure an unfair advantage or benefit from the Owner or in favor of any person interested in the proposed Contract.

(8) The prices bid are fair and proper and are not tainted by any collusion, conspiracy, connivance, or unlawful agreement on the part of the Bidder or any other of the Bidder's owners, officers, partners, directors, agents, representatives, employees or parties in interest, including this Affiant; and neither the Bidder nor any of its owners, officers, partners, directors, agents, representatives, employees or parties in interest, including this Affiant, have divulged any information regarding the Bid or any data about the Bid to any other person.

Title: _____

SIGMA VENDOR NUMBER _____

Telephone No. _____

VERIFICATION

STATE OF _____)
COUNTY OF _____)

Before me, a Notary Public commissioned, qualified and acting, personally appeared (enter name of the person signing this Affidavit) _____ to me well known to be the person described in and who signed this Section 00320 Non-collusion Affidavit, who being by me first duly sworn upon oath, says that he/she is the Attorney-in-Fact for (enter Bidder's name) _____ - _____, that he/she has been authorized by (enter name of individual, partnership name, or the authorized governing body of the Bidder) _____ to execute this Section 00320 Non-collusion Affidavit on behalf of the named Bidder in favor of the STATE OF MICHIGAN, for the uses and purposes mentioned.

Subscribed and sworn to before me this _____ day of _____, 20_____.

Notary Public, State of _____
My Commission expires: _____, 20_____

END OF SECTION 00320

SECTION 00410 BID BREAKDOWN

PROFESSIONAL – G.H. Forbes Associates Architects

WORK – Cadillac Place 15th Floor – Build (3) Judicial Suites

AGENCY No. – 950 FUNDING CODE: _____ FILE No. 950_22357.MNB

1.0 BID BREAKDOWN: The Apparent Low Bidder shall itemize below a cost breakdown of the Apparent Low Bidder's Bid. The Bid Breakdown shall be organized into separable parts of the Work so that one hundred percent (100%) of the Base Bid plus all Alternates is accounted for. Portions of the Work for which costs are itemized shall include Work to be furnished and performed directly by the Apparent Low Bidder and its Subcontractors and Suppliers, as applicable. Each separable part of the Work identified in this Bid Breakdown shall have a value not exceeding _____ percent (____%) of the Apparent Low Bidder's Base Bid, except parts of the Work designating furnished materials or equipment, which may be itemized as quoted.

2.0 DISCREPANCIES: Discrepancies in this Section 00410 Bid Breakdown shall be resolved in accordance with Article 14 of the Instructions to Bidders. Any discrepancies between the Apparent Low Bidder's Bid Breakdown and Article 6 "Bid Schedule" on the Apparent Low Bidder's Section 00300 Bid Form with respect to a given lump sum item, unit price item or "One Each" item, or any sum of any of them, will be resolved so that the corresponding amount(s) on the Apparent Low Bidder's Section 00300 Bid Form will be binding on the Apparent Low Bidder.

END OF SECTION 00410

PROFESSIONAL – G.H. Forbes Associates Architects

WORK – Cadillac Place 15th Floor – Build (3) Judicial Suites

AGENCY No. – 950 FUNDING CODE: _____ FILE No. 950/22357.MNB

ARTICLE 1 ORGANIZATION

1.1. Date of organization (or incorporation) _____ State of incorporation _____ (IRS) EIN _____

1.2. Title and name of Principals (President, Vice-Presidents, Secretary and Treasurer, if a corporation; partners, if a partnership)

1.3. Is your organization's principal place of business maintained in the State of Michigan? ____ If your organization maintains its principal place of business outside the State, attach a copy of the Certificate of Authority which your organization procured in accordance with MCL 450.2011.

1.4. If your organization, any business entity related to or affiliated with your organization, or any present or former executive employee, officer, director, shareholder (owning twenty percent (20%) or more of the outstanding shares), partner, or owner of your organization or of any such related or affiliated entity has ever been convicted of a felony, or has felony charges pending, in any state within the last three (3) years from the date of Bid opening, furnish with this Bidder's Questionnaire all material facts relating to any such felony conviction or such pending felony charges.

ARTICLE 2 SPECIALTY CONTRACTOR LICENSES

2.1. Does your organization hold valid licenses covering specialty classifications of Work that your organization itself intends to perform and for which a specific specialty license is required by any Political Subdivision with jurisdiction over the Work _____? If so, attach a list with all licenses by number and classification; state the name of the organization holding the license, the renewal date of each license, whether each license is active, and attach a copy of each license.

ARTICLE 3 EXPERIENCE

3.1. What is the general character of the work performed by your organization? _____ How many years of experience in construction work similar in character and scope to the Work under the Bidding Documents has your organization had: (a) as a General Contractor? _____; (b) as a Subcontractor? _____.

3.2. Attach a list of all public contracts or subcontracts under public contracts that your organization has performed within the last five (5) years which are similar in character and scope to the Work under the Bidding Documents (using the forms in the "References Attachment" provided with this Questionnaire). If the contract or subcontract referenced is not substantially completed, furnish the percent complete for that contract or subcontract.

3.3. Within the last five (5) years, has your organization been in litigation with The State of Michigan or failed to complete a contract or subcontract awarded to it? ____ If so, attach a list for each contract or subcontract, state when, where and why.

3.4. Within the last five (5) years, has any officer, partner or executive employee of your organization been an officer, partner or employee of another organization that was involved in a litigation with The State of Michigan? or failed to complete a contract or subcontract? _____. If so, for each contract or subcontract, state the name of each officer, partner or employee and the name of the organization and owner(s), and the explanation of litigation or reasons why the contract or subcontract was not completed.

3.5 Identify your organizations Experience Modification Rating (EMR) _____. Attach a letter of explanation if your organization does not have an EMR.

3.6 Provide the name and attach a brief resume and list of similar success projects for your proposed Project Superintendent.

ARTICLE 4 ADDITIONAL QUALIFICATIONS

4.1. **(Nominated Subcontractor only)** Will you subcontract any part of the Work covered by the intended Sub agreement? _____. If so, which parts of the Work covered by the intended Sub agreement do you intend to subcontract to a lower tier Subcontractor?

4.2. State the name, address, and telephone number of a representative of your organization who personally visited and inspected the site: _____.

Also, describe, in an attachment to this Section 00420 Questionnaire, subsurface and physical conditions at or contiguous to the site that your representative investigated and how they were accounted for in the preparation of your organization's Bid.

4.3. Attach a list of construction equipment and machinery your organization intends to use in the execution of the Work, as estimated in the preparation of your organization's Bid.

4.4. Does your organization rent or lease equipment or facilities from other affiliate organizations? _____. If so, state the name of the affiliate organization(s) _____.

4.5. **(Apparent Low Bidder only)** Bank line of credit available? \$ _____.

4.6. **(Apparent Low Bidder only)** Will your organization, i.e., the Bidder named in the Authorized Signature Article on Section 00300 Bid Form, be the only named Principal in Section 00610 Performance Bond and Section 00620 Payment Bond? _____. If not, please identify the organization who will be named as Principal or Co-Principal on Section 00610 Performance Bond and Section 00620 Payment Bond _____. Also, state how such organization relates to the Bidder _____ (NOTE: If another organization is identified, the Apparent Low Bidder shall submit to the Owner a separate Section 00420 Questionnaire filled out by that organization as part of the Qualification Submittals required under Article 2 of Section 00100 Instructions to Bidders).

ARTICLE 5 REFERENCES

5.1. Trade references (Minimum of three (3)):

5.2. Bank references:

5.3. Insurance:

The undersigned Apparent Low Bidder ____ or nominated Subcontractor _____ certifies that all statements and answers made to the interrogatories in this Section 00420 Questionnaire are current, accurate and complete as of the date stated below. (Note: Attachments shall be fastened at the end of this Section).

Signed by: _____ Name _____ Title _____

on this _____ day of _____, 20_____.

END OF SECTION 00420

REFERENCES ATTACHMENT**PROFESSIONAL** – G.H. Forbes Associates Architects

WORK – Cadillac Place 15th Floor – Build (3) Judicial Suites

AGENCY No. – 950 FUNDING CODE: _____ FILE No. 950/22357.MNB

REFERENCE #

Public Owner: _____

Project/Contract Name: _____

Location of Project/Contract: _____

Contract Price: _____ Project/Contract Started: _____ Completed: _____

Owner's Representative (Name and Telephone): _____

Apparent Low Bidder's ____ or Nominated Subcontractor's ____

Representative Name and Telephone _____

Scope of Project/Contract: _____

REFERENCE #

Public Owner: _____

Project/Contract Name: _____

Location of Project/Contract: _____

Contract Price: _____ Project/Contract Started: _____ Completed: _____

Owner's Representative (Name and Telephone): _____

Apparent Low Bidder's ____ or Nominated Subcontractor's ____

Representative Name and Telephone _____

Scope of Project/Contract: _____

REFERENCES ATTACHMENT

PROFESSIONAL – G.H. Forbes Associates Architects

WORK – Cadillac Place 15th Floor – Build (3) Judicial Suites

AGENCY No. – 950 FUNDING CODE: _____ FILE No. 950/ 22357.MNB

REFERENCE #

Public Owner: _____

Project/Contract Name: _____

Location of Project/Contract: _____

Contract Price: _____ Project/Contract Started: _____ Completed: _____

Owner's Representative (Name and Telephone): _____

Apparent Low Bidder's ____ or Nominated Subcontractor's ____

Representative Name and Telephone _____

Scope of Project/Contract: _____

REFERENCE #

Public Owner: _____

Project/Contract Name: _____

Location of Project/Contract: _____

Contract Price: _____ Project/Contract Started: _____ Completed: _____

Owner's Representative (Name and Telephone): _____

Apparent Low Bidder's ____ or Nominated Subcontractor's ____

Representative Name and Telephone _____

Scope of Project/Contract: _____

SECTION 00430 LIST OF SUBCONTRACTORS

PROFESSIONAL – G.H. Forbes Associates Architects

WORK – Cadillac Place 15th Floor – Build (3) Judicial Suites

AGENCY No. – 950 FUNDING CODE: _____ FILE No. 950/ 22357.MNB

1. To enable the **Owner** and **Professional** to evaluate the Apparent Low Bidder's qualifications to perform the Work, for each Division of the Specifications, Section of the Specifications and/or trade itemized in this Section 00430 List of Subcontractors, the Apparent Low Bidder shall nominate the Subcontractor(s) to be awarded a Sub agreement(s). To the extent a contractor's licensing is required for any such classification of Work, the Apparent Low Bidder shall provide the nominated Subcontractor's license number(s). If the Apparent Low Bidder intends to self-perform any of the listed classifications of Work, the Apparent Low Bidder shall nominate itself in the spaces provided for that purpose and shall furnish the corresponding Apparent Low Bidder's license number(s). For each nominated Subcontractor, the Apparent Low Bidder shall enter, if applicable, whether the Subcontractor is a minority, woman or handicapped owned business in the spaces provided for that purpose. The Apparent Low Bidder also shall furnish the amount of the Sub agreement that the Apparent Low Bidder, directly or through another higher tier Subcontractor, anticipates awarding to each nominated Subcontractor.

2. Should the Apparent Low Bidder fail to nominate Subcontractors, as required, or provide duplicate nominees for any Division, Specification, or trade, or fail to enter the required licensing information, the Apparent Low Bidder shall clarify the omission or ambiguity within two (2) Business Days of the **Owner** or **Professional's** request. Failure by the Apparent Low Bidder to comply with this Subcontractor nominating requirement may render the Bid as not conforming in all material respects with the requirements of the Bidding Documents.

3. Pursuant to the Bidding Documents, the Apparent Low Bidder shall not remove, replace, or add a nominated Subcontractor except as provided in paragraph 8.3 of Section 00100 Instructions to Bidders and/or in paragraph 5.1 of Section 00700 General Conditions. Since the requirement to nominate Subcontractors for the *listed* Divisions, Specification Sections and/or trades survives the award of the Contract, any Subcontractor nominated for any *listed* Division, Specification Section and/or trade *for the first time* after Contract Award and who is objected to by the **Owner**, for good cause, shall be replaced at no increase in Contract Price and/or Contract Time.

4. The requirement to make a definite nomination of Subcontractors or to state that the Apparent Low Bidder intends to self-perform that classification, and to clarify any omissions or ambiguities in this Section 00430 List of Subcontractors, applies to the Apparent Low Bidder and any other Bidder remaining or wishing to remain in contention for the award.

5. This listing requirement is not intended to create any express or implied duty or obligation to the Apparent Low Bidder or the nominated Subcontractors by the **Owner** or **Professional**.

(THE REMAINDER OF THIS PAGE LEFT BLANK INTENTIONALLY)

Division, Specification Section and/or Trade	Nominated Subcontractor(s)	License Number(s) Classification	Amount of Subcontract
1. _____	_____	_____	_____
2. _____	_____	_____	_____
3. _____	_____	_____	_____
4. _____	_____	_____	_____
5. _____	_____	_____	_____
6. _____	_____	_____	_____
7. _____	_____	_____	_____
8. _____	_____	_____	_____
9. _____	_____	_____	_____
10. _____	_____	_____	_____
11. _____	_____	_____	_____
12. _____	_____	_____	_____
13. _____	_____	_____	_____
14. _____	_____	_____	_____

The undersigned Apparent Low Bidder _____ certifies that all the information and data furnished in this Section 00430 List of Subcontractors are current, accurate and complete as of the date stated below.

Signed by: _____ Name _____ Title _____

on this _____ day of _____, 20_____.

END OF SECTION 00430

PROFESSIONAL – G.H. Forbes Associates Architects

WORK – Cadillac Place 15th Floor – Build (3) Judicial Suites

AGENCY No. – 950 FUNDING CODE: _____ FILE No. 950/22357.MNB

ARTICLE 1 BID MATERIALS AND EQUIPMENT – LISTED (NAMED OR SPECIFIED) ITEMS

1.1. The Apparent Low Bidder has examined the requirements of paragraphs 7.4 and 7.5 of Section 00100 Instructions to Bidders, and by submitting a Bid, commits to bid only a *listed* named or specified materials and equipment for those Specifications *listed* in Schedule 1.6. To the extent that any such *listed* Specification states that an "or equal" or a substitute may be furnished, if acceptable to the **Professional**, application for any such acceptance will not be considered by the **Professional** until after Contract Award. Any such application shall comply with the terms and conditions of Article 2 in this Section and paragraph 5.2 of Section 00700 General Conditions.

1.2. For those Sections of the Specifications *listed* in paragraph 1.6, the Contract will be awarded on the basis that only one of the *listed* materials or equipment will be furnished. Therefore, to be considered responsible, the Apparent Low Bidder shall nominate, by circling the letters "A," "B," "C," etc. corresponding to each *listed* manufacturer/Supplier, the Bidder's chosen manufacturers/Suppliers for the corresponding products named or specified in the Specifications and Drawings (including all Addenda).

1.3. If the Apparent Low Bidder fails to circle a manufacturer/Supplier for a *listed* material or equipment, or circles more than one letter for a *listed* material or equipment, the Apparent Low Bidder hereby agrees to correct the omission or ambiguity within two (2) Business Days after submittal of this Section 00440 Schedule of Materials and Equipment. The requirement to make a definite selection and to correct any omissions or ambiguities in Schedule 1.6 applies to the Apparent Low Bidder and any other Bidder remaining or wishing to remain under consideration for the award.

1.4. The Apparent Low Bidder's attention is directed to paragraph 7.3 of Section 00100 Instruction to Bidders, which holds the Apparent Low Bidder responsible, if awarded the Contract, for certain costs and time impacts, provided the Apparent Low Bidder, in the preparation of its Bid, knew or had reason to know, that any *listed* material or equipment bid by the Bidder requires changes in the Work and failed to provide advanced written notice to that effect to the **Professional**.

1.5. The Apparent Low Bidder shall insert the provisions of this Section in all Sub agreements with Subcontractors and Suppliers furnishing the materials or equipment *listed* in Schedule 1.6, altering the respective paragraphs only as appropriate to properly identify the contracting parties. Each such Sub agreement shall expressly bind the respective Subcontractor or Supplier to the conditions of paragraph 1.4, the other provisions of Section 00440 Schedule of Materials And Equipment and paragraph 5.2 of Section 00700 General Conditions.

1.6. Schedule of Bid Materials and Equipment

ITEMS NAMED OR SPECIFIED (ENTERED BY THE PROFESSIONAL)		CONTRACTOR TO NOMINATE (CIRCLE) ITS CHOSEN NAMED OR SPECIFIED MANUFACTURERS AND SUPPLIERS
ITEM OF MATERIAL OR EQUIPMENT	SPECIFICATION SECTION	
ITEM 1 -		A. B.
ITEM 2 -		A. B. C. D.
ITEM 3 -		
ITEM 4 -		

1.7 Use of "Or Equal" or Substitute Materials or Equipment After Contract Award

1.7.1. Paragraph 5.2 of Section 00700 General Conditions provides for the consideration (after the date of Contract Award) and possible acceptance by the **Professional** of "or equal" or substitute materials or equipment (unless any material or equipment named is followed by words establishing that no "or equal" or substitution is permitted). If sufficient information is submitted to allow the **Professional** to determine in a timely manner that the material or equipment proposed is equivalent or equal to that named or described in the Drawings or specified in the Specifications, then the **Professional** will consider the proposed "or equal" or substitute material or equipment.

1.7.2. The Apparent Low Bidder assumes responsibility for the cost and time required to make any proposed "or equal" or substitute material or equipment approved by the **Professional** conform to the requirements of the Contract Documents. In addition, if any such "or equal" or substitute material or equipment requires any changes in the drawings, or in any testing requirements, or in any Means and Methods indicated in or required by the Contract Documents, or in work performed by the **Owner** or others, or requires any other changes in the Work whatsoever, the Apparent Low Bidder shall assume full responsibility for the cost and the time required to carry out such changes in the Work or the work of others. Pursuant to this provision, the Apparent Low Bidder shall bear an appropriate portion of the Delay and costs resulting from the events contemplated in this paragraph.

1.7.3. Paragraph 5.2 of Section 00700 General Conditions provides for reimbursement by the **Contractor** to the **Owner** for any additional expenses incurred by the **Professional** directly attributable to the evaluation of any proposed substitute material or equipment and any proposed "or equal" material or equipment for materials and equipment *listed* in Schedule 1.6.

1.7.4. The Apparent Low Bidder shall insert the provisions of this Article 1 of Section 00440 Schedule of Materials and Equipment in all Sub agreements with Subcontractors and Suppliers furnishing any materials or equipment, altering the respective paragraphs only as appropriate to properly identify the contracting parties. Each such Sub agreement shall expressly bind the respective Subcontractor or Supplier to the conditions of paragraph 1.7.2, the other provisions of this Section 00440 Schedule of Materials And Equipment and paragraph 5.2 of Section 00700 General Conditions.

ARTICLE 2 BID MATERIALS AND EQUIPMENT – OPEN SPECIFICATIONS

2.1. For those Specifications *not listed* in Schedule 1.6, the Apparent Low Bidder, if and when awarded the Contract, shall disclose to the **Owner** and **Professional** (when submitting the Schedule of Values required by paragraph 12.1.1 of Section 00700 General Conditions) the Bidder's chosen manufacturers/Suppliers for the corresponding materials and equipment specified in the Specifications and Drawings (including all Addenda).

2.2. The Apparent Low Bidder has examined the requirements of paragraphs 7.2 and 7.3 of the Instructions to Bidders and commits to furnish materials and equipment meeting the requirements of the Specifications. If any such Bidder-selected material or equipment represents an "or equal" or a substitute material or equipment, no such material or equipment shall be used or furnished in the execution of the Work unless previously approved by the **Professional** as an acceptable "or equal" or substitute material or equipment. Application for any such acceptance will not be considered until after Contract Award. Any such application shall comply with the terms and conditions of this Article 2 and paragraph 5.2 of Section 00700 General Conditions.

2.3. The Apparent Low Bidder shall insert the provisions of this Section in all Sub agreements with Subcontractors and Suppliers furnishing the materials or equipment listed in Schedule 2.4, altering the respective paragraphs only as appropriate to properly identify the contracting parties. Each such Sub agreement shall expressly bind the respective Subcontractor or Supplier to the conditions of paragraph 2.2, the other provisions of this Section 00440 Schedule of Materials and Equipment and paragraph 5.2 of Section 00700 General Conditions.

2.4. Schedule of Bid Materials and Equipment

MATERIAL OR EQUIPMENT	SPECIFICATION SECTION	CONTRACTOR TO NAME ITS CHOSEN MANUFACTURERS AND SUPPLIERS
ITEM 2 – Solid Surface Sink+Counter	06 61 16	
ITEM 4 – Porcelain Tile	09 30 13	
ITEM 5 – Acoustic Tile Ceiling	09 51 23	
ITEM 6 – Resilient Flooring	09 65 19	
ITEM 7 – Tile Carpeting	09 68 13	
ITEM 11– LED Interior Lighting	26 51 19	

MATERIAL OR EQUIPMENT	SPECIFICATION SECTION	CONTRACTOR TO NAME ITS CHOSEN MANUFACTURERS AND SUPPLIERS
-----------------------	-----------------------	---

IMPORTANT: The provisions of this Section 00440 Schedule of Materials and Equipment shall not create or impose any express or implied duty or obligation on the **Owner** or **Professional** to exercise this authority for the benefit of the Apparent Low Bidder or any *listed* manufacturer/Supplier.

The undersigned Apparent Low Bidder _____ certifies that all the information and data furnished in this Section 00440 Schedule of Materials and Equipment are current, accurate and complete as of the date stated below.

Signed by: _____ Name _____ Title _____

on this _____ day of _____, 20_____.

END OF SECTION 00440

SECTION 00500 AGREEMENT

AGENCY No. 950 Funding Code. _____

FILE No. 511/21236.CAK CONTRACT ORDER No. Y _____

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* To be Completed With the Bidding Documents

** To Be Completed Upon Award of the Contract **

 **THIS AGREEMENT TO CONTRACT is made this _____ day
 of _____ in the year Two-Thousand And _____
 (_____) by and between THE STATE OF MICHIGAN, "Owner,"
 represented by the Director, Department of Technology,
 Management and Budget, duly authorized, and
 _____,
 the "Contractor," a corporation _____, partnership _____, individual
 _____, or joint venture _____ (between
 _____ and
 _____), of the
 State of _____, whose address is _____
 _____, represented by
 _____, its _____, duly authorized.

The Owner and Contractor, in consideration of the mutual
 covenants and obligations stated in this Section 00500 Agreement
 and the other parts of the Contract Documents, agree as follows:

ARTICLE 1 THE CONTRACT; THE PROJECT; THE WORK

1.1. THE CONTRACT – The Contract entered between
 the Owner and Contractor for the furnishing and performance
 of the Work by the Contractor, which consists of the Contract
 Documents listed or designated in paragraphs 2.2 through 2.4.

STATE OF MICHIGAN MODEL

Developed from FORMSPEC™ Michigan Model

©1986 – 2002 PMA Consultants LLC

1.2. PROJECT NAME – Cadillac Place 15th Floor –
 Build (3) Judicial Suites

1.3. THE WORK –
 THIS PROJECT INCLUDES THE DEMOLITION OF AN
 EXISTING OFFICE SPACE BUILT OUT IN 2013 AND
 CONSTRUCTION OF (3) NEW JUDGES SUITES. TWO SUITES
 WILL SHARE A WING OF THE BUILDING WHILE THE THIRD
 SUITE IS TO BE CONSTRUCTED IN THE SPLINE OF THE
 BUILDING. EACH JUDGES SUITE WILL INCLUDE OFFICE
 SPACE APPROXIMATELY 4 EMPLOYEES INCLUDING THE
 JUDGES.

ARTICLE 2 CONTRACT DOCUMENTS

2.1. The Contract Documents form the contract between the
 Owner and Contractor and represent the entire and final integrated
 agreement between the Owner and Contractor with respect to the
 Work. The Contract Documents are incorporated into this
 Agreement by this reference, and supersede all prior oral or written
 agreements, if any, between the Owner and Contractor. Any
 statement, representation, promise or inducement not set forth in the
 Contract Documents is null and void, and not binding on either the
 Owner or Contractor. The Contract Documents shall not in any
 way create a relationship of any kind between the Professional and
 Contractor, or between the Owner and a Subcontractor, or Supplier
 or any other third party. The Professional shall, however, be
 entitled to performance and enforcement of obligations under the
 Contract that are consistent with the Professional's authority and
 responsibilities under the Contract Documents.

2.2. The Contract Documents on the date when the Owner
 executes this Section 00500 Agreement, which are attached to this
 Section 00500 Agreement, consist of the following:

2.2.1. This Section 00500 Agreement, fully executed by the
 Owner and Contractor, including the following attachments:
 _____ and Addenda _____ through _____.

2.2.2. Section 00800 Supplementary Conditions, including
 _____; and
 Section 00120 Supplementary Instructions, including _____

2.2.3. Section 00020 Glossary, and Section 00700 General
 Conditions.

2.2.4. General Requirements, Division 1 of the
 Specifications.

2.2.5. Divisions 2 through _____ of the Specifications,
 and Drawings, bearing the title: _____,
 _____, dated _____.

2.2.6. **Section 00030 Advertisement; Section 00100 Instructions to Bidders**, including **Attachment A–Bidder's Check List**, and **Section 00210 Information for Bidders**.

2.2.7. **Section 00610 Performance Bond** and **Section 00620 Payment Bond**, fully executed by the **Contractor** and the sureties, each enclosing separate evidence of Power of Attorney.

2.2.8. The **Contractor's Section 00300 Bid Summary and Bid Form** (with attachments) and **Section 00320 Non-collusion Affidavit** (including any revisions delivered after Bid opening).

2.2.9. The following **Contractor's Qualification Submittals** (post-Bid opening): _____

2.3. Contract Documents that will be issued after the date the **Owner** executes this Section 00500 Agreement consist of:

2.3.1. **Change Orders** and **Change Authorizations** signed as provided in the Contract Documents.

2.3.2. **Notice of Award** and **Notice to Proceed**.

2.4. There are no Contract Documents other than those listed or designated in this Article or added through Section 00520 Attachment A to the Agreement. The Contract Documents may be modified, as provided in Section 00700 General Conditions.

ARTICLE 3 CONTRACT PRICE

3.1. The **Contractor** will furnish and perform the Work and accept in full payment the Contract Price of _____ Dollars (\$_____). The Contract Price includes only those Alternates accepted by the **Owner**, as itemized in the Notice of Award.

3.2. The Contract will include those Change Order prices (bid on Section 00300 Bid Form) accepted by the **Owner** when the **Owner** issues the Notice to Proceed or by Change Authorization.

3.3. Payments to the **Contractor** will be made based on the prices stated on the **Contractor's** Section 00300 Bid Form, subject to the terms and conditions of the Contract Documents.

ARTICLE 4 CONTRACT TIME; LIQUIDATED DAMAGES

4.1. The periods allowed for completion of the Work, or a designated part of the Work, will be as follows:

4.1.1. The entire Work will be substantially complete in accordance with the requirements of the Contract Documents: 180 CALENDAR DAYS

4.1.2. If separable parts of the Work shall be completed before the period allowed for Substantial Completion of the entire Work, the Contract Times for those parts of the Work will be as specified in Section 00520 Attachment A to Agreement, and as may be supplemented in the Specifications.

4.1.3. The entire Work will be complete and ready for final payment as specified in the Contract Documents: 210 CALENDAR DAYS

4.2. The **Owner** and **Contractor** recognize that the Contract Times are of the essence of the Contract and that the **Owner** will suffer costs and damages if the Work is not completed within the Contract Times, including any extensions in Contract Time authorized by Change Orders. Therefore, liquidated damages (in the amounts specified in paragraphs 4.2.3 through 4.2.5) will apply if the Work is not completed within the limits of the Contract Times. Liquidated damages are not a penalty, are cumulative and represent a reasonable estimate of the **Owner's** extra costs and damages, which are difficult to estimate with accuracy in advance.

4.2.1. Accordingly, if the **Contractor** fails, neglects, or refuses to complete all or any designated part of the Work within the specified Contract Time, the **Contractor** agrees to pay to the **Owner** liquidated damages and to allow, at the appropriate time, a corresponding adjustment in Contract Price.

4.2.2. If under the procedures of paragraph 4.3, the **Owner** is justified in withholding liquidated damages due to or in anticipation of late completion, the **Contractor** agrees to allow the **Owner** to deduct liquidated damages from Requests for Payment.

4.2.3. Liquidated damages for each Calendar Day that expires after the Contract Time specified in paragraph 4.1.1 for Substantial Completion of the entire Work – until the Work is substantially complete – shall be in the amount of Four Hundred Dollars and No/Cents (\$400.00)

4.2.4. Liquidated damages for each Calendar Day that expires after each of the Contract Times designated in Section 00520 Attachment A to the Agreement – until each such part of the Work is sufficiently complete – shall be in the amounts stated in Section 00520 Attachment A to the Agreement.

4.2.5. Liquidated damages for each Calendar Day after Substantial Completion of the entire Work that expires after the Contract Time specified in paragraph 4.1.3 for completion and readiness for final payment – until the entire Work is complete and ready for final payment – shall be in the amount of Four Hundred Dollars and No/Cents (\$400.00)

Assessment and/or Withholding of Liquidated Damages

4.3. If the **Contractor** fails to complete the Work, or a specified part of the Work, within the corresponding Contract Time, or if at any time after the Work is eighty percent (80%) in place, the **Contractor** does not prosecute the balance of the Work with the diligence required to comply with the Contract Times, the **Contractor** shall be requested to submit a schedule recovery plan acceptable to the **Owner**. The **Contractor's** schedule recovery plan shall describe the cause of schedule slippage or delayed progress and the actions proposed and taken to recover schedule. In addition, to the extent that the **Contractor** believes that an extension in Contract Time is justified, the recovery plan shall include a request for an appropriate extension in Contract Time.

4.3.1. Within fifteen (15) Calendar Days after the **Contractor** receives any such request, the **Contractor** shall meet with the **Owner** and present the **Contractor's** written schedule recovery plan. If, upon evaluation of the **Contractors'** schedule recovery plan, and after consultation with the **Professional**, the **Owner**, in its sole discretion, determines that there is sufficient cause to withhold liquidated damages, the **Owner** may deduct from Requests for

Payment the liquidated damages then due or that would become due using the **Owner's** estimate of late completion of the Work.

4.3.2. For the purposes of returning liquidated damages, schedule recovery implementation shall not be complete until such slippage or delayed progress has been corrected and the Progress Schedule once again supports compliance with the Contract Times. Once late completion has been corrected, the **Contractor** shall be entitled to reimbursement of all liquidated damage sums previously withheld. Any such reimbursement of liquidated damages previously withheld shall not constitute a waiver of any claims that the **Owner** may otherwise have.

ARTICLE 5 PAYMENTS TO CONTRACTOR

*5.1. The **Owner** will pay one hundred percent (100%) of the amount due upon completion of any Schedule of Value *pay item*. The **Professional** may require, for each Request for Payment, sworn statements, consent of surety, waivers of lien (from the **Contractor**, Subcontractors and Suppliers), Record Documents, guarantees, operating and maintenance manuals and such other documents required by the Contract Documents. Payment to the **Contractor** will be made within thirty (30) Calendar Days from receipt by the **Owner** of the **Professional's** certification representing to the **Owner** the amount of payment to be due to the **Contractor**.

*5.2. Processing of Requests for Payment by the **Owner** may be deferred until Work having a prior sequence, as provided in the Contract Documents, is in place and is approved.

5.3. Payments shall be subject to the terms and conditions of Section 00700 General Conditions and the other parts of the Contract Documents and shall be made less such deductions as the **Owner** and/or **Professional** determines are appropriate, as specified in paragraph 12.4 of Section 00700 General Conditions.

5.4. If any portion of the Work is funded by a federal or State agency, the **Owner** will have fifteen (15) Calendar Days after receiving those funds in which to make payment. This provision shall take effect only after the thirty (30) Calendar Day period following certification by the **Professional** has expired.

ARTICLE 6 THE PROFESSIONAL SERVICES CONTRACTOR

6.1. The **Owner** has retained ____ G.H. Forbes Associates Architects _____ to assume all duties and responsibilities of, and have the rights and authority assigned to, the **Professional Services Contractor** in the Contract Documents with respect to completion of the Work in accordance with the Contract Documents.

ARTICLE 7 CONTRACTOR'S REPRESENTATIONS

7.1. The **Contractor** reiterates and makes each of the representations itemized in Article 2 of the **Contractor's** Section 00300 Bid Form. Article 2 in the **Contractor's** Section 00300 Bid Form is by this reference repeated verbatim in this Section 00500 Agreement as paragraphs 7.2 through 7.13 just as though those paragraphs had been written in this Article 7, except that the term "**Contractor**" shall replace the term "Bidder" in every instance.

ARTICLE 8 MISCELLANEOUS

8.1. If any provision of the Contract Documents is invalid, illegal, or unenforceable, all other provisions of the Contract Documents shall remain in full force and effect. If any provision of the Contract Documents is inapplicable to any Person or circumstance, that provision shall remain applicable to all other Persons and circumstances.

8.2. It is the intent of the **Owner** and **Contractor** that all provisions of Law required to be inserted or referenced in the Contract Documents are in fact so inserted or referenced. If any provision of Law is not so inserted or referenced, or is inserted or referenced improperly, then each such provision shall be considered inserted or referenced in the Contract Documents in proper form at no increase in Contract Price and/or Contract Time.

8.3. The duties, obligations, criteria or procedure imposed by, and the rights and remedies made available in, the Contract Documents are in addition to, and not in any way a limitation of, any rights and remedies that are otherwise allowed or imposed by Law, except that in the event a specific part or detailed requirement of a provision, criterion or procedure in the Contract Documents and a specific part or detailed requirement of a provision, criterion or procedure imposed by Law conflict, the specific part or detailed requirement of such provision, criterion or procedure imposed by Law shall govern. All other specific parts or detailed requirements in the provisions, criteria or procedures imposed by Law and the Contract Documents shall remain in full force and effect and be read with the controlling specific part or detailed requirement. These provisions will be as effective as if repeated specifically in the Contract Documents in connection with each duty, obligation, right and remedy to which they apply.

8.4. The **Contractor** shall not sell, assign, transfer or otherwise convey any of the **Contractor's** rights and shall not delegate any of the **Contractor's** duties under this Agreement without the prior written consent of the **Owner** and the sureties for the **Contractor**. In its sole discretion, the **Owner** may refuse to consent to any proposed assignment or delegation. Any attempted sale, assignment, transfer, or other conveyance in violation of this paragraph shall be void and shall relieve the **Owner** of any further liability under the Contract Documents but shall not relieve the **Contractor's** sureties of any liability. If the **Owner** consents in writing to an assignment, unless specifically stated to the contrary in the consent, that assignment shall not release or discharge the **Contractor** from any duty or responsibility set forth in the Contract Documents and shall not release or discharge the **Contractor's** sureties under the Bonds required by the Contract Documents.

8.5. The **Owner** reserves the right to correct any error in any Request for Payment that may have been paid. The **Owner** reserves the right, should proof of Defective Work be discovered after final payment, to claim and recover from the **Contractor** and/or the **Contractor's** surety, sufficient sums to correct or remove and replace the Defective Work.

8.6. Any waiver by the **Owner** of any provision of the Contract Documents shall be specific and in writing and apply only to the specific matter and not to other similar or dissimilar matters. Any waiver of any breach of this Contract shall not be held to be a waiver of any other or subsequent breach.

8.7. Nothing contained in this Agreement shall in any manner authorize, empower, or constitute the **Contractor**, Subcontractors

or Suppliers (a) to act as agents of the **Owner**, (b) to assume or create any obligation or responsibility whatsoever, express, or implied, on behalf of or in the name of the **Owner**; (c) to bind the **Owner** in any manner, or (d) to make any representation, warranty, covenant, agreement, or commitment on behalf of the **Owner**. It is the intent and understanding of the parties that the **Contractor** shall perform the Work as an independent contractor. This Agreement does not create, and shall not be construed as creating, any rights enforceable by any third party.

8.8. If the **Owner** or **Contractor** suffers injury or damage to person or property because of error, omission, or act of the other, any of the other's employees or agents or others for whose acts the other party is legally liable, claim will be made in writing to the other party within a reasonable time of the first observation of that injury or damage. This provision is not and shall not be construed as a substitute for or a waiver of the provisions of any applicable statute of limitations or time requirements set forth in Section 00700 General Conditions.

8.9. All computer programs which are not the subject of copyrights by third parties, and which are delivered, developed, produced, or paid for under a specific requirement of the Contract Documents and all plans, drawings, designs, specifications, technical reports, operating manuals, and other data which are delivered, developed, produced, or paid for under the Contract Documents shall be the property of the **Owner**. The **Owner** maintains all rights to such programs and deliverables, including the right to use, duplicate, and disclose the programs and deliverables, in whole or in part, in any manner and for any purpose. If any program or deliverable is copyrightable, the **Contractor** may copyright it subject to the **Owner's** rights. The **Owner** reserves a royalty-free, nonexclusive, and irrevocable license to use, duplicate,

publish, and disclose such programs and deliverables, in whole or in part, and to authorize others to do so.

8.10. The **Contractor** warrants that all costs in proposals and claims for adjustments in Contract Price shall not exceed those allowed under the Contract Documents, and that proposals and claims for adjustments in Contract Price shall grant prices, terms, and warranties comparable to or better than prices, terms and warranties offered to others for similar work.

8.11. This Agreement shall be binding on the **Contractor**, **Owner** and their respective successors and legal representatives and, if the **Owner** has consented to an assignment or other conveyance, on all their respective assigns and delegates.

*8.12. The Contract Documents shall be governed by and construed in accordance with the Laws of the State of Michigan in effect on the date of Bid opening. Any change in Michigan Law after that date shall be binding only to the extent the **Owner** and **Contractor** agree or to the extent such change is beyond the capacity of the parties to avoid.

ARTICLE 9 NOTICE AND SERVICE

9.1. Unless otherwise provided in the Contract Documents or consented to by the **Owner** in writing, any notice, demand, or communication shall be in writing and shall be deemed to have been given when received by the individual required to be given notice at the address designated in this Agreement. A copy of any notice, demand or notification shall be sent to the address below.

9.2. Any written notice or other written communication to the sureties shall be sufficiently given if delivered to the individual required to be given notice at the address designated in the Bond.

IN WITNESS WHEREOF, the **Owner** and **Contractor** have signed this Section 00500 Agreement in triplicate and initialed three (3) full sets of the Contract Documents. One (1) full set of the executed Contract Documents will be delivered to the **Contractor**.

THE STATE OF MICHIGAN

BY:

Director, DTMB, SFA, Design and Construction
 NAME:

 Witness:

 Date:

 Address for giving notices:

Department of Technology, Management and Budget
 State Facilities Administration
 Design and Construction
 3111 W. St. Joseph Street
 Lansing, MI 48917

THE CONTRACTOR

BY:

Title: _____ Date _____

NAME:

Federal ID No. or SS No. (LAST 4 Only) _____

Telephone No.

Witness:

Date:

Address for giving notices

CERTIFICATE OF PRINCIPAL

(If **Contractor** is Other Than a Sole Proprietor)

I, _____, certify that I am the Secretary of the Corporation _____, or a General Partner _____ or Managing Partner _____ or Partner _____ of the partnership, named as the **Contractor** in the attached Section 00500 Agreement, that _____ who signed Section 00500 Agreement on behalf of the **Contractor**, was then _____ of that corporation _____ or partnership _____; that I know the undersigned's signature, and the signature is genuine; and that Section 00500 Agreement was duly signed, sealed and attested for and on behalf of that corporation _____ partnership _____ by authority of its governing body _____ or partners _____

Signed by the Secretary or Other Authorized Officer of the Corporation _____ Date _____
or By General Partner or Managing Partner or Authorized Partner Certifying

Name of the Corporation or True Name of the Partnership

Telephone No. _____

(Corporate Seal)

VERIFICATION
(by **Contractor**)

STATE OF _____)

COUNTY OF _____)

Before me, a Notary Public duly commissioned, qualified and acting, personally appeared (enter name of person who signed Section 00500 Agreement on behalf of the Bidder), _____ to me well known, who being by me first duly sworn upon oath, says that he/she is the Attorney-In-Fact for (enter the **Contractor's** name) _____ and that he/she has been authorized by (enter name of individual, partnership name, or that governing body of the Bidder named in the attached corporate resolution) _____ to execute Section 00500 Agreement on behalf of the named **Contractor** in favor of the STATE OF MICHIGAN.

Subscribed and sworn before me this _____ day of _____, A.D., 20_____.

Notary Public, State of _____

My Commission Expires: _____

RESOLUTION OF CORPORATE AUTHORITY
(If Contractor is a Corporation)

I, _____, Corporate Officer of _____, a _____
(Print or type) Corporation (the "Company") (Indicate State)

DO HEREBY CERTIFY that the following is a true and correct excerpt from the minutes of the meeting of the Board of Directors, wherein a quorum was present, duly called and held on _____ and that the same is now in full force and effect:

"RESOLVED, that the Chairman, the President, each Vice President, the Treasurer, and the Secretary and each of them, hereby is authorized to execute and deliver, in the name and on behalf of the Company and under its corporate seal or otherwise, any agreement or other instrument or document in connection with any matter or transaction that shall have been duly approved; the execution and delivery of any agreement, document, or other instrument, or document in connection with any matter or transaction that shall have been duly approved; the execution and delivery of any agreement, document, or other instrument by any of such officers to be conclusive evidence of such approval."

I FURTHER CERTIFY that _____ is Chairman of the Board, _____ is President, _____ is Treasurer, and _____ is Secretary.

I FURTHER CERTIFY that any of the officers of the Company named in this Resolution of Corporate Authority are authorized to execute or guarantee and commit the Company to the conditions, obligations, stipulations, and undertakings contained in the Contract Documents for Agency No. _____, Funding Code. _____, File No. _____ Work _____, _____ and that all necessary corporate approvals have been obtained in relationship thereto.

IN WITNESS THEREOF, I have set my hand this _____ day of _____, 20____.

CORPORATE SEAL

Corporate Officer's Signature

Title

Telephone No. _____

CERTIFICATE OF PARTNERSHIP AUTHORITY
(If **Contractor** is a Partnership)

I, _____, General Partner in _____, a _____
(Print or Type) Partnership (the "Partnership") (Indicate State)

DO HEREBY CERTIFY that I am a General Partner in the Partnership formulated pursuant to a Partnership Agreement dated _____, 20____, and that the following is a true and correct excerpt from the minutes of the meeting of the General Partnership held on _____ and that the same is now in full force and effect:

"That each General Partner is authorized to execute and deliver, in the name and on behalf of the Partnership, any agreement or other instrument or document in connection with any matter or transaction that shall have been duly approved; the execution and delivery of any agreement, document, or other instrument, or document in connection with any matter or transaction that shall have been duly approved; the execution and delivery of any agreement, document, or other instrument by a General Partner to be conclusive evidence of such approval."

I FURTHER CERTIFY that any of the aforementioned General Partners of the Partnership are authorized to execute or guarantee and commit the assets of the Partnership to the conditions, obligations, stipulations, and undertakings contained in the Contract Documents for Agency No. _____, Funding Code. _____, File No. _____ Work _____, _____ and that all necessary partnership approvals have been obtained in relationship thereto.

IN WITNESS THEREOF, I have set my hand this ____ day of _____, 20 ____.

General Partner's Signature

Title

Telephone No. _____

END OF SECTION 00500

SECTION 00520 ATTACHMENT "A" TO AGREEMENT

PROFESSIONAL – G.H. Forbes Associates Architects
WORK – Cadillac Place 15th Floor – Build (3) Judicial Suites

AGENCY No. – 950 FUNDING CODE: _____

FILE No. 950/22357.MNB CONTRACT ORDER No. _____

This Section 00520 Attachment A to Agreement supplements those specific provisions in Section 00500 Agreement designated below. All other provisions in Section 00500 Agreement that are not so supplemented remain in full force and effect. The terms "Agreement", "Contract Documents" and "Contract" have specific intents and meanings assigned as stated in Section 00500 Agreement and Section 00020 Glossary.

**SUPPLEMENTARY TERMS AND CONDITIONS TO
 ARTICLE 4 CONTRACT TIME; LIQUIDATED DAMAGES**

The following separable parts of the Work will be completed, as specified in the Contract Documents:

- (a) within _____ (___) Days from the date when the Contract Time commences to run, or on or before _____, 20____.
- (b) within _____ (___) Days from the date when the Contract Time commences to run, or on or before _____, 20____.
- (c) within _____ (___) Days from the date when the Contract Time commences to run, or on or before _____, 20____.

These interim Contract Times are of the essence so as to: (a) not Delay work by others as provided in Article 13 of the General Conditions; (b) conform to the sequences of Work indicated in or required by the Contract documents; and (c) comply with the coordination requirements of the Contract Documents.

The **Owner** and **Contractor** recognize that the Contract Time(s) specified in this Attachment A is(are) of the essence to this Agreement in that the **Owner** will suffer costs and damages if the Work is not completed within the Contract Time(s) plus any extensions authorized in accordance with Section 00700 General Conditions. Accordingly, liquidated damages will apply based on the following schedule: (a) _____ Dollars and No/Cents (\$ _____); (b) _____ Dollars and No/Cents (\$ _____); and (c) _____ Dollars and No/Cents (\$ _____) for each Calendar Day that expires after each of the respective Contract Times specified in this Section 00520 Attachment A to the Agreement for the completion of each of those designated parts of the Work, respectively, until each of those parts of the Work is complete. Any deduction by the **Owner** of liquidated damages from Requests for Payment shall be undertaken only after consultation with the **Professional** and shall be subject to the procedures outlined in paragraph 4.3, Section 00500 Agreement.

END OF SECTION 00520

SECTION 00610 PERFORMANCE BOND

AGENCY No. 511 Funding Code: _____

FILE No. 511/21326.CAK SURETY COMPANY REFERENCE No. _____

KNOW ALL PERSONS BY THESE PRESENTS: That "the Contractor," _____, a corporation ____, individual ____, partnership ____, joint venture ____ of the State of _____, qualified to do business in the State of Michigan, as Principal, and "the Surety," _____, of the State of _____, as surety, are hereby held and firmly bound unto the State of Michigan, "the Owner," as Obligee, in the amount of _____ Dollars (\$ _____), for the payment of which the Contractor and Surety hereby bind themselves, their respective heirs, successors, legal representatives and assigns, jointly and severally, firmly by these presents in compliance with 1963 PA 213, as amended, MCL 129.201 et seq.

WHEREAS, the Contractor has entered into "the Contract" with the Owner for _____, "the Work," covered by the Contract Documents, which are incorporated into this Performance Bond by this reference.

NOW, THEREFORE, THE CONDITION OF THIS OBLIGATION IS THAT, if the Contractor faithfully performs and fulfills all the undertakings, covenants, terms, conditions, warranties, indemnifications and agreements of the Contract Documents within the Contract Time (including any authorized changes, with or without notice to the Surety) and during the Correction Period, and if the Contractor also performs and fulfills all the undertakings, covenants, terms, conditions, warranties, indemnifications and agreements of any and all duly authorized modifications of the Contract Documents, then THIS OBLIGATION SHALL BE NULL AND VOID, OTHERWISE TO REMAIN IN FULL FORCE AND EFFECT.

A. No change in Contract Price or Contract Time, "or equal" or substitution or modification of the Contract Documents (including addition, deletion, or other revision) shall release the Surety of its obligations under this Section 00610 Performance Bond. The Surety hereby expressly waives notice of any such change in Contract Price or Contract Time, "or equal" or substitution or

modification of the Contract Documents (including addition, deletion, or other revision).

B. This Section 00610 Performance Bond shall be solely for the protection of the Owner and its successors, legal representatives or assigns. The prevailing party in a suit on this Bond is entitled to recover as part of that party's judgment reasonable attorneys' fees.

C. It is the intention of the Contractor and Surety that they shall be bound by all terms and conditions of the Contract Documents (including, but not limited to Article 14 of Section 00700 General Conditions and this Section 00610 Performance Bond). However, this Section 00610 Performance Bond is executed pursuant to 1963 PA 213, as amended, MCL 129.201 et seq., and if any provision(s) of this Section 00610 Performance Bond is/are illegal, invalid, or unenforceable, all other provisions of this Section 00610 Performance Bond shall nevertheless remain in full force and effect, and the Owner shall be protected to the full extent provided by 1963 PA 213, as amended, MCL 129.201 et seq.

IMPORTANT: The Surety shall be authorized to do business in the State of Michigan by the Department of Consumer and Industry Services – Insurance Bureau, shall be listed on the current U.S. Department of the Treasury Circular 570, and, unless otherwise authorized by the Owner in writing, shall have at least an A– Best's rating and a Class VII or better financial size category per current A. M. Best Company ratings.

Name, Address and Telephone of the Surety:

Address and Telephone of Agent, who is either a resident of, or whose principal office is maintained in, the State of Michigan

Signed and sealed this _____ day of _____, 20_____.

THE CONTRACTOR: (Print Full Name and Sign) _____
WITNESS _____

By: _____
Name & Title: _____

THE SURETY: (Print Full Name and Sign) _____

Telephone No. _____
Agent: _____

WITNESS _____

Attorney-in-Fact: _____
Telephone No. _____

END OF SECTION 00610

SECTION 00620 PAYMENT BOND

AGENCY No. 511 Funding Code: _____

FILE No. 511/21326.CAK SURETY COMPANY REFERENCE No. _____

KNOW ALL PERSONS BY THESE PRESENTS: That "the Contractor," _____, a corporation ____, individual ____, partnership ____, joint venture ____, of the State of _____, qualified to do business in the State of Michigan, as Principal, and "the Surety," _____, of the State of _____, as surety, are hereby held and firmly bound unto the State of Michigan, "the Owner," as Obligee, in the amount of _____ Dollars (\$ _____), for the payment of which the Contractor and Surety hereby bind themselves, their respective heirs, successors, legal representatives and assigns, jointly and severally, firmly by these presents in compliance with 1963 PA 213, as amended, MCL 129.201 et seq.

WHEREAS, the Contractor has entered into "the Contract" with the Owner for _____, "the Work," covered by the Contract Documents, which are incorporated into this Payment Bond by this reference.

NOW, THEREFORE, THE CONDITION OF THIS OBLIGATION IS THAT, if the Contractor promptly pays all claimants supplying labor or materials to the Contractor or to the Contractor's Subcontractors in the prosecution of the Work, then THIS OBLIGATION SHALL BE NULL AND VOID, OTHERWISE TO REMAIN IN FULL FORCE AND EFFECT.

obligations under this Section 00620 Payment Bond. The Surety hereby expressly waives notice of any such change in Contract Price or Contract Time, "or equal" or substitution or modification of the Contract Documents (including addition, deletion, or other revision).

A. All rights and remedies on this Section 00620 Payment Bond shall be solely for the protection of all claimants supplying labor and materials to the Contractor or the Contractor's Subcontractors in the prosecution of the Work and shall be determined in accordance with Michigan Law.

C. It is the intention of the Contractor and Surety that they shall be bound by all terms and conditions of the Contract Documents (including, but not limited to this Section 00620 Payment Bond). However, this Section 00620 Payment Bond is executed pursuant to 1963 PA 213, as amended, MCL 129.201 et seq., and if any provision(s) of this Section 00620 Payment Bond is/are illegal, invalid, or unenforceable, all other provisions of this Section 00620 Payment Bond shall nevertheless remain in full force and effect, and the Owner shall be protected to the full extent provided by 1963 PA 213, as amended, MCL 129.201 et seq.

B. No change in Contract Price or Contract Time, "or equal" or substitution or modification of the Contract Documents (including addition, deletion, or other revision) shall release the Surety of its

IMPORTANT: The Surety shall be authorized to do business in the State of Michigan by the Department of Consumer and Industry Services – Insurance Bureau, shall be listed on the current U.S. Department of the Treasury Circular 570, and, unless otherwise authorized by the Owner in writing, shall have at least an A– Best's rating and a Class VII or better financial size category per current A. M. Best Company ratings.

Name, Address and Telephone of the Surety:

Address and Telephone of Agent, who is either a resident of, or whose principal office is maintained in, the State of Michigan

Signed and sealed this _____ day of _____, 20_____.

THE CONTRACTOR: (Print Full Name and Sign) _____
WITNESS _____

By: _____
Name & Title: _____

THE SURETY: (Print Full Name and Sign)

Telephone No. _____
Agent: _____

WITNESS _____

Attorney-in-Fact: _____
Telephone No. _____

END OF SECTION 00620

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STATE OF MICHIGAN MODEL

Developed from FORMSPEC™ Michigan Model

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ARTICLE 1 INTERPRETATIONS

1.1 Section 00020 Glossary:

1.1.1. Section 00020 Glossary assigns specific intent and meanings to capitalized terms and to other defined terms used in this Section 00700 General Conditions, Section 00500 Agreement, Section 00520 Attachment A to the Agreement, Section 00610 Performance Bond, Section 00620 Payment Bond, and Section 00800 Supplementary Conditions.

1.1.2. Section 00020 Glossary also provides specific rules for construing any reference to any Article or paragraph that is made in this Section 00700 General Conditions.

1.2 Intent of the Contract Documents:

1.2.1. The intent of the Contract Documents is to describe the *entire* Work, including its various parts, to the extent necessary for the **Contractor** to discharge its obligation to execute and complete the Work in accordance with the Contract Documents. The Contract Documents are complementary; what is required by one shall be as binding as if required by all Contract Documents.

1.2.2. The *entire* Work required by the Contract Documents includes Work, which is reasonably inferable from the Contract Documents or from prevailing custom and trade usage. The **Contractor** shall provide any Work reasonably inferable to the extent such Work is required to properly complete the installation of other Work expressly shown or specified in the Contract Documents. If the **Contractor** disagrees that Work that is not expressly shown or detailed in the Contract Documents is Work reasonably inferable, the **Contractor** shall proceed in accordance with the provisions of paragraph 10.1.3.

1.2.3. The breakdown of the Work by Divisions and Sections, or the identification of any Drawing, shall not delineate or be construed to delineate Work to be performed by any trade. The breakdown shall not control the manner in which the Work may be divided by the **Contractor** among Subcontractors and Suppliers.

*1.2.4. Reference to the State Construction Code Act of 1972, 1972 PA 230, as amended, MCL 125.1501 *et seq.*, or to standard specifications, manuals or codes of any technical society, organization, or association, whether specifically or by implication, means the issue in effect on the date of Bid opening, unless otherwise expressly stated. Work indicated in or required by the Contract Documents that is above standards set in the State Construction Code shall be provided to the higher standard.

1.2.5. The provisions of the Contract Documents shall govern over any standard specification, manual or code of any technical society, organization, or association. Unless otherwise provided in the Contract Documents, words with an accepted technical or trade meaning used to describe any Work shall be interpreted in accordance with that meaning.

1.2.6. If any Work indicated in, or required by, the Contract Documents is above the standards set by any Law applicable to the Work and the Project, the higher standard shall govern.

1.2.7. The terms "the Contract Documents," "as specified in the Contract Documents," "in accordance with the Contract Documents" or such other similar terms shall be construed as including all valid Change Orders and Change Authorizations.

1.2.8. "Execution of the Work" and "shall provide" includes the furnishing and/or performance of the Work. "*Work*" as in "Unit Price Work," or "any Work" or "acceptable Work," etc. refers to a specific part(s) of the Work.

1.2.9. Subject to the **Contractor's** continuing responsibilities for the acts of Subcontractors and Suppliers, whenever in the Contract Documents the term "the **Contractor**" is used concerning any action, obligation, cost, or event, it shall cover, even if not expressly stated, actions or obligations or costs of, or events involving, any Subcontractor, Supplier, or anyone for whom any of them may be liable, unless the context requires otherwise.

1.2.10. Use of the terms "as ordered," "as directed," "as required," "as allowed," "as approved" or similar terms, or the adjectives "reasonable," "suitable," "acceptable," "proper" or "satisfactory" or similar adjectives, to describe a requirement, direction, review, or judgment of the **Professional** or **Owner** as to the Work will be solely to evaluate the Work for compliance with the Contract Documents. No use of any such term or adjective, or provision of any standard specification, manual or code (whether expressly incorporated by reference in the Contract Documents or not), or Suppliers' instructions, shall be effective to (a) change the duties and responsibilities of the **Owner** or **Professional** from those assigned in the Contract Documents, (b) assign to the **Owner** or **Professional** any duty or authority to supervise or direct the furnishing or performance of the Work or assume responsibility contrary to the provisions of the Contract Documents.

1.2.11. A provision stating "the **Contractor** shall bear its proportionate share of the Delay and costs" shall be construed as entitling the **Owner** to an appropriate decrease in Contract Price and Contract Time for all the **Owner's** direct, indirect, and consequential costs and damages that are attributable to the **Contractor**.

1.2.12. Contract Time computations shall be made in Calendar Days. The Progress Schedule shall be in the form of a Critical Path Method schedule. Total Float and Contract Float values stated in Business Days shall be converted to Calendar Days when used for the purpose of calculating changes in Contract Time.

1.2.13. Any computation of a Contract Time which adds Calendar Days to a date shall include both the first and last Day. Any computation of a notice period shall exclude the first Day and include the last Day. In any case, if the computed Day falls on a non-Business Day, it shall be omitted from the computation.

1.2.14. In the Contract Documents, the terms "substantially completed" and "substantially complete" have in context the same meaning as Substantial Completion.

1.3 Priority of the Contract Documents:

1.3.1. Whenever an issue of priority involves two Sections within the Contract Documents, the following will apply: Unless the **Owner** and **Contractor** mutually agree otherwise, a Section of the Contract Documents will *supersede* another *conflicting* Section if the *superseding* Section is listed in paragraph 2.2 of Section 00500 Agreement ahead of the *conflicting* Section.

1.3.2. Whenever an issue of priority involves Work called for in the technical Specifications or Drawings – figured dimensions shall govern scaled dimensions, detail Drawings shall govern general Drawings and Drawings shall govern Submittals. Whenever specifications, dimensions, notes, schedules, or details conflict (whether within the Specifications or Drawings, or between the Specifications and Drawings, or between Change Order Drawings and the Drawings), the **Contractor** shall be required to provide the higher performance requirement only to the extent such outcome results in Work reasonably inferable.

1.4 Interpretation of Indemnification Provisions:

1.4.1. Paragraphs 1.4.2 and 1.4.3 will be as effective as if repeated in paragraphs 4.5.2, 4.6.1, 4.9.1, 10.4.4, 13.3.1 and in any other paragraph requiring the **Contractor** to defend, indemnify and hold harmless the **Owner** and **Professional**.

1.4.2. Any indemnification provision requiring the **Contractor** to defend, indemnify and hold harmless the **Owner** and **Professional** against all claims, or covering liability of the **Owner** or **Professional**, shall include claims caused in part by the negligence or other liability-creating conduct or omission of the **Contractor**.

1.4.3. The terms "against all claims" in any such obligation shall be construed as covering all claims, of whatever type and nature, and all judgments, costs, losses, and damages, whether direct, indirect, or consequential (including, but not limited to, charges of architects, engineers, attorneys and others and all court, hearing, and any other dispute resolution costs).

1.5 Additional Interpretations:

1.5.1. The term "the **Professional**" shall be construed as covering, even if not expressly stated, the **Professional's** consultants, agents, and employees. This interpretation shall not be construed as relieving the **Professional** of its sole responsibility for the performance of the **Professional's** obligations and responsibilities, whether performed by the **Professional** directly or through any consultant, agent, or employee.

1.5.2. The expression "any act or omission within the control of" shall include, but is not limited to, the fault or negligence of the party involved and any other act, cause, and event for which that party is responsible. The expression "any cause beyond the control of" shall include any act or omission not within the reasonable control of the party involved and any other act, cause, and event for which that party is not responsible.

1.5.3. Whenever in the Contract Documents, the term "first tier" is used concerning a Subcontractor or Supplier, it means a Subcontractor or Supplier having a direct Sub agreement with the **Contractor**. Relatedly, the term "lower tier" refers to a Subcontractor or Supplier having a direct Sub agreement with another Subcontractor.

1.5.4. The expression "materials and/or equipment" shall not be construed to equate materials with equipment, but rather shall be interpreted as a general reference to materials or equipment, whichever actually applies. The term "stored materials" shall include materials and equipment. Where a differentiation between materials or equipment is necessary, such as for payments for approved equipment Shop Drawings, use of the term "equipment" shall exclude materials. In any such case, examples of equipment shall be conveying equipment, tanks, pumps, vessels, fans, boilers, air handling units, heat exchangers, compressors, incineration equipment, motor control centers, switchgears, transformers, control panels and so forth; and such components as pipe fittings and specialties, valves, ductwork, plumbing fixtures, cable tray, conduit and cable, electrical fixtures, panel boards and so forth shall be materials and not equipment.

1.5.5. The term "registered mail" includes registered U.S. mail and certified U.S. mail with return receipt requested. The term "hand delivered" includes delivery by private carriers.

1.5.6. The term "self-performed Work" means Work performed by the **Contractor**, as opposed to Work performed by a Subcontractor, which is referred to as "Subcontractor Work."

1.5.7. An "early completion" Progress Schedule is a **Contractor**-prepared Revision Progress Schedule Submittal that anticipates completion of the entire Work, or of any portion of the Work having a separate, specified Contract Time, ahead of the correspondingly specified Contract Time.

1.6 Ownership and Use of the Contract Documents:

1.6.1. Neither the **Contractor** nor any Subcontractor or Supplier shall have or acquire title to or ownership rights in any of the Drawings, Specifications or documents identified in Section 00210 Information for Bidders, and they shall not reuse any of them on extensions of the Project or any other project without prior written consent of the **Owner** and **Professional**.

1.6.2. The **Contractor**, Subcontractors and Suppliers are granted a limited license to use and reproduce parts of the Contract Documents and those documents identified in Section 00210 Information for Bidders as appropriate for their use in the furnishing and performance of their Work. All copies of the Drawings and Project Manual and other documents made under this license shall retain all copyright and trademark notices, if any.

1.7 Copies of the Contract Documents:

1.7.1. The **Owner** will furnish, at no cost to the **Contractor**, one (1) electronic copy of the Drawings and Project Manual. If the **Contractor**, or the Contractor's Subcontractors or Suppliers request hard copy sets, reproduction of these documents will be the responsibility of the **Contractor**.

ARTICLE 2 THE OWNER – GENERAL PROVISIONS

2.1 Availability of Lands, Areas, Properties and Facilities:

2.1.1. The Contract Documents indicate the lands, areas, properties, and facilities upon which the Work is to be performed and those rights-of-way and easements for access to the site furnished by the **Owner**. Easements for permanent structures or for permanent changes in any existing lands, areas, properties, and facilities will be obtained by the **Owner**, unless otherwise expressly stated elsewhere in the Contract Documents.

2.1.2. The **Contractor** shall obtain, at no increase in Contract Price or Contract Time, any other lands, areas, properties, facilities, rights-of-way, and easements the **Contractor** requires for temporary facilities, storage, disposal of spoil or waste material or any other such purpose. If public property, the **Contractor** shall obtain all required permits from the federal agency, State agency, Political Subdivision or Public Utility with jurisdiction. If private property, the **Contractor** shall obtain prior permission by written agreement. The **Contractor** shall submit copies of the permits and written agreements to the **Owner**.

2.2 Reference Points; Base Lines and Benchmarks:

2.2.1. Unless noted otherwise, the **Owner** or **Professional** will provide engineering surveys to establish reference points for

construction that the **Professional** considers necessary for the **Contractor** to proceed with the Work. The **Contractor** shall be responsible for surveying and laying out the Work from those reference points. The **Contractor** shall be responsible for protecting and preserving those reference points as well as any base lines and benchmarks provided for the Work.

2.2.2. The **Contractor** shall make no changes on any reference points, base lines, and benchmarks without the **Professional's** prior written approval. The **Contractor** shall report to the **Professional** whenever any reference point, base line or benchmark is lost, destroyed, or requires relocation. The **Contractor** shall replace and relocate any lost or destroyed reference points accurately, with professionally, licensed personnel, if so, directed by the **Professional**.

2.2.3. The **Contractor** shall bear its proportionate share of the Delay and costs resulting from any loss, destruction, replacement and/or relocation of reference points, base lines and/or benchmarks, to the extent any such loss, destruction, replacement and/or relocation results in whole or in part from any act or omission within the control of the **Contractor**.

2.3 Stop Work Order:

2.3.1. The **Owner** may order the **Contractor** in writing to stop the Work, in the whole or in part, in the event any of these situations occur: (a) any Work is Defective, (b) any Work, when completed, will not conform to the Contract Documents, (c) any materials or equipment are unsuitable, or (d) any workers are insufficiently skilled. The **Contractor** shall bear its proportionate share of the Delay and costs resulting from any such stop Work order unless the **Contractor** is/was not at fault.

2.3.2. If the **Contractor** is/was not at fault, the **Owner** will amend the Contract Documents to provide for any adjustments in Contract Price and/or Contract Time made necessary by any resulting Delay which is unreasonable under the circumstances. This authority to stop the Work or any Work shall not create or impose any duty or responsibility on the **Owner** to exercise such authority for the benefit of the **Contractor** or of any Subcontractor, Supplier, surety to any of them or any other third party.

2.4 Limitations on the Owner's Responsibilities:

2.4.1. The **Owner** is not responsible for the **Contractor's** Means and Methods, safety precautions and programs related to safety, or the **Contractor's** failure to execute the Work in accordance with the Contract Documents. Nor is the **Owner** responsible for any act or omission of the **Contractor** or of any Subcontractor, any Supplier or anyone for whose acts the **Contractor** or any Subcontractor or Supplier may be liable.

2.4.2. The **Owner** is not responsible for verifying whether the **Contractor's** Progress Schedule Submittals, any certificates and/or policies of insurance or any technical Submittals are in accordance with the Contract Documents, or for verifying their accuracy or completeness in any way.

2.4.3. Neither the **Owner's** authority to review any of those Submittals, nor the **Owner's** decision to raise or not raise any objections about any such Submittals, shall create or impose any duty or responsibility on the **Owner** to exercise any such authority or decision for the benefit of the **Contractor**, any Subcontractor or Supplier, any surety to any of them or any other third party.

2.5 Additional General Provisions:

2.5.1. Written communications from the **Owner** to the **Contractor** will generally be issued through the **Professional**. If there is need to issue communications directly, a copy will be sent concurrently to the **Professional**. Written communications from the **Contractor** to the **Owner** may be issued directly to the **Owner** or through the **Professional** if such is more appropriate. Any such communication shall also include concurrent copy of both parties.

2.5.2. The **State Facilities Administration** Representative shall be the representative for the **Owner**. The **State Facilities Administration** Representative may be represented on-site by a Field Representative(s). Neither the **State Facilities Administration** Representative nor the Field Representative shall have authority to interpret the requirements of the Contract Documents. Unless delegated by specific written notice from the **Owner**, the Field Representative does not have any authority to order any changes in the Work or authorize any adjustments in Contract Price or Contract Time.

2.6 Partnering Charter:

2.6.1. If the Contract Documents indicate the **Owner's** intent to implement a bilateral partnering charter, unless the **Contractor** declines in writing, the **Contractor** shall cooperate with the **Owner** in implementing such a partnering charter for the Contract. Unless the possibility is expressly allowed for in the Contract Documents, no provision, requirement, or other aspect of the Contract Documents shall be open for change, revision, or modification in any such partnering charter.

ARTICLE 3 THE PROFESSIONAL – GENERAL PROVISIONS

3.1 Owner's Representative:

3.1.1. The **Professional** shall be the **Owner's** representative during the Contract Time period. The **Professional's** duties, responsibilities and limits of authority set forth in the Contract Documents shall not be changed without the prior written consent of both the **Owner** and **Professional**.

3.1.2. The **Professional** will make On-Site Inspections at intervals appropriate to the stages of the Work to observe the quality and quantity of progress and completed Work; to determine actual quantities of Unit Price Work completed by the **Contractor** and to determine whether the Work is being executed so that the Work, when completed, will be in accordance with the Contract Documents. Based on the On-site Inspections, the **Professional** will endeavor to guard the **Owner** from Defective Work and to keep the **Owner** informed of the progress of the Work.

3.1.3. If the **Professional** assigns Resident Project Representatives, their duties, responsibilities, and limits of authority will be given in the Contract Documents or at the pre-construction conference. Unless delegated by specific written notice from the **Owner**, the Resident Project Representative does not have any authority to order any changes in the Work or authorize any adjustments in Contract Price or Contract Time.

3.1.4. The **Professional** will have authority to disapprove or reject Work that the **Professional** believes to be Defective, and to require inspection or testing of any Work, whether or not such Work

is fabricated, installed, or completed. The **Contractor** shall take prompt corrective action upon receiving any Defective Work notice from the **Professional**.

3.1.5. On-Site Inspections by the **Professional** and/or Resident Project Representatives shall not create or impose any duty on the **Professional** or Resident Project Representatives to make the On-Site Inspections for the benefit of the **Contractor** or any other third party. On-Site Inspections will not relieve the **Contractor** from its obligation to provide the Work in accordance with the Contract Documents or represent acceptance of Defective Work.

3.1.6. Inspections by the Field Representative(s) shall not create or impose any duty on such Field Representative to make the observations for the benefit of the **Contractor** or any other third party. Any such inspection will not relieve the **Contractor** from its obligation to provide the Work in accordance with the Contract Documents or represent acceptance of Defective Work.

3.2 Clarifications and Interpretations:

3.2.1. The **Professional** will issue with reasonable promptness written clarifications or interpretations as the **Professional** may determine necessary or in response to a **Contractor** written request for interpretation. If the **Contractor** believes that a written clarification or interpretation issued by the **Professional** justifies an adjustment in Contract Price or Contract Time, the **Contractor** shall promptly notify the **Professional** in writing before proceeding with the Work Involved.

3.2.2. In any such case, if the **Contractor** is properly authorized in writing to proceed with the Work Involved before full agreement is reached on the extent of any such adjustments (if any are determined to be due at all), the **Contractor** shall furnish to the **Professional**, upon request from the **Professional**, those actual cost Records specified in paragraphs 11.4 and 11.5.

3.3 Minor Variations and No-Cost Changes; Minor Delays:

3.3.1. The **Professional** may authorize minor variations in the Work, order no-cost changes consistent with the Contract Documents or cause minor Delay if, in the **Professional's** judgment, such variation, no-cost change or Delay does not justify any adjustment in Contract Price or Contract Time. Minor variations will be ordered in writing; no-cost changes will be authorized by Change Authorization. If the **Contractor** believes any minor variation or no-cost change justifies an increase in Contract Price or Contract Time, the **Contractor** shall promptly notify the **Professional** in writing before proceeding with the Work Involved and follow the procedures in paragraph 3.2. Notice requirements for minor Delays are provided in paragraph 8.7.4.

3.4 Determinations by the Professional:

3.4.1. The **Professional** will be the interpreter of the requirements of the Contract Documents and, in such capacity, will render determinations on the acceptability of the Work. Notices, proposals, claims, or other matters relating to the acceptability of the Work, the interpretation of the requirements of the Contract Documents or any adjustment in Contract Price or Contract Time shall be referred to the **Professional** in writing requesting a formal, written determination, which the **Professional** will render within a reasonable time. If the **Contractor** disagrees with any such

Professional determination, the **Contractor** may deliver notice of a claim and a claim submittal within thirty (30) Calendar Days in accordance with the procedures and within the deadlines set forth in Article 15 Disputes.

3.4.2. The rendering of any interpretation or of any determination on any notice, proposal, claim, or other matter relating to the acceptability of the Work or to any adjustment in Contract Price or Contract Time will be a prerequisite to the exercise by the **Contractor** of any rights or remedies the **Contractor** may otherwise have under the Contract Documents or by Law concerning any such issue.

3.5 Limitations on the Professional's Responsibilities:

3.5.1. The **Professional's** authority to act under this Article 3 or elsewhere in the Contract Documents, or any decision made by the **Professional** in good faith to exercise or not to exercise such authority, shall not give rise to any duty or responsibility of the **Professional** to the **Contractor**, to any Subcontractor or any Supplier, to any surety or to any third party.

3.5.2. The **Professional** is not responsible for the **Contractor's** Means and Methods, safety precautions and programs related to safety, or for the **Contractor's** failure to execute the Work in accordance with the Contract Documents. Furthermore, the **Professional** is not responsible for any act or omission of the **Contractor** or of any Subcontractor, Supplier, or anyone for whose acts the **Contractor** or any Subcontractor or Supplier may be liable.

ARTICLE 4 CONTROL OF WORK – GENERAL PROVISIONS

4.1 Review of the Contract Documents:

4.1.1. Before undertaking each part of the Work, the **Contractor** shall study and compare the Contract Documents with each other and against manufacturers' recommendations for installation and handling. Before undertaking each part of the Work, the **Contractor** shall verify dimensions and take field measurements, and the **Contractor** shall coordinate the location, dimensions, access, fit, completeness, etc. of dependent Work. The **Contractor** shall promptly notify the **Professional** in writing of any conflict, error or omission in the Contract Documents and deviation from manufacturers' recommendations for installation and handling discovered.

4.1.2. The **Contractor** shall bear its proportionate share of the Delay and costs resulting from any Work undertaken before apprising the **Professional** and/or obtaining a written clarification or interpretation from the **Professional**, if the **Contractor** knows or has reason to know that any such Work (a) involves a conflict, error or omission, or (b) is subject to a specified Means and Method which is inappropriate, unworkable or unsafe, or (c) is subject to a specified method of installation, performance or test procedure and/or result which is contrary to the recommendations provided by or for the respective manufacturer.

4.2 Management, Supervision and Personnel:

4.2.1. The **Contractor** shall manage, supervise, and direct the Work competently, applying the management, supervision, skills, expertise, scheduling, coordination, and attention necessary to provide the Work in accordance with the Contract Documents, while insuring timely and unhindered access to the site. The **Contractor** shall be responsible for any Means and Methods unless a specific

Means and Method is indicated in or required by the Contract Documents. The **Contractor** shall verify that completed Work complies with the Contract Documents, all approved Submittals and all clarifications and interpretations.

4.2.2. The **Contractor** shall maintain a competent, full-time superintendent on the Work at all times during its progress. The superintendent shall be the **Contractor's** representative at the site and shall have authority to act on behalf of the **Contractor**. The Superintendent shall not be assigned or replaced without the **Owner's** consent. If the **Owner**, in the reasonable exercise of its discretion, objects to the superintendent, the **Contractor** shall use a replacement superintendent at no increase in Contract Price or Contract Time. All communications given to the superintendent shall be as binding as if given to the **Contractor**.

4.2.3. The **Contractor** shall provide competent, suitably qualified personnel to survey and lay out the Work. As part of this responsibility, the **Contractor** shall engage a registered land surveyor to accurately locate base lines and Project elevations. The **Contractor** shall be required to furnish certifications that lines and grades for all concrete slabs were checked before and after placing of concrete, and that final grades are as required by the Contract Documents.

4.2.4. The **Contractor** shall provide competent and suitably qualified trade foremen and craft workers to construct the Work, in all cases as required by the Contract Documents. At all times, the **Contractor** shall maintain good discipline and order at the site.

4.2.5. Whenever activities of the **Contractor** are carried out beyond the limits of the site or the indications of temporary fences or barricades, the **Contractor** shall schedule trenching, utility Work, site development, landscaping and all other activities in the way that will cause minimum disturbance to or interference with adjoining property, service to the public or the normal operation of the **Owner** or others affected by such activities.

4.2.6. If a Means and Method is indicated in, or required by, the Contract Documents, a substitute Means, and Method may be used by the **Contractor** only after obtaining the **Professional's** approval that it meets the applicable criteria in paragraph 5.2 without increasing Contract Price or Contract Time. If any such substitution causes earlier completion of the Work, the **Owner** and **Contractor** may negotiate an appropriate shortening in Contract Time, a level of liquidated damages appropriate to the shortened Contract Time, and a decrease in the Contract Price. If the **Owner** and **Contractor** are unable to agree on the extent of any such adjustments, the **Owner** may deliver a claim in accordance with the procedures and within the deadlines set forth in Article 15.

4.2.7. The **Contractor** shall post appropriate construction signs to advise the occupants and visitors of occupied facilities of the limits of construction work areas, hardhat areas, excavations, construction parking and staging areas, etc.

4.3 Materials and Equipment:

4.3.1. Unless otherwise specified in the Contract Documents, the **Contractor** shall furnish and be responsible for all materials, equipment, transportation, construction equipment, tools, supplies, fuel, utilities, water for flushing and testing, temporary facilities and all other facilities and incidentals necessary for the furnishing and performance, which includes, without limitation, the testing and completion of the Work.

4.3.2. All materials and equipment shall be of good quality, free of defect and new, unless otherwise allowed in the Contract Documents. For each material and equipment, the **Contractor** shall provide complete information on preventive maintenance, operating requirements, parts lists, ordering of parts and other applicable conditions. Materials and equipment shall be protected against any damage at all times so that they remain new.

4.3.3. If required for the **Professional's** acceptance of any materials or equipment, the **Contractor** shall furnish satisfactory evidence (which shall include test procedures and reports of required tests) as to the kind and quality of the materials and equipment. Materials and equipment shall be applied, installed, connected, erected, used, cleaned, and conditioned following the manufacturer's and Suppliers' instructions, except as otherwise provided in the Contract Documents.

4.3.4. Paragraph 7.3, Section 00100 Instructions to Bidders, dealing with materials and equipment *listed* in Schedule 1.6 of Section 00440 Schedule of Materials and Equipment is made part of this Section 00700 General Conditions by this reference.

4.4 Concerning Control of Work:

4.4.1. The **Contractor** shall prosecute the Work in the way that will cause the least practicable interference with and avoid prolonged interruption of, or damage to, existing facilities. The **Contractor** shall obtain written approval from the **Owner** ten (10) Calendar Days before connecting to existing facilities or interrupting service. If the **Contractor's** Means and Methods require tapping into an existing system(s), the **Contractor** shall be responsible for the restoration of such system and of any extensions of such systems.

4.4.2. To the extent specified Work on an existing system may cause damage to, or imbalances in extensions of such systems, and restoration of the entirety of such systems is not designated in the Drawings and/or Specifications as required Work, the **Contractor** shall be responsible for seeking an appropriate clarification or interpretation from the **Professional** before proceeding with the Work Involved.

4.4.3. The **Contractor** shall perform Work and operate vehicles and construction equipment in a safe manner and without becoming a hazard to the public, while at the same time ensuring the least practicable interference with pedestrians and traffic. In addition, such operations shall be carried out without interfering with overhead utilities. When transporting materials or equipment, vehicles shall not be loaded beyond the capacity set by their manufacturers or applicable Laws. When crossing sidewalks, curbs or landscaped areas, the **Contractor** shall protect them from damage. Safe and adequate pedestrian and vehicular access shall be maintained to fire hydrants, commercial and industrial establishments, churches, schools, parking lots, hospitals, fire, and police stations and like establishments.

4.4.4. The **Contractor** shall be responsible for performing the pumping, draining, and controlling of surface water and groundwater in the way that will not endanger the Work or any adjacent facility or property, or interrupt, restrict or interfere with the use of any adjacent facility or property.

4.4.5. Paragraph 3.10, Section 00100 Instructions to Bidders, invoking the "Soil Erosion and Sedimentation Control," 1994 PA 451, Part 91, as amended, MCL 324.9101 *et seq.*, is made part of Section 00700 General Conditions by this reference.

4.4.6. To the extent the **Contractor** knows, or has reason to know, the **Contractor** shall be responsible for performing the Work taking fully into account any dewatering, blasting, etc. operations from other work bearing a potential impact on the Work.

4.4.7. Any damaged Work corrected by the **Contractor** shall be corrected and made equal in all respects (quality, finish, appearance, function, etc.) to similar non-damaged Work otherwise required by the Contract Documents.

4.4.8. The **Contractor** shall verify that Work already *in-place* is in proper condition to receive *dependent* Work, and that dependent Work connecting to the *in-place* Work is properly coordinated. Whether or not expressly specified in the Contract Documents, the **Contractor** shall be responsible for all cutting, fitting, drilling, fixing-up and patching of concrete, masonry, gypsum board, piping and other materials that may be necessary to make *in-place* Work and *dependent* Work fit together properly.

4.4.9. The **Contractor** shall not obstruct access to municipal structures, hydrants, valves, manholes, fire alarms, etc., nor operate valves or otherwise interfere with the operation of any Public utilities without first securing the necessary approvals and permits. Except as may be otherwise provided in the technical Specifications, the **Owner** will charge the **Contractor** for all utilities used based on the charges the **Owner** actually incurs.

4.4.10. In the event of any unauthorized interruption of service to any operating facility, the **Contractor** shall take immediate action to restore that service as soon as practicable. The **Contractor** shall be directly responsible for the charges of any manufacturer's representative called to the site to repair or adjust any systems damaged by the **Contractor**.

4.4.11. Whenever the **Contractor** has caused an operating security system to go out of service or left unsecured openings in existing facilities or security fences, the **Contractor** shall furnish a security guard acceptable to the **Owner** to maintain security of the facility outside of normal working hours. The **Contractor** will be held responsible for any losses on account of the **Contractor's** interruption of security systems or barriers at existing facilities.

4.4.12. The **Contractor** shall take steps, procedures or means as may be required to prevent dust nuisance resulting from the **Contractor's** operations. The dust control measures shall be maintained at all times to the satisfaction of the **Owner** and any Political Subdivision with jurisdiction.

4.4.13. The **Contractor** shall, before final inspection, mark in a permanent and readily identifiable manner, all reference points provided by the **Owner**.

4.5 Patent Fees and Royalties:

4.5.1. The **Contractor** shall be responsible for paying all royalties and license fees and assuming all costs resulting from the use in the furnishing and performance of the Work and/or the incorporation into the Work of any invention, design, process, product, or device covered by patent rights or copyrights, whether specified in the Contract Documents or chosen by the **Contractor**.

The **Contractor** shall sign suitable agreement(s) with the patentee or copyright owner and, if requested, provide copies to the **Owner**.

4.5.2. The **Contractor** shall defend, indemnify, and hold harmless the **Owner** and **Professional** from and against all claims, as construed in paragraph 1.4, arising from any patent or copyright infringement by the Contractor including, but not limited to, patent or copyright infringements resulting from "or equal" substitution of any invention, design, process, product, or device that is specified in the Contract Documents.

4.5.3. If the **Contractor** knows, or should know, that the specified invention, design, process, product, or device infringes on a patent or copyright, the **Contractor's** obligation to defend, indemnify and hold harmless **Owner** and **Professional** from and against all claims arising from any patent or copyright infringement shall apply, unless the **Contractor** promptly furnishes that information to the **Professional** in writing.

4.6 Use of Premises:

4.6.1. The **Contractor** shall confine its operations (including, but not limited to construction equipment and laydown and storage) to the site and lands, areas, properties, facilities, rights-of-way, and easements ("the premises") identified and permitted by the Contract Documents and shall not unreasonably encumber the premises. The **Contractor** shall be responsible for any damage to the premises (including, but not limited to, damage to any real and personal property) and for any damage to any adjacent lands, areas, properties, facilities, rights-of-way, and easements (including, but not limited to, damage to any real and personal property) resulting from the **Contractor's** operations. The **Contractor** shall defend, indemnify, and hold harmless the **Owner** and **Professional** against all claims, as construed in paragraph 1.4, arising from any damage to such premises or adjacent lands, areas, properties, facilities, rights-of-way, and easements (inclusive of real and personal property), including loss of use, to the extent resulting from the **Contractor's** operations.

4.6.2. The **Contractor** shall keep the premises free from accumulations of waste materials, rubbish, and other debris, and shall not remove, injure, cut, alter, or destroy trees, shrubs, plants, or grass, unless otherwise provided elsewhere in the Contract Documents. At the completion of the Work, the **Contractor** shall remove all obstructions, waste and surplus materials, rubbish, debris, tools, and construction equipment and shall leave the site clean and ready for occupancy by the **Owner**.

4.6.3. The **Contractor** shall restore to pre-existing conditions all walks, roadways, paved or landscaped areas and other real and personal property not designated for alteration by the Contract Documents. To the extent the **Contractor** refuses, fails or neglects to replace all such altered premises and/or restore to its pre-existing condition any walk, roadway, paved or landscaped area and other property not designated for alteration by the Contract Documents, the **Contractor** shall bear its proportionate share of the Delay and costs resulting from the **Contractor's** refusal, failure, or neglect to do so.

4.6.4. The **Contractor** shall not load or permit any part of any structure to be loaded in any way that will endanger the structure. The **Contractor** shall not subject any part of the Work or adjacent property to stresses or pressures that will damage or endanger the Work or adjacent property, or both.

4.7 Record Documents:

4.7.1. The **Contractor** shall maintain at the site one copy of all Record Documents in good order and annotated in a neat and legible manner using a contrasting, reproducible color to show (a) all revisions made, (b) dimensions noted during the furnishing and performance of the Work, and (c) all deviations between the as-built installation and the Contract Documents, all approved Submittals and all clarifications and interpretations.

4.7.2. Record Documents, along with a properly annotated copy of all approved Submittals, shall be available to the **Professional** and **Owner** at all times during the progress of the Work. The finalized Record Documents and approved Submittals shall be required for processing final payment to the **Contractor**.

4.7.3. The **Contractor** shall maintain and make available to the **Owner** and **Professional** daily field reports and digital photos recording the on-site labor force and equipment (**Contractor** and Subcontractors); materials/equipment received (at the site or at another location); visits by Suppliers; significant in-progress and completed trade Work within major areas; and other pertinent information.

4.7.3.1 Daily reports shall be submitted weekly to DTMB, the sign professional and any other governmental party requesting them. Each daily report shall be a separate PDF and shall include photos within this single PDF. Each individual PDF shall not exceed 5MB. Photo quality shall remain clearly legible (not overly pixelated) but may be adjusted as required to meet the file size limitations as noted above. Name each daily report in the following format: "950_22357.MNB Daily Rep YYYY-MM-DD.pdf"

4.7.4. Such daily field reports shall be furnished by the **Contractor** promptly to the **Professional** and **Owner** upon their request and shall be accepted by the **Owner** for information only. Neither the **Owner** nor **Professional's** review of any daily field report shall be construed as agreement with the information contained in any such daily field report.

4.8 Emergencies:

4.8.1. In Emergencies affecting the safety or protection of Persons, the Work or property at or adjacent to the site, the **Contractor**, without any special instruction or authorization from the **Professional** and/or the **Owner**, is obligated to act to prevent threatened damage, death, injury, or loss.

4.8.2. The **Contractor** shall give the **Owner** prompt written notice of any changes in the Work resulting from the action taken. If the **Owner** concurs, the **Owner** will amend the Contract Documents to provide for those changes and, unless the Emergency results in whole or in part from any act or omission within the control of the **Contractor**, to provide for any corresponding adjustment in Contract Price and/or Contract Time.

4.9 Indemnification:

4.9.1. The **Contractor** shall defend, indemnify and hold harmless the **Owner** and **Professional** from and against all claims, as construed in paragraph 1.4, for bodily injury, sickness, disease or death, or injury to the destruction of property, including loss of use, arising out of, relating to, or being in any way connected with the Work, that are in any way (a) caused by any negligent act or omission of the **Contractor**, any Subcontractor or Supplier or

anyone for whose acts any of them may be liable, or (b) related to the **Contractor's** failure to maintain the required insurance and coverages. As a point of emphasis, and as set forth in paragraph 1.4, such claims shall include, but are not limited to charges of architects, engineers, attorneys and others and all court, hearing, and other dispute resolution costs.

4.9.2. As a point of emphasis, as set forth in paragraph 1.4, this indemnification obligation shall include claims caused in part by the negligence or other liability-creating conduct or omissions of the **Owner** (including State departments, agencies, boards, commissions, officers, and employees) or **Professional**; however, the **Contractor** shall not be required to indemnify the **Owner** or **Professional** against liability for loss or damage resulting from the sole negligence of the **Owner** and/or **Professional**.

4.9.3. With respect to claims against the **Owner** or **Professional** by any employee of the **Contractor**, the indemnification obligation under this paragraph 4.9 shall not be limited in any way by any limitation on the amount or type of damages, compensation or benefits payable by or for the **Contractor**, any Subcontractor or Supplier under workers' compensation, disability benefit or other benefit acts.

ARTICLE 5 SUBCONTRACTORS AND SUPPLIERS

5.1 Employment of Subcontractors:

5.1.1. Upon due investigation, the **Owner** may revoke, because of subsequent violation of a material requirement of the Contract Documents, the **Owner's** consent to any Subcontractor previously given pursuant to the provisions of Article 8 of Section 00100 Instructions to Bidders and Section 00430 List of Subcontractors. Any such revocation of the **Owner's** consent shall not justify any increase in Contract Price or Contract Time.

5.1.2. After Contract Award, if the **Contractor** intends to add or substitute a Subcontractor for Work in a Division, Specification and/or trade for which Subcontractor nomination was required in Section 00430 List of Subcontractors, the **Contractor** shall nominate that Subcontractor for review by the **Owner** and/or **Professional**. The **Contractor** shall not award such Work to any Subcontractor to whom the **Owner** objects for good cause. No adjustment in Contract Price or Contract Time shall be allowed for any such newly nominated Subcontractor.

5.1.3. Whenever the **Owner** objects, for its convenience, to any Subcontractor nominated, but not objected to, before Contract Award or to any Subcontractor nominated after Contract Award, the **Contractor** shall nominate a substitute Subcontractor or shall proceed to self-perform the Work involved if the **Contractor** is so qualified. If any such **Owner** objection requires a Subcontractor substitution or the **Contractor** to self-perform the Work Involved, in either case at an increase of the **Contractor's** cost for the part of the Work Involved, the **Owner** will amend the Contract Documents to provide for a corresponding adjustment in Contract Price and/or Contract Time made necessary by the Subcontractor substitution or self-performance and by any resulting Delay which is not reasonably anticipatable under the circumstances and which is attributable to the **Owner** and/or **Professional**.

5.1.4. Failure of the **Owner** to object to any nominated Subcontractor shall not constitute a waiver of any right of the **Owner** or **Professional** to reject Defective Work; nor shall the authority given to the **Owner** under this paragraph create or impose any duty

on the **Owner** or **Professional** to exercise such authority for the benefit of the **Contractor** or any other third party.

5.1.5. Installation of any self-performed or Subcontractor Work shall constitute acceptance by the **Contractor** of all previously placed dependent Work. Consistent with this responsibility, the **Contractor**, directly or through the **Contractor's** choice of Subcontractors, shall supply, install and/or cause items to be built into previously placed Work, shall verify dimensions of previously placed Work, and shall notify the **Professional** of previously placed Work that is unsatisfactory for, or prevents satisfactory installation of, other dependent Work.

5.1.6 Work performed by any Subcontractor or Supplier shall be through an appropriate written Sub agreement that expressly binds the Subcontractor or Supplier to the requirements of the Contract Documents and contains the waiver of rights of subrogation provisions of Article 7.

5.2 "Or Equal" and Substitute Materials and Equipment:

5.2.1. Materials or equipment described in the Contract Documents by using a brand name, make, manufacturer, supplier, or specification shall be intended to denote the essential characteristics desired and establish a standard.

5.2.2. For materials and equipment which are actually *listed* in Schedule 1.6 of Section 00440 Schedule of Materials and Equipment, no "or equal" or substitute material or equipment will be acceptable or permitted unless the **Contractor** complies with the terms and conditions of paragraphs 5.2.2.1 through 5.2.2.5.

5.2.2.1. Unless words are used in a technical Specification indicating that no "or equal" or substitution is permitted, a proposal for an "or equal" or substitution may be accepted by the **Professional** if, in the **Professional's** judgment, the proposal (a) meets the criteria set forth in paragraphs 5.2.2.2 through 5.2.2.5, (b) demonstrates a net positive deduction, i.e., the deductive value of the proposal exceeds all direct, indirect and consequential costs and damages attributable to the "or equal" or substitution, and (c) offers a Contract Price decrease of one hundred percent (100%) of the net deduction, or another percentage reflecting a sharing of the savings which is agreed between the **Owner** and **Contractor**.

5.2.2.2. The **Contractor's** written application for the "or equal" or substitute material or equipment shall provide sufficient information to allow the **Professional** to determine whether the material or equipment proposed (a) will equally perform the functions and achieve the results called for by the Contract Documents, (b) is at least of equal materials of construction, quality and necessary essential design features, (c) is suited to the same use as that named or specified, (d) conforms substantially to the desired detailed requirements, e.g., durability, strength, appearance, aesthetics (if aesthetics are significant), safety, useful life, reliability, economy of operation and ease of maintenance, (e) evidences a proven record of performance and the availability of responsive service, and (f) will not extend any Contract Times.

5.2.2.3. Each such application shall certify whether or not acceptance of the proposed "or equal" or substitute material or equipment will require a change in any of the Work or any of the Means and Methods indicated in or required by the Contract Documents, or in work performed by the **Owner** or others, and whether or not incorporation or use of the proposed material or equipment is subject to payment of any license fee or royalty. All

variations of the proposed material or equipment from the material or equipment named or specified shall be identified (operation, materials or construction finish, thickness or gauge of material, dimensions, loads, tolerances, deleted and added features, etc.), and information regarding available maintenance, repair and replacement service shall be indicated.

5.2.2.4. The application shall contain an itemized estimate of all direct, indirect, and consequential costs and damages that will result from evaluation and acceptance of the proposed "or equal" or substitute material and equipment, including but not limited to costs and delays of redesign, or claims of other contractors affected by the proposed item, and changes in operating, maintenance, repair, replacement, or spare part costs. The **Professional** may require the **Contractor** to furnish a manufacturer's performance Bond, an analysis of the effects of the evaluation/acceptance of the "or equal" or substitution on the Progress Schedule, a list of locations of similar installations that have been in service for at least three (3) years before the date of the application, and any other relevant data.

5.2.2.5. The **Contractor** shall be responsible for verifying that "or equal" or substitute materials and equipment conform to the Contract Documents, and that all dimensions, arrangement, design and construction details and other features are suited to the specified purpose. If any "or equal" or substitute material or equipment differs materially from the material or equipment named or specified, and that difference was not expressly identified in the **Contractor's** application, or results in changes in the Work, the **Professional** has authority to require removal and replacement of that "or equal" or substitute material or equipment. The **Contractor** shall bear its proportionate share of the Delay and costs resulting from (a) any such removal and replacement of "or equal" or substitute materials or equipment, (b) making "or equal" or substitute materials or equipment conform to the requirements of the Contract Documents, and (c) any changes in the Work and/or in other work required to accommodate the "or equal" or substitute material or equipment, or both.

5.2.2.6. The **Contractor** shall reimburse the **Owner** for any costs incurred by the **Owner** in the evaluation of any "or equal" or substitution proposal. Such costs shall include, but are not limited to, related charges of the **Professional** made necessary by the evaluation and acceptance or rejection, as the case may be, of the proposed "or equal" or substitute material or equipment.

5.2.3. For materials and equipment *not listed* in Schedule 1.6 of Section 00440 Schedule of Materials and Equipment, no substitute material or equipment will be acceptable or permitted unless the **Contractor** meets with the requirements of paragraphs 5.2.2.1 through 5.2.2.5. Further, the reimbursement provisions of paragraph 5.2.2.6 shall apply equally to such substitutions.

5.2.4. Unless approved by the **Professional**, for materials and equipment *not listed* in Schedule 1.6 of Section 00440 Schedule of Materials and Equipment, no "or equal" material or equipment will be acceptable or permitted unless the **Contractor** complies with the requirements of paragraphs 5.2.2.2 – 5.2.2.5.

5.2.5. No "or equal" or substitute item shall be ordered, installed, or utilized without the **Owner's** prior acceptance. The **Owner's** acceptance shall be evidenced by a signed Change Order or Change Authorization, or if so, specifically designated by the **Professional**, by an approved Shop Drawing or sample.

5.3 The Contractor's Continuing Responsibilities:

5.3.1. The **Contractor** shall be fully responsible to the **Owner** and **Professional** for all acts and omissions of Subcontractors and Suppliers, at any tier, to the same extent as the **Contractor** is responsible for the **Contractor's** own acts and omissions. Nothing in the Contract Documents shall create any contractual relationship between the **Owner** or **Professional** and any Subcontractor or Supplier. No provision in Article 12 or in the other Contract Documents shall create or impose any express or implied duty or obligation on the **Owner** or **Professional** to any Subcontractor or Supplier or the **Contractor's** sureties to pay or to see to the payment of any monies owed to any of them.

ARTICLE 6 SUBMITTALS

6.1 Shop Drawing, Sample and Other Technical Submittals:

6.1.1. After complying with those requirements in paragraphs 6.1.2 through 6.1.5 and the technical Specifications, the **Contractor** shall submit to the **Professional** (a) an electronic file(s) of the drawing(s) compatible with the latest version of AutoCAD of all Shop Drawings required by the Contract Documents and bond copies if requested by the **Owner** or **Professional**; (b) all required samples (whether color or otherwise); and (c) all other technical Submittals (test results, test procedures, safety procedures, O&M manuals, etc.) that are required by the Contract Documents.

6.1.2. Submissions shall be delivered to the **Professional** with due diligence, as delineated in or required by the Progress Schedule, and shall allow reasonable times, per 6.5.1, for the **Professional's** review and turnaround. Each Submittal shall be uniquely identified as the **Professional** and **Contractor** may agree.

6.1.3. Each Submittal shall bear a stamp or specific written indication certifying that the **Contractor** has satisfied the requirements of this Article and the technical Specifications and the **Contractor's** responsibilities for prior review of the submission. In addition, each sample shall have been checked and be accompanied by a certificate guaranteeing that the material sampled complies with the Contract Documents. Unless otherwise allowed by the **Professional**, Submittals without the **Contractor's** indication of approval will be returned without review.

6.1.4. Before each submission, the **Contractor** shall (a) determine and verify all field measurements, quantities, dimensions, instructions for installation and handling of equipment and systems, installation requirements (including location, dimensions, access, fit, completeness, etc.), materials, color, catalog numbers and other similar data as to correctness and completeness, and (b) have reviewed and coordinated that technical Submittal with other technical Submittals and the requirements of the Contract Documents. Technical Submittals of a Subcontractor or Supplier shall be coordinated with those of other Subcontractors or Suppliers (location, dimensions, fit, completeness, consistency, integration, etc.), and so represented in the **Contractor's** stamp or specific written approval before submission to the **Professional**.

6.1.5. With each submission, the **Contractor** shall give the **Professional** specific written notice of each variation from the requirements of the Contract Documents, and the **Contractor** shall cause a specific notation of each variation to be made on that Shop Drawing, sample, or other technical Submittal.

6.1.6. Where a Shop Drawing, sample or other technical Submittal is required by the technical Specifications, any related Work performed by the **Contractor** before the **Professional's** approval of the pertinent technical Submittal will be at the sole expense and responsibility of the **Contractor**.

6.1.7. The **Professional** shall be entitled to rely upon the accuracy or completeness of any designs, calculations or certifications made by licensed or certified professionals attached to a specific technical Submittal, whether or not that stamp, or written certification is required by the Contract Documents

6.2 Review and Return of Technical Submittals:

6.2.1. The **Professional's** review of a technical Submittal will be to evaluate whether the items covered by the Submittal, after installation or incorporation into the Work, will conform to the general design intent of the Contract Documents and for compatibility with the design of the completed Work as a functioning whole as indicated in the Contract Documents.

6.2.2. The review of Submittals by the **Professional** shall not be conducted for the purpose of determining the accuracy and completeness of such details as dimensions or quantities shown or indicated on the Submittals, or for substantiating instructions for installation or performance of equipment and systems developed by or for the **Contractor**, the correctness of which shall remain the sole responsibility of the **Contractor**. Further, any such **Professional's** review and approval will not extend to any Means and Methods (except where a specific Mean and Method is indicated in or required by the Contract Documents) or to safety precautions or programs related to safety.

6.2.3. Approval by the **Professional** of a separate item or partial Submittal shall not translate to approval of the assembly in which the item functions or to the approval of related Submittals not yet reviewed and approved by the **Professional**.

6.3 Progress Schedule Submittals:

6.3.1. After complying with the appropriate Progress Schedule requirements in the technical Specifications, the **Contractor** shall submit to the **Professional** electronic copies of the Progress Schedule Submittal then due, which shall include both PDF format and active software files with the **Contractor's** specific schedule data. Each Progress Schedule Submittal shall bear the **Contractor's** stamp or written indication of approval as representation to the **Owner** that the **Contractor** has determined or verified all data on that Progress Schedule, and that the **Contractor** and Subcontractors and Suppliers have reviewed and coordinated the sequences in that Progress Schedule with the requirements of the Work. Progress Schedule Submittals are not Contract Documents.

6.3.2. Progress Schedule Submittals are intended to show: (a) the priority and sequencing by which the **Contractor** intends to execute the Work (or Work remaining) to comply with the Contract Times, those sequences of Work indicated in or required by the Contract Documents and any other requirements of the Contract Documents; (b) how the **Contractor** anticipates foreseeable events, site conditions and all other general, local and prevailing conditions that may in any manner affect cost, progress, schedule, performance and furnishing of the Work; (c) how the Means and Methods chosen by the **Contractor** translate into Activities and sequencing; (d) the actual timing and sequencing of completed

Work; and (e) if required by the Contract Documents, the allocation of the Contract Price to the Activities.

6.4 Review and Return of Progress Schedule Submittals:

6.4.1. The **Owner's** and **Professional's** review of Progress Schedule Revision 0 Submittals may result in comments relating to conformance with (a) the Contract Times, (b) those sequences of Work indicated in or required by the Contract Documents, and (c) any other Contract Document requirements that may have a significant bearing on the use of Revision 0 Progress Schedule Submittals to resolve issues affecting Contract Price and/or Contract Time. Progress Schedule review comments may also result in the selection of Targets and recording of Target Times.

6.4.2. The review of Progress Schedule Revision Submittals may, in addition to the types of comments outlined in paragraph 6.4.1, result in comments as to whether the **Contractor's** scheduling of Work remaining continues to conform with the Contract Times and those sequences of Work indicated in or required by the Contract Documents. Progress Schedule Revision Submittal review comments may also respond to suggested **Contractor** schedule recovery plans, when and as appropriate, and to **Contractor** requests for extensions in Contract Time.

6.4.3. Progress Schedule reviews shall not impose on the **Owner** or **Professional** any responsibility for verifying whether Work is omitted; Activity durations are reasonable; the adequacy of the level of labor, materials, and construction equipment; the reasonableness of the **Contractor's** chosen Means and Methods; or whether Work sequences and Activity timing are practicable. Even if any comments or objections are noted from the reviews of Progress Schedule Submittals, no such reviews or objections noted shall be effective or construed to create or impose on the **Owner** or **Professional** any responsibility for the timing, planning, scheduling, or execution of the Work or for the correctness of any such Progress Schedule details. The correctness of the Progress Schedule shall remain the sole responsibility of the **Contractor**.

6.5 Additional Provisions Concerning Submittals:

6.5.1. Unless otherwise designated in a more specific technical Specification, a Submittal will be returned to the **Contractor** within fifteen (15) to twenty (20) Calendar Days, as designated by the **Professional** in writing. If a Submittal cannot be returned when it comes due, the **Professional** shall give appropriate notice to the **Contractor** of its return date. The **Contractor** shall revise, and correct Submittals returned for revision and resubmittal, and resubmit them to the **Professional** directing specific attention in writing to revisions other than the corrections called for by the **Professional** on previous submissions of the same Submittals.

6.5.2. No review or approval of Submittals shall relieve the **Contractor** of responsibility for the following: (a) variation from the requirements of the Contract Documents, unless the **Contractor** has called attention to each variation, as provided in paragraph 6.1.5, and the **Professional** has given written approval of that variation by a specific notation within or attached to the returned Submittal, (b) compliance with the "or equal" and substitution requirements of paragraph 5.2, (c) errors or omissions in the Submittal, or (d) compliance with the requirements of this Article.

6.5.3. Unless the **Professional** determines that additional submissions are reasonable under the circumstances, all costs incurred by the **Owner** made necessary by the **Professional's**

review of a Submittal after the first resubmission of that Submittal shall be reimbursed by the **Contractor** to the **Owner**.

6.5.4. All time consumed by the resubmissions and rereviews of a particular Submittal shall constitute time required to furnish that Submittal or shall represent Delays not justifying any increase in Contract Time or Contract Price, or both.

ARTICLE 7 LEGAL REQUIREMENTS; INSURANCE

7.1 Laws; Permits (Which Include Approvals and Licenses):

7.1.1. The **Contractor** shall comply with and shall require all Subcontractors and Suppliers to comply with, all applicable Laws. The **Contractor** shall insure that everyone employed on the Work discharge their responsibilities consistent with all Laws.

*7.1.2. The **Contractor** shall secure from the State Department of Labor and Economic Growth and from all Political Subdivisions with jurisdiction, all construction permits necessary for the commencement, prosecution, and completion of the Work before starting any Work at the site. All fees for securing the permits shall be paid by the **Contractor**, including all inspection costs which may be legally assessed by the Bureau of Construction Codes according to authority granted under 1972 PA 230, as amended, MCL 125.1501 *et seq.* The time incurred by the **Contractor** in obtaining construction permits shall constitute time required to complete the Work and shall not justify any increases in Contract Time or Contract Price, except to the extent any related Delay is attributable to the fault of the Drawings or Specifications or to revisions to the Drawings and/or Specifications required by the Political Subdivision with jurisdiction.

7.1.3. Unless expressly required by any Laws or permits, neither the **Owner** nor **Professional** shall be responsible for monitoring the **Contractor's** compliance with any Law, the State Construction Code, or any permits. The **Contractor** is not responsible to make certain that the Contract Documents comply with applicable Laws and the State Construction Code; however, if the **Contractor** believes the Contract Documents deviate from the requirements of any Law, the State Construction Code or any permit, the **Contractor** shall give the **Professional** prompt written notice. If the **Contractor** provides any Work knowing or having reason to know such Work conflicts with any Laws, or the State Construction Code or any permits, the **Contractor** shall be responsible for that performance. The **Contractor** shall be proportionately responsible for the time required and the costs involved in complying with the obligations stated in this paragraph.

*7.1.4. All Work shall be provided in accordance with the State Construction Code and the requirements of paragraph 1.2.4. If the **Contractor** observes that any Contract Document is at variance with any Laws or the State Construction Code in any respect, the **Contractor** shall promptly notify the **Professional** in writing, and any necessary changes shall be accomplished by an appropriate Change Order. The **Contractor** shall pay all charges of Public Utilities for connections to the Work, unless otherwise provided by Cash Allowances specific to those connections.

*7.1.5. In accordance with the Michigan State Construction Code Act, 1972 PA 230, as amended, MCL 125.1501 *et seq.*, the State Department of Labor and Economic Growth, Construction Code Commission has adopted and filed with the Secretary of State the following Construction Code Reference Standards: (a) Michigan Building Code; (b) Michigan Plumbing Code; (c) National Electric

Code; (d) Michigan Mechanical Code; (e) State Elevator Code; (f) State Boiler Code; and (g) State Barrier Free Design Rules.

7.2 Sales and Use Tax and Other Similar Taxes:

7.2.1. The **Contractor** shall be responsible for and pay all Michigan sales and use taxes and any other similar taxes covering the Work that are currently imposed by legislative enactment and as administered by the Michigan Department of Treasury, Revenue Division. The **Owner** shall make a corresponding adjustment in Contract Price for any increase or decrease in sales, use and other similar taxes (excluding payroll taxes) covering the Work that are enacted after the date of Bid opening.

7.3 Safety and Protection:

7.3.1. The **Contractor** shall comply with and shall require all Subcontractors and Suppliers to comply with, all Laws governing the safety and protection of persons or property, including, but not limited to the Michigan Occupational Safety and Health Act (1974 PA 154, as amended, MCL 408.1001 *et seq.*) and all rules promulgated under the Act. The **Contractor** shall be responsible for all fines and penalties imposed for any related violation(s) of federal and State health and safety requirements. The **Contractor's** safety representative at the site shall be the superintendent required by the provisions of paragraph 4.2.2, unless otherwise designated in writing by the **Contractor**.

7.3.2. The **Contractor** shall be solely responsible for initiating, maintaining, and supervising all safety precautions and programs. The **Contractor** shall take all necessary precautions for the safety of, and shall erect and maintain all necessary safeguards and provide the necessary protection to prevent damage, injury or loss to: (a) all employees on the Work and other persons who may be affected by the Work, (b) all the Work and materials and equipment to be incorporated into the Work, whether stored on or off the site, and (c) other property at or adjacent to the site, including trees, shrubs, lawns, walks, pavements, roadways, structures, utilities and Underground Utilities not designated for removal, relocation or replacement. In the event of severe weather, the **Contractor** shall immediately inspect the Work and the site and take all reasonably necessary actions and precautions to protect the Work and ensure that public access and safety are maintained.

7.3.2.1. All damage, injury or loss to the Work, materials and equipment and such other property caused, directly or indirectly, in whole or in part, by the **Contractor** shall be remedied by the **Contractor**, except to the extent due to fault of the Drawings or Specifications or to act or omission of the **Owner** or **Professional**, and not due to, directly or indirectly, in whole or in part, to the fault or negligence of the **Contractor** or any Subcontractor or Supplier.

7.3.2.2. The **Contractor** shall notify owners of adjacent property and Underground Utilities when prosecution of the Work may affect them, and shall cooperate with them in the protection, removal, relocation, and replacement of their property.

7.3.2.3. Except as the division of responsibilities for safety may be otherwise delineated in writing between the **Owner** and **Contractor** in a Substantial Completion certificate, the **Contractor** duties and responsibilities for safety and protection shall continue until such time as the **Professional** is satisfied that the Work, or Work inspected, is completed and ready for final payment.

7.3.3. Use of Explosives – The **Contractor** shall comply with all federal, state, and local Laws governing the use of explosives, obtain and pay for any required permits before their use and furnish a copy of the permits to the **Professional** before using explosives. The **Contractor** shall, under the supervision of competent and suitably trained and qualified personnel, exercise the utmost care not to endanger life or damage property in the transportation, storage, handling, use and disposal of explosives, and in the use of Means and Methods. The **Contractor** shall be responsible for all injury, damage and adverse impacts outside the permit area resulting from the use of explosives (including an appropriate portion of the Delay and costs resulting from such injury, damage, and impacts).

7.4 Bonds and Insurance – General Requirements:

7.4.1. Both the Section 00610 Performance Bond and Section 00620 Payment Bond shall remain in full force and effect from the date of Contract Award until final completion of the Work or the end of the Correction Period, whichever comes later. The **Contractor** shall furnish any other bonds (e.g., manufacturer performance Bond or maintenance Bond) required by Section 00800 Supplementary Conditions or the technical Specifications.

7.4.2. The **Contractor** shall purchase and maintain insurance providing the coverages and limits designated in this Article. Insurance shall be provided by insurers authorized to do business as insurer in the State, as evidenced by a Certificate of Authority issued by the Department of Consumer and Industry Services – Insurance Bureau. Also, and unless otherwise authorized in writing by the **Owner**, insurers shall have an "A-" A.M. Best Company Rating and a Class VII or better financial size category as shown in the most current A.M. Best Company ratings. The **Contractor** shall not start to perform and furnish the Work, or continue with any part of the Work, unless the **Contractor** has in full force and effect all the required insurance.

7.4.3. Insurance policies shall contain a provision or endorsement stating that coverage will not be canceled or materially changed, or renewal refused unless at least thirty (30) Calendar Days prior written notice has been personally delivered or sent by registered mailed to the **Owner** and **Contractor**. Any coverage nearing expiration during the period in which it is to remain in full force and effect shall be renewed before its expiration, and an acceptable certificate of insurance shall be filed with the **Owner** at least thirty (30) Calendar Days before it expires.

7.4.4. If any of the **Contractor's** sureties or insurers is declared bankrupt or placed into receivership, ceases to meet the requirements of the Contract Documents or its authority to do business in the State is revoked or expires, the **Contractor** shall immediately substitute other Bonds/sureties or insurers/policies, which shall meet the requirements of the Contract Documents.

7.5 The Contractor's Liability Insurance:

7.5.1. The **Contractor** shall maintain Workers' Compensation and Employer's Liability, Commercial General Liability, Commercial Automobile Liability, Excess Liability, and such other insurance as may be designated in Section 00800 Supplementary Conditions or as is appropriate for the Work. The **Contractor's** liability insurance shall provide protection from claims which may arise out of or result from the **Contractor's** performance and furnishing of the Work and the **Contractor's** other obligations under the Contract Documents, whether performed or furnished by the **Contractor**, any

Subcontractor, any Supplier, or anyone for whose acts any of them may be liable.

7.5.2. Liability Insurance shall be endorsed to list as additional insureds the **State of Michigan** (Owner), its departments, divisions, agencies, offices, commissions, officers, employees and agents, the **Owner's** consultants, and agents, the **Professional**, and the **Professional's** consultants and agents, including their respective subsidiaries and affiliates and their respective directors, officers, shareholders, agents, or employees. The **Contractor** shall use the current Insurance Services Office (ISO) Form CG 20 09 for general liability insurance or equivalent, ISO Form CA 20 01 for automobile liability insurance or equivalent, and manuscript form for excess liability insurance. The insurance afforded to the additional insureds shall be primary, and neither the coverages nor limits under the **Contractor's** policies shall be reduced or prorated by the existence of any other insurance applicable to any loss that the additional insureds may have sustained. Workers' Compensation, Employer's Liability Insurance and all other liability insurance policies shall be endorsed to include a waiver of rights to recover from the **Owner**, **Professional** and the other additional insureds.

7.5.3. The **Contractor's** liability insurance shall remain in effect through the Correction Period and through any special correction periods that are implemented pursuant to the requirements of paragraph 9.5.3. Liability insurance issued on a claims-made basis and completed operations insurance shall be maintained for two (2) years after final payment, and evidence of coverage shall be furnished to the **Owner** yearly.

7.5.4. For any employee, resident of and hired in Michigan, the **Contractor** shall have insurance for benefits payable under Michigan's Workers' Compensation Law. For any other employee protected by Worker's Compensation Laws of any other state, the **Contractor** shall have insurance or participate in a mandatory state fund, where applicable, to cover the benefits payable to any such employee.

7.5.5. Commercial General Liability Insurance shall be equivalent to that provided by the current edition of standard ISO Form CG 00 01, and shall include contractual liability and underground, explosion and collapse hazard exposure operations and pile driving operations (if risk is present).

7.5.6. Commercial Automobile Liability Insurance coverage shall be equivalent to that provided by the current edition of the ISO Form CA 00 01 and include Michigan statutory requirements.

7.5.7. Excess Liability Insurance shall provide the following protections: employer's liability, general liability, and automobile liability. Excess Liability Insurance shall be at least as broad as the underlying policies of liability insurance.

7.5.8. Coverage Limits - Workers' Compensation and Employer's Liability Insurance shall conform to statutory limits under Michigan Law. Commercial General Liability limits shall be \$2,000,000.00 each occurrence, \$2,000,000.00 general aggregate, \$2,000,000.00 products and completed operations aggregate, and \$2,000,000.00 personal and advertising injury. Commercial Automobile Liability limits shall be \$2,000,000.00 combined single limit. Excess Liability limits shall be \$2,000,000.00 each occurrence and aggregate, if the Contract Price is less than \$10,000,000.00, and \$5,000,000.00 each occurrence and aggregate, otherwise. Deductible amounts shall not exceed \$25,000.00.

7.5.9. The **Contractor** shall promptly notify the **Owner** in writing of (a) any reduction in coverage limits over \$100,000.00 resulting from Work under the Contract Documents or otherwise, and (b) any claim notice involving the Work. Notification of a claim shall provide full details and an estimate of the amount of loss or liability. If it turns out that the aggregate limits have been impaired to the extent that they are no longer adequate for the Work, the **Contractor** shall promptly reinstate the coverage limits and submit to the **Owner** certificates of insurance confirming that coverage has been reinstated to the specified limits.

7.5.10. These requirements shall not be construed to limit the liability of the **Contractor** or its insurers. The **Owner** does not represent that the specified coverages or limits of insurance are sufficient to protect the **Contractor's** interests or liabilities.

7.6 Pollution Liability Insurance

(...*** Professional to include Pollution Liability Insurance if needed
***...)

7.6.1. Pollution Liability Insurance in the amounts of not less than \$2,000,000 per occurrence is required. **7.7 Property Insurance (Builders Risk Insurance)**

*7.7.1. The **Contractor** shall purchase and maintain property insurance for one hundred percent (100%) of the actual cash replacement value of the insurable Work while in the course of construction, including foundations, additions, attachments, and all fixtures, machinery and equipment belonging to and constituting a permanent part of the building structure. The property insurance also shall cover temporary structures, materials and supplies of all kinds, to be used in completing the Work, only while on the building site premises or within five hundred (500) feet of the site. The property insurance shall insure the interests of the **Owner**, **Contractor** and all Subcontractors and Suppliers at any tier as their interests may appear. The property insurance shall insure against "all risk" of physical loss or damage to the extent usually provided in policy forms of insurers authorized to transact this insurance in Michigan. Any deductible shall be both the option and responsibility of the **Contractor**.

*7.7.2. A certificate or other proof of coverage shall be provided prior to final contract execution or issuance of a purchase order by the State. A copy of the master insurance policy will be made available to the **Owner** upon request.

7.7.3. The **Contractor** and **Owner** will cooperate in determining the actual cash replacement value of any insured loss. Any deductible amount shall be assumed or shared by the **Contractor** and Subcontractors, at any tier, in accordance with any agreement the parties in interest may reach.

7.7.4. The **Owner** may purchase and maintain for its benefit boiler and machinery insurance for boiler and machinery required to be registered and inspected by Law.

7.8 Waiver of Rights:

7.8.1. To the extent any losses and damages caused by any of the perils covered by property insurance covering the Work (whether under paragraph 7.7 or otherwise) are covered and payments are made, the **Owner** and **Contractor** waive all rights against each other for any such losses and damages and also waive all such rights against the **Professional** and all other Persons named as insureds or additional insureds in such policies. Each Sub

agreement shall contain similar waiver provisions by the Subcontractor or Supplier in favor of the **Owner**, **Professional**, and all other Persons named as insureds or additional insureds. None of these waivers shall extend to the rights that any of the insureds may have to the proceeds of insurance held by the **Owner** as trustee or otherwise payable under a policy so issued.

7.8.2. The **Owner** and **Contractor** intend that the required policies of property insurance shall protect all the parties insured and provide primary coverage for all losses and damages caused by the perils covered. Accordingly, all such policies shall be endorsed to provide that in the event of payment of any loss or damage the insurer will have no rights of subrogation or other recovery against any of the parties named as insureds or additional insureds, and if the insurers require separate waiver forms to be signed by the **Professional** or the **Owner's** and **Professional's** consultants, the **Owner** will obtain such waiver forms, and if required of any Subcontractor or Supplier, the **Contractor** will obtain such waiver forms as well.

7.9 Receipt and Application of Proceeds:

7.9.1. Any insured loss under the policies of property insurance will be adjusted with the **Owner** and will be made payable to the **Owner** as trustee for the insureds, as their interests may appear, subject to the conditions of paragraph 7.9.2. The **Owner** shall deposit, in a separate account, and shall distribute monies received based on any agreement the parties in interest may reach. If no other distribution agreement is reached, the damaged Work shall be replaced or repaired, the monies received shall be used for that purpose and the Work Involved and resulting costs shall be covered by Change Order.

7.9.2. The **Owner**, as trustee, shall have power to adjust and settle any loss with the insurers unless a party in interest objects in writing within fifteen (15) Calendar Days after the occurrence of loss to the **Owner's** exercise of this power. If an objection is made, the **Owner** as trustee shall settle with the insurers pursuant to any agreement the parties in interest may reach.

*7.10 Unfair Labor Practice:

*7.10.1. The **Owner**, pursuant to 1980 PA 278, as amended by MCL 423.321(b), may void and rescind the Contract if, at any time, the **Contractor** or any Subcontractor or Supplier appears on the register maintained by the Michigan Department of Consumer and Industry Services of employers who have been found in contempt of court by a Federal Court of Appeals on not less than three occasions involving different violations during the preceding seven (7) years for failure to correct unfair labor practices as prohibited by Section 8 of Chapter 372 of the National Labor Relations Act, 29 U.S.C. 158.

*7.11 Michigan Right-To-Know Law:

*7.11.1. The **Contractor** shall comply with Section 14a-14n of the Michigan Occupational Safety and Health Act (MIOSHA), 1974 PA 154, as amended, MCL 408.1014a – MCL 408.1014n, commonly referred to as the "Michigan Right-to-Know Law" and the rules promulgated under the Act. The Act places certain requirements on employers to develop a communication program designed to safeguard the handling of hazardous chemicals through labeling of chemical containers and development and availability of Safety Data Sheets (SDS), and to provide training for employees

who work with these chemicals and develop a written hazard communications program.

*7.11.2. Provisions of the Michigan Right-to-Know Law may be found in those sections of the Michigan Occupational Safety and Health Act (MIOSHA), which contain Right-to-Know provisions, and the Federal Hazard Community Standard, which is part of the MIOSHA Right-to-Know Law through adoption. The Act, rules and standards should be reviewed for additional requirements.

*7.11.3. The Michigan Right-to-Know Law also provides for specific employee rights, including the right to be notified of the location of SDS and to be notified at the site of new or revised SDS within five (5) Business Days after receipt and to request SDS copies from their employers. The **Contractor**, employer or Subcontractor shall post and update these notices at the site.

*7.12 Nondiscrimination:

*7.12.1. The **Contractor** and each Subcontractor and Supplier covenants to comply with the following requirements:

*7.12.1.1. Not to discriminate against any employee or employment applicant because of race, religion, color, national origin, age, sex (*as defined in Executive Directive 2019-09*), height, weight, marital status, or a physical or mental disability that is unrelated to the individual's ability to perform the duties of the particular job or position.

*7.12.1.2. To take action to ensure that applicants are employed and that employees are treated during employment without regard to their race, religion, color, national origin, age, sex, height, weight, marital status, or a physical or mental disability that is unrelated to the individual's ability to perform the duties of the particular job or position. Such action shall include, but is not limited to employment upgrading, demotion or transfer; recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship.

*7.12.1.3. To state, in all solicitations or advertisements for employees, that all qualified applicants will receive consideration for employment without regard to race, religion, color, national origin, age, sex, height, weight, marital status, or a physical or mental disability that is unrelated to the individual's ability to perform the duties of the particular job or position.

*7.12.1.4. To send, or have its collective bargaining representative send, each labor union or representative of workers with which it has a collective bargaining agreement or other contract or understanding, a notice advising that labor union or worker's representative of commitments under this provision.

*7.12.1.5. To comply with the Elliot-Larsen Civil Rights Act, 1976 PA 453, as amended, MCL 37.2201 et seq.; the Michigan Persons With Disabilities Civil Rights Act, 1976 PA 220, as amended, MCL 37.1101 et seq.; *Executive Directive 2019-09*; and all published rules, regulations, directives, and orders of the Michigan Civil Rights Commission which may be in effect on or before the date of Bid opening.

*7.12.1.6. A breach of the covenants set forth in paragraphs 7.12.1.1 through 7.12.1.5 shall be regarded as a material breach of the Contract.

*7.12.2. The **Contractor** shall furnish and file compliance reports within the times, and using the forms, prescribed by the Michigan Civil Rights Commission. Compliance report forms may also elicit information as to the practices, policies, programs, and employment statistics of the **Contractor** and Subcontractors. The **Contractor** shall permit access to Records by the Michigan Civil Rights Commission and its agent for the purposes of ascertaining compliance with the Contract Documents and with rules, regulations, and orders of the Michigan Civil Rights Commission.

*7.12.3. If, after a hearing held pursuant to its rules, the Michigan Civil Rights Commission finds that the **Contractor** has not complied with the nondiscrimination requirements of the Contract Documents, the Michigan Civil Rights Commission may, as part of its order, certify said findings to the **Board**. Upon receipt of certification, the **Board** may order the cancellation of the Contract and/or declare the **Contractor** ineligible for future contracts with the State, until the **Contractor** complies with said order of the Michigan Civil Rights Commission.

*7.13 Michigan Residency for Employees:

*7.13.1. Fifty percent (50%) of the persons employed on the Work by the **Contractor** shall have been residents of the State of Michigan for not less than one year before beginning employment on the Work. This residency requirement may be reduced or omitted in writing, at the sole discretion of the **Owner**, to the extent that Michigan residents are not available or to the extent necessary to comply with federal Law concerning federal funds used for the Project. A breach of this requirement shall be considered a material breach of the Contract.

*7.13.2. This residency requirement shall not apply to the **Contractor** or to any Subcontractor if the **Contractor** or any such Subcontractor is signatory to collective bargaining agreements which allow for the portability of employees on an interstate basis (The Management and Budget Act, 1984 PA 431, as amended, MCL 18.1241a).

*7.14 Prevailing Wages:

*7.14.1. The term "the **Contractor**", as used in this paragraph, shall include the **Contractor** and all the **Contractor's** Subcontractors and their respective lower tier Subcontractors and all construction persons (whether general contractors, prime contractors, project managers or trade contractors) in privity of contract with any of them.

*7.14.2. To the extent applicable, Contractor will comply with federal, state, and local prevailing wage requirements.

ARTICLE 8 PROSECUTION; SUBSTANTIAL COMPLETION

8.1 Starting the Work:

8.1.1. Within fifteen (15) Calendar Days after the **Owner** executes the Section 00500 Agreement, a pre-construction conference will be held. The conference will be intended, without limitation, to (a) review the **Contractor's** Schedule of Shop Drawing submissions; (b) review the qualifications of key **Contractor** personnel; (c) review the **Contractor's** proposed normal working hours and plans for laydown, staging, construction traffic, access to the site, parking and other similar matters; (d) review procedures for Submittals, clarifications and interpretations (including reasonable times for response turnaround), Change Orders, Change

Authorizations and Record Documents; and (e) exchange twenty-four (24) hour emergency telephone numbers for key personnel.

8.1.2. The **Contractor** shall start the Work on the Date of Commencement of the Contract Time. No Work shall be started at the site before such is allowed by the Contract Documents.

8.2 Revision 0 (Rev. 0) Schedule and Cost Submittals:

8.2.1. The **Contractor** shall deliver the interim Rev. 0 Progress Schedule, Schedule of Shop Drawing submissions and Rev. 0 Progress Schedule as required in the Contract Documents. The **Contractor** shall correct and adjust any Rev. 0 Submittal returned for revision. The finalized Revision 0 *As-Planned* Schedule shall be the Progress Schedule from which Revision Schedules shall be developed and used by the **Contractor** when making proposals or claims for adjustments in Contract Time and/or Contract Price.

8.3 Compliance with Contract Time Requirements:

8.3.1. The **Contractor** shall prosecute the Work with the diligence necessary to ensure its completion within the Contract Times. The **Contractor** shall provide sufficient management, supervision, labor, materials and equipment, and the **Contractor** shall undertake appropriate action promptly to recover schedule when necessary to comply with the Contract Times.

8.3.2. Unless disallowed by any Law or modified in another Section of the Specifications, a daily schedule from 06:00 AM to 06:00 PM, during Business Days, shall be normal working hours. Except in an Emergency, or as may be required by the **Contractor's** safety and protection obligations, or as the **Owner** and **Contractor** may otherwise agree, all Work at the site shall take place during normal working hours. The **Contractor** shall provide written notice to the **Owner** at least twenty-four (24) hours and up to seventy-two (72) hours if so, noted for projects specific requirements such as Correctional Facilities, before performing Work outside of normal working hours.

8.3.3. Unless otherwise agreed in writing by the **Owner**, for any Work actually performed outside of normal working hours, the **Contractor** shall reimburse the **Owner** any related increases in costs the **Owner** incurs, provided those costs are costs which the **Contractor** could reasonably have foreseen, and which are not offset through the earlier completion of the Work resulting from working outside of normal working hours. Examples of **Owner** costs include, but are not limited to, overtime charges of the **Professional** and payments for custodial and security personnel.

8.3.4. Early Dates in the Progress Schedule shall be based on proceeding with all or part of the Work exactly on the date when the corresponding Contract Time commences to run. Late Dates shall be based on completing all or part of the Work exactly on the corresponding Contract Time, regardless of whether the **Contractor** anticipates early completion or not. If sequences of Work are indicated in or required by the Contract Documents, the Progress Schedule shall show in sufficient detail the **Contractor's** approach to conforming with those sequences.

8.3.5. The Progress Schedule shall reflect the **Contractor's** approach to Work remaining, be employed when reporting on progress or schedule recovery and facilitate the evaluation of Requests for Payment, as provided in the Contract Documents.

8.3.6. The **Contractor** shall carry on the Work with due diligence during all disputes or disagreements with the **Owner**. No Work shall be delayed or postponed pending resolution of any disputes or disagreements. The **Contractor** shall exercise reasonable precautions, efforts, and measures to avoid or mitigate situations that would cause Delays.

8.4 Substantial Completion:

8.4.1. The **Contractor** shall conduct inspections of the Work to verify the extent of completion. The **Contractor** shall provide to the **Owner** a list of items to be completed or corrected resulting from the inspections whenever the **Contractor**, upon completing all pre-requisite testing of the Work, considers that the Work, or any portion of the Work designated in the Contract Documents as having a separate, specified Substantial Completion, has progressed to the point that it is substantially complete.

8.4.2. Within a reasonable time after receiving the **Contractor's** list of items to be completed or corrected, the **Owner**, **Professional** and **Contractor** shall jointly conduct a Substantial Completion inspection. If, after consulting with the **Owner**, the **Professional** does not consider the Work, or portion of the Work inspected, substantially complete, the **Professional**, within twenty (20) Calendar Days after the inspection, will deliver to the **Owner** and **Contractor** a list of incomplete or Defective Work sufficient to demonstrate the basis for that determination.

8.4.3. If the **Professional** and **Owner** agree that the entire Work, or that the portion of the Work inspected, is substantially complete, the **Professional** will deliver to the **Owner** and **Contractor** a certificate of Substantial Completion with a Punch List.

The certificate shall (a) fix a reasonable date of Substantial Completion, (b) fix a date for completion of the Punch List to the satisfaction of the **Professional**, and (c) recommend the division of responsibilities between the **Owner** and **Contractor**. Neither the Work, nor any portion of the Work inspected, shall be substantially complete, unless the **Owner** can use the Work, or designated portion of the Work inspected, for the use intended.

8.4.4. Upon Substantial Completion of the Work, or designated part of the Work on which separate Substantial Completion and Contract Price are specified, payment may be made in full subject to (a) a withholding of two hundred percent (200%) of the value of any uncompleted Work, as determined by the **Professional**, and (b) any other deductions as the **Professional** may recommend or the **Owner** may withhold to cover Defective Work, liquidated damages and the fair value of any other items entitling the **Owner** to a withholding.

8.4.5. To the extent **Owner** training is required before Substantial Completion, the **Contractor** will provide the **Owner** copies of all related operating and maintenance (O&M) documentation before the start of training. Where **Owner** training for a portion of the Work is not required before Substantial Completion, the related O&M documentation will be provided no later than Substantial Completion. Final O&M documentation (with revisions made after Substantial Completion), will be furnished by the **Contractor** to the **Owner** before the request for final payment.

8.5 Partial Use:

8.5.1. Before Substantial Completion of the entire Work, the **Owner** may, at its sole option, use any portion of the Work for which

a separate Substantial Completion has been specified in the Contract Documents. Before Substantial Completion of the entire Work, the **Owner** may, at its sole option, use any portion of the Work considered by the **Owner**, **Professional** and **Contractor** to be separately functioning Work that can be used without significant interference with the **Contractor's** completion of the balance of the Work, even though a Substantial Completion for such Work is not specified in the Contract Documents.

8.5.2. If the **Owner** decides to use any portion of the Work, it shall inform the **Contractor** in writing. Unless such portion of the Work has undergone a Substantial Completion inspection under paragraph 8.4.2, within a reasonable time after receipt of the notice, the **Owner**, **Contractor** and **Professional** shall jointly make an inspection to determine the extent of completion. If the portion of the Work inspected is substantially complete, the provisions of paragraph 8.4.3 shall be followed by the **Owner**, **Professional** and **Contractor**. If the portion of the Work inspected is not substantially complete, the **Professional** will prepare a list of items remaining to be completed or corrected before that portion of the Work is considered substantially complete. Upon completing the list, the **Professional** will deliver the prepared list of items to the **Owner** and **Contractor**.

8.5.3. There shall be attached to the list a written recommendation about the division of responsibilities between the **Owner** and **Contractor** for those matters enumerated in paragraph 8.6.1 with respect to that portion of the Work, pending Substantial Completion of that portion of the Work and the entire Work. During Partial Use, and before Substantial Completion of the portion of the Work under Partial Use, the **Owner** shall allow the **Contractor** reasonable access to complete or correct listed items and to complete other Work. The **Owner** will not start any Partial Use unless the property insurer, by endorsement or like acceptable procedure, has acknowledged receipt of notice of and consent to Partial Use.

8.6 Division of Responsibilities:

8.6.1. A certificate of Substantial Completion will include the **Professional's** recommendation about the division of responsibilities between the **Owner** and **Contractor** for utilities, security, safety, insurance, maintenance, etc. The **Owner** and **Contractor** will accept the division of responsibilities recommended by the **Professional** or shall negotiate a mutually agreeable split of responsibilities, which shall bind the **Owner** and **Contractor** when the **Owner** starts Partial Use.

8.7 Suspension of Work:

8.7.1. Suspension of Work Order – The **Owner** may, at any time, order the **Contractor** in writing to defer, stop, slow down, suspend or interrupt all or any part of the Work for such period as the **Owner** may determine appropriate for its convenience. If any such written order Delays performance for an unreasonable period, the **Owner** will amend the Contract Documents to provide for a corresponding adjustment in Contract Time and/or Contract Price (excluding Fee under paragraph 11.11).

8.7.2. Constructive Suspension of Work – If performance of all or any part of the Work is, for an unreasonable period, deferred, stopped, slowed down, suspended or interrupted by any other act or failure to act of the **Owner** or **Professional**, or act or event attributable to the **Owner** under the Contract Documents, the **Owner** will negotiate with the **Contractor** or authorize an adjustment in

Contract Time and/or Contract Price (excluding Fee under paragraph 11.11.1) for any increase in the time required to complete the Work and/or the **Contractor's** cost of performance.

8.7.3. Suspension of Work Limitation – No adjustment in Contract Price under paragraphs 8.7.1 or 8.7.2 shall be made to the extent performance is delayed by any other cause, including any act or omission within the control of the **Contractor**. Further, no suspension of Work shall justify an increase in Contract Price or Contract Time unless the resulting Delay exceeds the time allowed in the Contract Documents for the act or failure to act.

8.7.4. If the **Contractor** believes a suspension of Work justifies an increase in Contract Price or Contract Time, the **Contractor** shall give prompt written notice to the **Owner** and submit a written proposal promptly after the extent of the Delay becomes known. However, no proposal or claim by the **Contractor** on account of a suspension of Work shall be allowed (a) for any Delay or costs incurred more than thirty (30) Calendar Days before the **Contractor** gives written notice (except for written orders under paragraph 8.7.1), or (b) if made after final payment.

8.8 Sharing of Total Float On Non-Critical Paths:

8.8.1. The Progress Schedule shall be in the form of a Critical Path Schedule, Total Float on non-Critical Paths shall be available to the **Owner**, to the extent the **Owner's** use is reasonable given the Total Float remaining for the Work affected. If any such **Owner's** use of Total Float causes Delay which materially increases the **Contractor's** cost to complete the Work affected, and the **Contractor** notifies the **Owner** in writing and proceeds to support the assertion to the **Owner's** satisfaction, the **Owner** will correspondingly adjust Contract Price for any such material changes in the **Contractor's** cost to complete the Work.

8.8.2. The amount of Total Float available in the Progress Schedule shall not be artificially reduced by suppressing Total Float merely for the sake of voiding Total Float. Total Float hidden through the use of such techniques as preferential sequencing; slow or late starts of follow-on trades; restraining a Contract Time by Work actually required for a later Contract Time; the use of small crews, extended durations, imposed dates; and so forth, shall be Total Float otherwise available for sharing with the **Owner** under the provisions of paragraph 8.8.1.

ARTICLE 9 WARRANTY; TESTS, INSPECTIONS AND APPROVALS; CORRECTION OF WORK

9.1 Warranty:

9.1.1. The **Contractor** warrants to the **Owner** that all Work will conform to the Contract Documents and will not be Defective. Reasonably prompt notice of Defective Work of which the **Owner** or **Professional** has actual knowledge shall be given to the **Contractor**, but failure to do so will not void the **Contractor's** warranty unless actual prejudice results from such untimely notice. The **Contractor's** warranty excludes defect or damage caused by (a) abuse, modification by others, insufficient or improper operation or maintenance, or (b) normal wear and tear under normal usage.

9.1.2. Manufacturer warranties for materials and equipment received by the **Contractor** shall be assigned and promptly delivered to the **Owner**. Manufacturer warranties shall be in full force and effect for the entire duration of the Correction Period.

9.2 Tests, Inspections and Approvals:

9.2.1. The **Owner**, **Professional**, their representatives and consultants, testing agencies and those State agencies and Political Subdivisions with jurisdiction shall be permitted access to the Work at reasonable times while the Work is in progress for On-Site Inspection and/or inspection, testing or approval. The **Contractor** shall provide proper and safe conditions for such access. The **Contractor** shall give the **Professional** timely notice whenever any Work is ready for inspections, tests, or approvals, so that the **Professional** may observe such inspections, tests, or approvals. Tests, inspections, or approvals shall not in any way relieve the **Contractor** from the **Contractor's** obligations to perform the Work in accordance with the Contract Documents or warrant the Work as provided in the Contract Documents.

9.2.2. Unless otherwise provided in Section 00800 Supplementary Conditions, the **Owner** will retain a testing agency, directly or through the **Professional**, to perform inspections, tests or approvals required by the Contract Documents except for those inspections, tests or approvals specifically designated to the Contractor in the Contract Documents. The **Owner** will pay the charges of the testing agency, except if related to tests, inspections or approvals required by Law or otherwise charged to the **Contractor** under the provisions of paragraph 9.2.4 or 9.3.

9.2.3. The **Contractor** shall assume full responsibility for any testing, inspection, or approval (a) required by Law, (b) indicated in or required by the Contract Documents as designated to the Contractor, or (c) required for the **Professional's** acceptance of a Supplier, materials or equipment or mix designs submitted for prior approval by the **Contractor**. The **Contractor** shall (a) pay all related costs, except costs assumed by the **Owner** under paragraph 9.2.2, (b) schedule related activities, and (c) secure and furnish to the **Professional** the required certificates of inspection, testing or approval.

9.2.4. The **Contractor** shall be responsible for any testing, inspection or approval that reveals Defective Work, including an appropriate portion of the Delay and costs occasioned by such discovery of Defective Work. Examples of such costs assumed by the **Contractor** include, but are not limited to, charges of the **Professional** for repeated On-Site Inspections and, to the extent designated in the pertinent Specification, repeat testing, inspection, or approval charges by testing agencies.

9.3 Uncovering Work:

9.3.1. Any Work covered without the **Professional's** prior written concurrence shall, when requested by the **Professional**, be uncovered, exposed, or otherwise made available for On-Site Inspection, testing, inspection, or approval as the **Professional** may require, and replaced, if necessary. This requirement applies to Work, which requires On-Site Inspection by the **Professional**, based on the Contract Documents or on specific On-Site Inspection procedures of which the **Professional** notifies the **Contractor** in advance. This requirement also applies to Work, which is to be inspected, tested, or approved by others. The **Contractor** shall be responsible for any such uncovering, exposure, On-Site Inspection, testing, inspection, and satisfactory reconstruction, including an appropriate portion of the Delay and costs, unless the **Contractor** gave the **Professional** timely written notice of the **Contractor's** intentions to cover such Work and the **Professional** failed to act with reasonable promptness in response to such written notice.

9.3.2. The **Contractor**, at the **Professional's** request, shall uncover, expose, or otherwise make available for On-Site Inspection, inspection, testing or approval any covered Work otherwise not required to be observed or inspected, tested, or approved before covering, if the **Professional** determines that such covered Work shall be on-site inspected by the **Professional** or inspected, tested, or approved by others. The **Contractor** shall be responsible for any such uncovering, exposure, On-Site Inspection, inspection, testing and satisfactory reconstruction, including an appropriate portion of the Delay costs, whenever any such uncovered Work is found to be Defective. If, however, any such Work uncovered at the **Professional's** request is not found Defective, the **Owner** will amend the Contract Documents to provide for a corresponding adjustment in Contract Price and/or Contract Time.

9.4 Correction of Work:

9.4.1. Before the Correction Period – If required by the **Professional**, the **Contractor** shall correct all Defective Work, whether fabricated, installed or completed or not. If any Work is rejected by the **Professional** or if any testing, inspection, or approval reveals Defective Work, the **Contractor** shall promptly, as direct, remove the Defective Work from the site and replace it with non-Defective Work. The **Contractor** shall bear responsibility for its proportionate share of the Delay and costs resulting from the correction and/or the removal and replacement of Defective Work.

9.4.1.1. If the **Contractor**, within reasonable time after receipt of written notice, (a) fails to correct Defective Work or remove and replace rejected Work, or (b) fails to correct or complete items on any Punch List, or (c) fails to perform Work in accordance with the Contract Documents, or (d) fails to comply with any other provision of the Contract Documents, the **Owner**, after seven (7) Calendar Days' written notice to the **Contractor**, may correct and remedy the deficiency. To the extent necessary to correct and remedy such deficiency, the **Owner** shall be allowed to exclude the **Contractor** from all or part of the site; take possession of all or part of the Work and stop related operations of the **Contractor**; take possession of the **Contractor's** tools, plant and office and construction equipment at the site; and incorporate into the Work materials and equipment for which the **Owner** has paid the **Contractor**. The **Contractor** shall allow the **Owner** and **Professional** access to the site as the **Owner** may require completing corrective and remedial action. The **Owner** shall be entitled to an appropriate decrease in Contract Price for all claims, costs, losses, damages, and Delay incurred or sustained by the **Owner** which are attributable to the **Contractor**. Costs assumed by the **Contractor** under this provision include, without limitation, costs of correction or removal and replacement of Defective Work, costs of repair and replacement of other work destroyed or damaged by the action and related charges of the **Professional**.

9.4.1.2. Instead of requiring correction or removal and replacement of any Defective Work, the **Owner**, with the advice of the **Professional**, may prefer to accept any Defective Work. In any such case, the **Contractor** shall bear its proportionate share of the Delay and costs associated with the **Owner's** determination to accept the Defective Work. If the **Owner's** acceptance of the Defective Work takes place before the **Professional's** recommendation of final payment, a Change Order will be issued incorporating the necessary revisions in the Contract Documents, and the Contract Price shall be adjusted accordingly.

9.4.2. Correction Period – The Contract Documents provide for one Correction Period for the entire Work, whether Partial Use of any portion of the Work is designated as eligible by the Contract

Documents or not. The Correction Period shall start on the date of Substantial Completion of the Work, or on a later date, if so, provided in the Contract Documents. The Correction Period shall last one year, or longer, if so, specified in the Contract Documents.

9.4.3. Correction of Work During the Correction Period – The **Contractor** shall correct Defective Work or, if rejected by the **Owner**, remove from the site, and replace any Defective Work with non-Defective Work. The **Contractor's** corrective action shall be in accordance with the **Owner's** written instructions and shall be accomplished at the **Contractor's** sole expense. If the Defective Work causes an Emergency or unacceptable risk of loss or damage, the **Contractor** shall take immediate action to correct or remove and replace the Defective Work.

9.4.3.1. If the **Contractor** fails to take corrective action in accordance with the terms of any such **Owner** written instruction, the **Owner**, directly or through others under contract with the **Owner**, may correct or remove and replace the Defective Work. In any such case, the **Contractor** shall bear its proportionate share of all resulting claims, costs, losses, and damages. If the **Owner** and the **Contractor** are unable to agree as to the amounts due by the **Contractor** to the **Owner** under the provisions of this paragraph, the **Owner** may deliver a claim, in accordance with the procedures and within the deadlines set forth in Article 15. If the discovery of the Defective Work takes place after final payment and the **Contractor** fails to pay the **Owner** any of the amounts due under the provisions of this paragraph, the **Owner** shall demand due performance under Section 00610 Performance Bond and Article 14 or deliver a claim, in accordance with the procedures and within the deadlines set forth in Article 15, or both.

9.4.4 After the Correction Period – Until the period of limitation provided by Michigan Law, the **Contractor** shall promptly correct Defective Work upon receipt of written notice from the **Owner**. If appropriate under the circumstances or, in the event of an Emergency or unacceptable risk of loss or damage, the **Owner**, directly or through others under contract with the **Owner**, may correct or remove and replace the Defective Work.

9.4.5. It is not the intent of paragraph 9.4 or paragraph 9.5 to establish a period of limitations for the **Contractor's** warranty or to limit the obligations of the **Contractor** to warrant that the Work will not be Defective. The specified correction of Work requirements relates only to the specific obligation of the **Contractor** to correct or remove and replace Defective Work. The specified correction of Work requirements has no limitation on the rights of the **Owner** to have Defective Work corrected or removed and replaced, if rejected, except as otherwise provided by Michigan Law.

9.5 Special Correction Period Requirements:

9.5.1. Whenever the **Owner** undertakes Partial Use of any portion of the Work specifically designated as eligible for Partial Use in the Contract Documents, the warranties for all materials and equipment incorporated into that portion of the Work shall remain in full force and effect between the start of such Partial Use and the date when the Correction Period starts. If no separate price for such special correction period was requested in Section 00300 Bid Form and made part of the Contract Documents, the **Owner** will appropriately adjust the Contract Price.

9.5.2. Whenever the **Owner** undertakes Partial Use of any portion of the Work because any act or omission within the control of the **Contractor** Delays completion of the Work, or any portion of

the Work, within a designated Contract Time, the warranties for all materials and equipment incorporated into that portion of the Work shall, at no adjustment in Contract Price, be maintained in full force and effect between the beginning date of such Partial Use and the date when the Correction Period starts.

9.5.3. The correction period for any Defective Work that is corrected or rejected and replaced within the last three (3) months of the Correction Period shall be extended by an additional six (6) months, starting on the date such Work was made non-Defective.

9.5.4. The Contract Documents may require the Correction Period to start on a date later than the date of Substantial Completion of the entire Work. If such is the case, and the **Owner** advances or defers the start of the Correction Period, the **Contractor** shall maintain the warranties for materials and equipment until the revised starting date of the Correction Period. If no separate price for such advance or deferment was requested in Section 00300 Bid Form and made part of the Contract Documents, the **Owner** will amend the Contract Documents to appropriately adjust the Contract Price.

9.6 Special Maintenance Requirements:

9.6.1. If the Contract Documents specify that the entire Work, or a portion of the Work, upon reaching Substantial Completion, shall not be placed in use by the **Owner**, the **Contractor** shall maintain the Work, or specified part of the Work, in good order and proper working condition and shall take all other actions necessary for its protection between the certified date of Substantial Completion and the date when the Work, or designated part of the Work, is placed in use.

9.6.2. If no separate price for such special maintenance period was requested in Section 00300 Bid Form and made part of the Contract Documents, the **Owner** will amend the Contract Documents to appropriately increase the Contract Price.

ARTICLE 10 CHANGES

10.1 Changes in the Work:

10.1.1. Changes in the Work – The **Owner** is entitled to make changes within the general scope of the Work consisting of (a) additions, deletions or other revisions in the Specifications and Drawings, any Means and Methods or the **Owner**-furnished lands, equipment, materials, or services, or (b) directing acceleration of the Work. Changes in the Work may be accomplished through negotiated, *bilateral* Change Orders or *unilateral* Change Orders or result from any other properly authorized written order from the **Owner** or **Professional** which represents a constructive change.

10.1.2. Negotiated Changes – The **Owner** may negotiate changes in the Work by directing the **Professional** to prepare a Bulletin in numerical sequence describing the change being considered. Upon receiving a Bulletin, the **Contractor** (with the appropriate Subcontractors) shall evaluate the described change and quote the Bulletin. In estimating adjustments in Contract Price and/or Contract Time, the **Contractor** shall follow the provisions, including the breakdown requirements, specified in Article 11.

10.1.3. Constructive Changes – Any written order (including instruction, interpretation, determination, authorization, or approval) from the **Owner** or **Professional** that causes a change in the Contract Documents shall constitute a change in the Work, provided the **Contractor** or the **Owner** gives prompt, written notice of a

change to the other (with copy to the **Professional**) stating the date, circumstances, and source of the change.

10.1.3.1. Upon receipt and evaluation of the written notice, if the **Owner** agrees, with the **Professional's** advice, that a change within the general scope of the Work has been ordered, the **Owner** shall, by Change Order or Change Authorization, correspondingly amend the Contract Documents. If the **Owner** finds that a change within the general scope of the Work has not been ordered, and the **Contractor** disagrees, the **Contractor** may deliver notice of a claim and a claim Submittal in accordance with the procedures and within the deadlines set forth in Article 15.

10.1.3.2. **No proposal or claim** by the **Contractor** on account of changes under paragraphs 3.2.1, 10.1.3 or any other matter for which Contractor asserts added cost or time **shall be allowed unless initiated by written notice** of such proposal or claim to the Professional and Owner **within 21 days after the occurrence of the event giving rise to such proposal or claim or within 21 days after the contractor first recognizes the condition giving rise to the proposal or claim.** A full and detailed breakdown of cost and time requested, with supporting documentation, if not provided with initial notice shall be delivered to Professional and Owner within 15 days of the notice, as noted in article 11.1.2, unless otherwise agreed in writing, by the Owner prior to expiration of such time.

10.1.4. **Unilateral Changes** – If, in negotiations, the **Owner** and **Contractor** are unable to agree on the adjustment in Contract Price or Contract Time corresponding to any change in the Work, the **Owner** may issue a *unilateral* Change Order. Upon receiving any such Change Order, the **Contractor** shall promptly proceed or continue with the Work Involved as required by the Change Order.

10.1.4.1. *Unilateral* Change Orders may adjust Contract Price and/or Contract Time, as the **Owner**, with the advice of the **Professional**, may determine appropriate. Contract Price may be adjusted on a *lump sum* basis or an *actual cost, not to exceed* basis. If the **Contractor** disagrees with the extent of the adjustments in Contract Price and/or Contract Time made by any such *unilateral* Change Order, the **Contractor** may deliver notice of a claim and a claim Submittal in accordance with the procedures and within the deadlines set forth in Article 15.

10.2 Differing Subsurface or Physical Site Conditions:

10.2.1. The Contract Documents make available Authorized Technical Data concerning subsurface site conditions and physical conditions of existing surface and subsurface facilities at the site. Consistent with Section 00100 Instructions to Bidders, except for reasonable reliance on the accuracy of Authorized Technical Data, the **Owner** does not warrant that Authorized Technical Data is necessarily sufficient and complete for the purposes of selecting Means and Methods, initiating, maintaining, and supervising safety precautions and programs or discharging any other obligation assumed by the **Contractor** under the Contract Documents.

10.2.2. The **Contractor** or **Owner** shall notify the other in writing if the **Contractor** or **Owner**, respectively, discovers that (I) actual subsurface conditions or latent physical conditions of existing surface and subsurface facilities encountered at the site differ materially from those shown or indicated in the Contract Documents, or (II) unknown subsurface conditions or unknown physical conditions of existing surface and subsurface facilities encountered at the site, of an unusual nature, differ materially from those ordinarily

encountered and recognized as inherent in work similar in character to the Work. A written notice from the **Contractor** shall be delivered promptly before the conditions are disturbed and before proceeding with the affected Work. A written notice from the **Owner** shall be delivered promptly after the **Owner** has knowledge of the differing subsurface or physical conditions.

10.2.2.1. Upon receipt or delivery of any such notice, the **Owner** shall investigate the differing conditions asserted. If, with the **Professional's** advice, the **Owner** determines that conditions on which the **Contractor** is entitled to rely do differ materially, the **Owner** will amend the Contract Documents to provide for any changes in the Work and adjustments in Contract Price and Contract Time made necessary by the differing conditions and any resulting Delay which is not reasonably anticipatable under the circumstances and which is attributable to the **Owner** and/or **Professional**. Unless the **Owner** and **Contractor** otherwise agree, no increase in Contract Time shall be made for any suspension of Work made necessary by any differing subsurface conditions, if the suspension of Work lasts less than ten (10) Calendar Days.

10.2.2.2. If the **Owner** determines that the actual conditions encountered and those conditions on which the **Contractor** is entitled to rely do not differ materially, and the **Contractor** disagrees with the **Owner's** determination, the **Contractor** may deliver notice of a claim and a claim Submittal in accordance with the procedures and within the deadlines set forth in Article 15.

10.2.2.3. No proposal or claim by the **Contractor** due to differing site conditions shall be allowed (a) if the **Contractor** knew of their existence before submitting its Bid or if those conditions could have been discovered by any reasonable examinations for which the **Contractor**, as Bidder, was made responsible under the Bidding Requirements, and/or (b) unless the **Contractor's written notice** is provided **within not more than 21 days after the contractor first recognizes the condition giving rise to the proposal or claim and gives the Owner adequate opportunity to investigate the asserted differing site conditions.** A full and detailed breakdown of cost and time requested, with supporting documentation, if not provided with initial notice shall be delivered to Professional and Owner within 15 days of the notice, as noted in article 11.1.2, unless otherwise agreed in writing, by the Owner prior to expiration of such time.

10.2.3. The provisions of paragraph 10.2.2 through 10.2.2.3 also shall apply to situations where the **Contractor** or **Owner** discovers that any reference points provided by the **Owner** need correction to enable the **Contractor** to proceed with the Work.

10.3 Responsibilities for Underground Utilities:

10.3.1. The **Contractor** shall comply with 1974 PA 53, as amended, MCL 460.701 *et seq.*, and all other Laws concerning Underground Utilities. In addition, the **Contractor** shall be responsible for immediately notifying the **Owner** of any contact with or damage to Underground Utilities, and for the safety, protection of and repairing of any damage done to any Work and any surface and subsurface facilities. Except as provided under 1974 PA 53, as amended, MCL 460.701 *et seq.*, paragraph 10.3.2 or by any Allowance specific to Underground Utilities, the **Contractor** shall bear an appropriate portion of the Delay and costs relating to the obligations set forth in this paragraph.

10.3.2. Shown or Indicated – If the **Contractor** encounters Underground Utilities shown or indicated (whether in the Contract

Documents or those documents itemized in Section 00210 Information for Bidders) that are inaccurately shown or are inaccurately located, responsibility for any damage shall be as provided in MCL 460.701 et seq. To the extent the Drawings and/or Specifications inaccurately show or locate, through error or omission, the actual physical conditions and/or location of existing Underground Utilities (when compared with the information and data provided by the owners of such Underground Utilities), the **Owner** will amend the Contract Documents to provide for a corresponding adjustment in Contract Price and/or Contract Time.

10.3.3. Not Previously Located – If the **Contractor** encounters not previously located Underground Utilities, which could not reasonably have been foreseen, the **Owner** will amend the Contract Documents to provide for any changes in the Work and corresponding adjustments in Contract Price and/or Contract Time made necessary by such changes in the Work and by any resulting Delay which is not reasonably anticipatable under the circumstances and which is attributable to the **Owner** and/or **Professional**.

10.4 Hazardous Material Conditions:

10.4.1. The **Contractor** shall use, handle, store, dispose of, process, transport and transfer any material considered a Hazardous Material in accordance with all federal, state, and local Laws. If the **Contractor** encounters material reasonably believed to be a Hazardous Material and which may present a substantial danger, the **Contractor** shall immediately stop all affected Work, give written notice to the **Owner** of the conditions encountered, and take appropriate health and safety precautions.

10.4.2. Upon receipt of the written notice, the **Owner** will investigate the conditions. If (a) the material is a Hazardous Material that may present a substantial danger and which was not described in the Drawings and/or Specifications, or identified in the Contract Documents as Work under the Contract Documents, and (b) the Hazardous Material was not brought to the site by the **Contractor**, or does not result in whole or in part from any violation by the **Contractor** of any Laws covering the use, handling, storage, disposal of, processing, transport and transfer of Hazardous Materials, the **Owner** shall order a suspension of Work in writing. The **Owner** shall proceed to have the Hazardous Material removed or rendered harmless by negotiating a change in the Work with the **Contractor**, by means of separate contract or as the **Owner** may deem otherwise expedient. In the alternative, the **Owner** shall terminate the affected Work or the Contract for the **Owner's** convenience.

10.6 Unit Price Work:

10.6.1. If the Contract Documents specify Unit Price Work, the Contract Price shall contain the sum of each unit price times its estimated quantity. The **Contractor** shall be responsible for completing, within the Contract Times, one hundred twenty (120%) of the estimated quantities of Specified Unit Price Work and reasonable quantities of Contingent Unit Price Work.

10.6.2. The **Contractor** shall promptly, **before proceeding with any affected Unit Price Work**, deliver a written notice to the **Professional** (a) whenever actual quantities for an item of Specified Unit Price Work differs materially from those estimated and request an adjustment in the estimated quantity, or (b) requesting authorization to provide any or differing quantities of any item of

10.4.3. Once the Hazardous Material has been removed or rendered harmless by any of the means outlined in paragraph 10.4.2, the affected Work shall be resumed as directed in writing by the **Owner**. Any determination by the Michigan Department of Health & Humans Services and/or the Michigan Department of Environment, Great Lakes, and Energy (whichever is applicable) that the Hazardous Material has either been removed or rendered harmless shall be binding upon the **Owner** and **Contractor** for the purposes of resuming the Work. If any such incident with Hazardous Material results in Delay not reasonable anticipatable under the circumstances and which is attributable to the **Owner** or **Professional**, the **Owner** will amend the Contract Documents to provide for a corresponding adjustment in Contract Price or Contract Time, or both, made necessary by such Delay.

10.4.4. If the Hazardous Material was brought to the site by the **Contractor**, or results in whole or in part from any violation by the **Contractor** of any Law covering the use, handling, storage, disposal of, processing, transport and transfer of Hazardous Materials or from any other act or omission within its control, the **Contractor** shall bear its proportionate share of the Delay and costs involved in cleaning up the site and removing and rendering harmless the Hazardous Material to the satisfaction of the **Owner**, State and all Political Subdivisions with jurisdiction. If the **Contractor** fails to proceed with due diligence to take appropriate action pursuant to applicable Law and consistent with the **Owner** requirements, the **Owner** may act accordingly, in which case the **Contractor** shall defend, indemnify, and hold harmless the **Owner** from and against all claims, as construed in paragraph 1.4, arising from the **Owner's** exercise of such appropriate action.

10.5 Incidents with Archaeological Features:

10.5.1. The **Contractor** shall at once notify in writing the **Owner** of any Archaeological Feature deposits that are encountered or unearthed during the execution of the Work. The **Contractor** shall protect the deposits in a satisfactory manner and no further disturbance of the Archaeological Features shall take place until Work is allowed to be resumed in the affected areas.

10.5.2. If the **Owner**, with the advice of the **Professional**, concludes that the Contract Documents require changes because of Archaeological Features encountered, the **Owner** will amend the Contract Documents to provide for any changes in the Work and corresponding adjustment in Contract Price and/or Contract Time made necessary by the changes due to the Archaeological Features encountered and by any resulting Delay which is not reasonably anticipatable under the circumstances, and which is attributable to the **Owner** and/or **Professional**

Contingent Unit Price Work. The **Contractor** or the **Owner** shall submit to the other and the **Professional**, a proposal for adjusting that item's unit price and/or the Contract Time. The proposal shall be properly substantiated.

10.6.2.1. Promptly after being notified by the **Contractor**, the **Professional** will evaluate the affected Unit Price Work and provide its determination to the **Owner** and **Contractor**. If the **Owner** adjusts the estimated quantity of Specified Unit Price Work or authorizes any, or any additional, quantities of Contingent Unit Price Work, the **Contractor** shall proceed with that Unit Price Work as directed by the **Professional**. The **Contractor** shall proceed with the Unit Price Work regardless of whether the **Owner**, after conferring with the **Professional** determines that a variation in quantity justifies an adjustment in the unit price, or that the existing unit price is valid for the additional or reduced quantities, or that no

adjustment in the Contract Time is warranted. In the event the **Contractor** disagrees with any such determination, the **Contractor** shall deliver a notice of claim and a claim submittal in accordance with the procedures and within the deadlines set forth in Article 15.

10.6.2.2. Any adjusted Unit Price agreed upon by the **Owner** will only apply to the actual quantities above one hundred twenty percent (120%) or to the actual quantities less than eighty percent (80%) of the estimated quantity. For additional quantities over one hundred twenty percent (120%) or reduced quantities below eighty percent (80%) of the estimated quantity, the **Owner** may negotiate a Unit Price with the **Contractor**, or direct a unilateral change as provided by Article 10 or rebid that Work. In no case, however, will a Unit Price change resulting from a reduction in quantity be renegotiated such that the changed Unit Price produces a modified Bid Price for any line item that exceeds the initial Bid Price for that line item.

10.6.3. No adjustment due to quantity variations shall be allowed (a) unless the **Contractor** met the notice requirements of paragraph 10.6.2, (b) to the extent that the Bid Price for a line item will increase due to reduced quantities at a higher unit, (c) for under runs in any quantities of Contingent Unit Price Work, unless the unit price times the estimated quantity exceeds the lesser of \$50,000.00 or two percent (2%) of the Contract Price, or (d) if any unit price increase results in whole or in part from any act or omission within the control of the Contractor (errors in the Contractor's Bid, unbalanced unit prices, etc.).

10.7 Cash Allowances; Provisionary Allowances:

10.7.1. The **Contractor** shall obtain the **Professional's** written acceptance before providing materials, equipment or other items covered by a Cash Allowance. Payments under a Cash Allowance shall be on actual costs, and exclude costs for supervision, handling, unloading, storage, installation, testing, etc., which shall be considered to be included within other elements of the Contract Price. Payments within the limits of an Allowance shall exclude Fee and Bond and insurance premiums since these are already included within other elements of the Contract Price.

10.7.2. The **Contractor** shall complete Work covered by Provisionary/Contingency Allowances as approved in writing by the **Owner** and directed by the **Professional**. The Cost of the Work Involved for Work authorized under any Provisionary/Contingency Allowance shall be determined pursuant to Article 11, except those payments within the limits of any Allowance shall exclude Bond and insurance premiums under paragraph 11.8.1.5, since these costs are already included within other elements of the Contract Price.

10.8 Change Orders; Change Authorizations:

10.8.1. The terms "Change Order" and "Change Authorization" are defined in Section 00020 Glossary. Further, Division 1 includes prototype Change Order and Change Authorization forms which shall be used by the **Owner** and **Contractor** in connection with modifications to the Contract.

*10.8.2. A *bilateral* Change Order which does not incorporate a **Contractor** reservation of rights to claim additional adjustments, shall memorialize the **Owner's** and **Contractor's** agreement as to the adjustments in Contract Price and/or Contract Time made by the Change Order. Any such *bilateral* Change Order shall constitute an all-inclusive settlement for all changes, Delay, and costs, whatsoever, and the **Contractor's** signature on the Bulletin and

proposal incorporated into that Change Order represents a waiver of all rights to file a subsequent proposal or a claim under Article 15 on account of that Change Order or the Work.

10.8.3. A presumed *bilateral* Change which includes a proposal signed by the **Contractor** with a reservation to claim additional adjustments shall be regarded as a notice of claim as to those adjustments and shall be pursued as provided in Article 15, except as the **Owner** and **Contractor** may otherwise agree.

10.8.4. A Change Order issued by the **Owner** after unsuccessful Contract Price and/or Contract Time negotiations with the **Contractor** and stating the **Owner's** proposed basis for the necessary adjustments in Contract Price and/or Contract Time shall be a *unilateral* Change Order.

10.8.5. The **Owner** will issue Change Orders to amend the Contract Documents for changes in the Work and for any adjustments in Contract Price or Contract Time agreed to in total or in part by both the **Owner** and **Contractor**; or to correspondingly adjust the Contract Price for Work furnished under Cash Allowances, Work completed that was authorized under Provisionary/Contingency Allowances and actual quantities of Unit Price Work. Amounts for Work Involved in a Change Order signed by the **Owner** may be included in subsequent Requests for Payment.

10.8.6. The **Owner** may use Change Authorizations (a) to document agreed-upon minor variations in the Work, and/or (b) to document or order changes in the Work not warranting any adjustment in Contract Price or Contract Time. Examples of the second category include but are not limited to the **Owner's** authorization for drawing payments against a Provisionary/Contingency Allowance or the **Owner's** consent to quantity variations not increasing the Contract Price.

10.8.7. Before, or in conjunction with, the **Professional's** certification of final payment, an appropriate Change Order will be issued, with the **Professional's** advice, to correspondingly adjust the Contract Price for the value of Work furnished under Cash Allowances, Work completed that was authorized under Provisionary/Contingency Allowances and actual quantities of Unit Price Work.

10.8.8. Subject to the provisions of paragraphs 10.8.2 through 10.8.4, it is a requirement of the Contract Documents that all Change Orders duly signed and issued by the **Owner** shall incorporate Bulletins, which are duly signed by the **Contractor**, regardless of whether the **Contractor** uses a reservation of rights.

ARTICLE 11 CHANGES IN CONTRACT PRICE; CHANGES IN CONTRACT TIME

11.1 General Provisions:

11.1.1. Contract Price or Contract Time may be changed only by Change Order duly signed by the **Owner**. Neither Contract Price nor Contract Time may be changed by Change Authorization (subject to the provisions for constructive changes).

11.1.2. **Contractor** proposals for adjusting Contract Price and/or Contract Time shall be due within fifteen (15) Calendar Days after the **Contractor** receives a Bulletin or delivers to the **Owner** a notice of a change or a Delay. Proposals not complying with the requirements of paragraphs 11.1.4 and 11.1.5 shall be returned for

resubmission. This turnaround period is of the essence and any Delay in delivering a bulletin or resulting from resubmission of an incomplete Bulletin shall not justify any increase in Contract Price or Contract Time. The **Owner**, in its sole discretion, may extend or shorten the 15-Day period for Bulletin quotations estimated at more than \$250,000 or less than \$25,000.

11.1.3. The **Professional** will review each **Contractor** proposal, and the **Professional** will recommend to the **Owner**, within a reasonable time, whether or not the Bulletin quotation is acceptable. Due to the time required to obtain **Board** and **Director** approvals, a **Contractor** proposal shall be irrevocable for sixty (60) Calendar Days after it is submitted to the **Professional**.

11.1.4. **Contractor** proposals or claims for Work Involved shall detail all affected items of Work, whether increased, revised, added, or deleted, and shall be fully documented and itemized as to (a) individual adds and deducts in Work quantities and labor manhours; (b) corresponding itemized Cost of Work Involved (paragraphs 11.4 through 11.9; and (c) Fee. Proposals or claims including Fee of five percent (5%) for Work Involved of a Subcontractor shall nominate the performing Subcontractor and enclose the Subcontractor's pricing data, if available.

11.1.5. For **Contractor** proposals or claims for adjustments in Contract Price arising from Delays (whether or not such Delays extend any Contract Time or any early completion date), the **Contractor's** estimates shall be as comprehensive and detailed as may be appropriate to support the proposal or claim. Examples of germane information include labor productivity, labor manpower levels, production data and Progress Schedule revisions.

11.1.6. If the **Contractor's** surety requires notice of any adjustment in Contract Price and/or Contract Time, whether made pursuant to Article 11 or otherwise; any "or equal" material or equipment or substitution approved by the **Professional**; any change within the scope of Article 10; or any other addition, deletion or revision in the requirements of the Contract Documents, whether made by Change Order or Change Authorization, it shall be the **Contractor's** responsibility, and not the **Owner's**, to give notice to the **Contractor's** surety. It is agreed that none of these modifications to the Contract Documents and/or the Work shall invalidate the Agreement.

methods in paragraph 11.3.1.1 through 11.3.1.3, or otherwise shall be limited to the methods in paragraph 11.3.1.4 or 11.3.1.5.

11.3.1.1. If any Work Involved is covered by lump sum prices or unit prices contained in the Contract Documents, those prices shall be used (subject to the terms and conditions of paragraph 10.6 Unit Price Work). In the latter case, the unit prices shall be applied to the quantity of Unit Price Work Involved.

11.3.1.2. If any Work Involved is not covered by lump sum or unit prices contained in the Contract Documents, then application of a lump sum price may be negotiated using the **Contractor's** itemized estimate of the *anticipated* Cost of the Work Involved, as specified in this Article, and a Fee for the Work Involved, as specified in paragraph 11.11.1.

11.2 Changes in Contract Time:

11.2.1. An extension in Contract Time will be justified only to the extent that the **Contractor** demonstrates, with comprehensive and detailed documentation, that the Delay is not reasonably anticipatable under the circumstances, is not caused by act or omission within the control of the **Contractor**, and, furthermore, that the Delay necessarily extends the Work, or portion of the Work in question, beyond the pertinent Contract Time. If the **Owner** determines that the **Contractor's** documentation is insufficient to allow a thorough evaluation of the time extension request, the **Contractor** shall further support the request through a detailed analysis of the Progress Schedule Revision Submittal.

11.2.2. Examples of events that may justify an extension in Contract Time include acts of God or the public enemy; acts of the U.S. Government, the State or a Political Subdivision, each acting in its public capacity (including acts as permitting agency); acts of a Public Utility acting in its public capacity; fires, floods, epidemics, quarantine restrictions; strikes, freight embargoes; unusual weather (unusual in the sense of frequency or severity vis-à-vis the prior five (5) year average); unusually severe shortages of construction materials (considering all feasible sources of supply); Underground Utilities which the Contract Documents, through error or omission, inaccurately show or indicate; Underground Utilities not previously located; objection, for the **Owner's** convenience, to a nominated Subcontractor; Archaeological Features; suspension of Work; changes in the Work, differing site conditions; variation in quantities; and Delay, as provided in this paragraph, of Subcontractors or Suppliers, at any tier, not caused in whole or in part by any act or omission within the control of both the **Contractor** and any such Subcontractors and Suppliers.

11.2.3. If upon evaluation of the **Contractor's** analysis, the **Owner** approves an extension in Contract Time for Delay not caused in whole or in part by any act or omission within the control of the **Owner** and/or **Professional**, the **Owner** shall authorize the necessary adjustment in Contract Time only. If the **Owner** approves an extension in Contract Time for Delay caused in whole or in part by any act or omission within the control of the **Owner** and/or **Professional**, the **Owner** shall authorize the necessary adjustments in Contract Time and Contract Price.

11.3 Methods for Making Adjustments in Contract Price:

11.3.1. The method to be used to determine any adjustment in Contract Price shall be selected by the **Owner** from one of the

11.3.1.3. If the Work Involved is not covered by the first two methods, the **Owner** may direct the **Contractor** to proceed with the Work Involved on an *actual cost* basis, with or without a guaranteed maximum, based on an itemized breakdown of the *actual* Cost of the Work Involved, as specified in this Article, and a Fee for the Work Involved, as specified in paragraph 11.11.2.

11.3.1.4. If the Work Involved is *not* covered by the first two methods, the **Owner** may direct the **Contractor** to proceed through a *unilateral* Change Order on a lump sum basis or a not-to-exceed basis, based on the **Professional's** estimate of the anticipated Cost of Work Involved and a Fee for the Work Involved, as specified in paragraph 11.11.1 or 11.11.2.

11.3.1.5. If payment for the Work Involved is to be determined by the Michigan Court of Claims or a AAA arbitration panel, it is agreed by the **Contractor** that the *actual cost* and Fee method in

paragraph 11.3.1.3 shall represent the appropriate method for determining such payment.

11.3.2. Items making-up the Cost of the Work Involved shall be allowable to the extent (a) consistent with those prevailing in the Project locality, (b) necessary, reasonable, and clearly allocable to the Work Involved, and (c) limited to labor costs, Subcontract costs, material and equipment costs, construction equipment costs and general conditions costs, as specified in this Article.

11.4 Labor, Subcontract and Material/Equipment Costs:

11.4.1. The Cost of any Work Involved includes the **Contractor's** payroll costs for craft workers resident at the site (through crew foremen) assigned to furnishing and incorporating materials and equipment into the Work Involved. If craft labor manhours exceed those that can be gleaned from the Means Cost Data, or other cost guide acceptable to the **Owner**, the **Contractor** shall provide proper justification, which shall be acceptable to the **Professional**.

11.4.1.1. Payroll costs shall include wages, labor burdens and a factor for field supplies and purchase costs (less market value if not consumed) of tools not owned by the workers. Labor burdens shall be certified by an authorized financial representative of the **Contractor** and may include social security, unemployment taxes, workers' compensation, health and retirement benefits, vacation, and holiday pay. The factor for field supplies and tools (individually valued at less than \$1,000.00) shall not exceed four percent (4%) of the wages without burdens, unless the **Contractor** furnishes detailed data which supports a higher factor. For actual payroll costs, **Contractor** time sheets verified by the **Professional** and/or certified payrolls shall be the only valid Records. For actual payroll costs under paragraph 11.3.1.5, time sheets shall be valid only if they expressly correlate to the Work Involved and were recorded at that time and/or used for certified payrolls.

11.4.2. The Cost of the Work Involved includes the **Contractor's** costs for the labor costs, (lower tier) Subcontract costs, material and equipment costs and general conditions costs of Subcontractors nominated for the Work Involved. Except for a higher six percent (6%) limit on the factor for field supplies and small tools, the methods for calculating Subcontractors' costs shall be the same as those for **Contractor** costs, except that the term "Subcontractor" shall replace the term "**Contractor**," context permitting. If the **Owner** and **Contractor** agree in advance, the **Contractor** shall obtain detailed quotations and shall nominate at least two (2) Subcontractors, acceptable to both the **Contractor** and **Professional**, for selection by the **Owner**.

located applicable to the equipment (model number and year) shall be used. For equipment leased or rented on an hourly basis, the rate for second or third shifts shall not exceed fifty percent (50%) of the base rate. Operating costs shall not exceed the hourly operation rate in the Blue Book. Hourly rates for equipment previously in use at the site for a month or longer shall use the monthly rate divided by 176 hours. Equipment previously in use for only one week or not previously in use at the site shall be invoiced to the **Owner** using the following schedule of equipment use:

Less than 8 hours	Hourly Rate
1 Day but less than 7 Calendar Days	Daily Rate
1 week but less than 30 Calendar Days	Weekly Rate
30 Calendar Days or more (when in use)	Monthly Rate

11.4.3. The Cost of any Work Involved includes the **Contractor's** costs for materials and equipment, including transportation, storage, and necessary Suppliers' field services. All trade discounts, rebates and refunds and returns from surplus sales that can be realized at the time of pricing shall accrue to the **Owner**, and the **Contractor** shall make arrangements so that they may be obtained. If the Bulletin for the Work Involved *lists* specific Suppliers, the **Contractor** shall obtain written quotations from them and shall nominate one of the *listed* Suppliers to allow a comprehensive review of the proposal by the **Professional**. Invoices segregating items relating to the Work Involved shall be valid Records in support of actual Supplier costs.

11.5 Construction Equipment Costs:

11.5.1. The cost of any Work Involved includes costs for individual construction equipment with replacement value in excess of \$1,000.00. Transportation, loading and unloading, installation, dismantling and removal and shipping costs shall be allowed to the extent required by the Work Involved and reasonable under the circumstances. Equipment costs shall cease when the equipment is no longer needed for the Work Involved. Payroll costs for labor operating the equipment are as specified in paragraph 11.4.1. Equipment costs shall be computed using the same accounting and estimating rules and prices, whether related to added or deleted Work.

11.5.2. When determining actual construction equipment costs (a) under paragraph 11.3.1.3, daily logs of the equipment, operators, and actual usage, verified by the **Professional**, shall be the valid Records; (b) under paragraph 11.3.1.5, such daily Records shall be valid only if developed when any such Work Involved was performed and used for accounting purposes.

11.5.3. Rented (or owned) equipment, idled solely by actions of the **Owner** or **Professional**, shall be paid at the rate for rented equipment (or at fifty percent (50%) of the rate for owned equipment) provided the idle period exceeds what is normal for the equipment and occurs during normal working hours.

11.6 Rented or Leased Construction Equipment:

11.6.1. Construction equipment rented or leased from third parties shall be priced using the rates negotiated between the **Owner** and **Contractor**. If no agreement is reached, those rates listed in the Rental Rate "Blue Book" published by PRIMEDIA Information Inc. of San Jose, Ca, for the region where the Project is

11.7 Owned Construction Equipment:

11.7.1. Construction equipment owned by the **Contractor** or rented or leased from lessors associated with or owned by the **Contractor**, shall be priced using the rates negotiated between the **Owner** and **Contractor** based on the **Contractor's** normal accounting practices. If no agreement is reached, the hourly rates in the "Contractor's Equipment Cost Guide," published by PRIMEDIA Information Inc. for the region where the Project is located shall be used. Operating costs shall not exceed the hourly operation rate in the Blue Book. For multiple shifts, rates shall not exceed the shift Work adjustments recommended in the Cost Guide.

11.8 General Conditions Costs:

11.8.1. The Cost of any Work Involved may include necessary general conditions costs to the extent those costs increase or decrease on account of, or are directly attributable to, the performance of Work Involved, or are required due to an extension in Contract Time or Delay under paragraph 11.13.5. Categories of general conditions which are allowable under this paragraph (subject to the provisions of paragraph 11.9) include:

11.8.1.1. To the extent agreed to in advance by the **Owner**, payroll costs for the **Contractor's** project manager or construction manager, but not both, for Work activities conducted at the site.

11.8.1.2. Payroll costs for the **Contractor's** superintendent and full-time general foremen, if any are assigned to the Work, for Work Involved performed beyond normal working hours and/or to the extent those costs and subsistence expenses arise solely from an extension in Contract Time or Delay under paragraph 11.13.5.

11.8.1.3. If agreed to in advance by the **Owner**, payroll costs for management personnel resident and working at the site and for workers not covered under paragraph 11.4.1, resident at the site and engaged as support workers (i.e., loading/unloading, clean-up, etc.) to workers covered under paragraph 11.4.1.

11.8.1.4. Costs of office and temporary facilities at the site, including office materials, office supplies, office equipment, minor expenses, utilities, fuel, sanitary facilities, internet, and telephone service at the site, provided those cost arise solely from an extension in Contract Time or Delay under paragraph 11.13.5.

11.8.1.5. Costs of liability insurance premiums for insurance not included within the labor burdens charged under paragraph 11.4.1, and costs of Bond premiums.

11.8.1.6. Costs of consultants not in the direct employ of the **Contractor**, or Subcontractors not covered under paragraph 11.4.2; to the extent authorized by the **Owner** before proceeding with the Work Involved, and provided that those costs are neither covered by paragraph 11.4 nor excluded by paragraph 11.10; and

11.8.1.7. Taxes on the Work Involved, and for which the **Contractor** is liable; and royalty payments and fees for permits and licenses, provided they relate solely to the Work Involved.

11.9 Limitations on Allowable Costs:

11.9.1. The **Contractor** shall not include as part of the Cost of any Work Involved any construction equipment costs, small tool

Involved. Examples of administrative costs or home office overhead covered by this provision include, without limitation:

11.10.1.1. Payroll costs and other compensation of executives, general and administrative managers, estimators (except to the extent agreed to in advance by the **Owner**), claim consultants, attorneys, accountants, labor relation coordinators, purchasers, expeditors, and other administrative staff, whether resident at the **Contractor's** principal or branch offices.

11.10.1.2. Payroll costs and other compensation of project managers, construction managers, architects, engineers, schedulers, detailers, safety personnel, clerks, and other

costs, or general conditions costs that do not increase on account of, or are not directly attributable to, the furnishing and/or performance of any Work Involved. Examples of such unallowable costs include:

11.9.1.1. Charges for **Contractor's** superintendent, general foremen and management personnel assigned full-time to the Work, if the charges relate to Work Involved which does not extend the Contract Time or cause Delay under paragraph 11.13.5, or to Work Involved not performed beyond normal working hours.

11.9.1.2. Fixed percent mark-ups for construction equipment (as opposed to specific construction equipment costs); or

11.9.1.3. Cost of field supplies and/or small tools solely for extensions in Contract Time or Delay under paragraph 11.13.5.

11.9.2. Changes in Contract Price for extensions in Contract Time or Delay under paragraph 11.13.5 shall exclude any costs that are unaffected or do not relate to the extension in Contract Time or the Delay in early completion. Examples include:

11.9.2.1. Operating costs of construction equipment assigned to the Work for the duration, to the extent used in the incorporation of materials and equipment into the Work, provided the equipment is not subject to increased usage because of the extension in Contract Time or the Delay in early completion.

11.9.2.2. Operating costs plus owned/rental costs of construction equipment brought to the site for a specific activity (crane used for specific lifts, concrete pump used for pours, etc.), provided the equipment is not subject to increased usage because of the extension in Contract Time or the Delay in early completion.

11.9.2.3. Construction equipment and site facilities which are fully paid under the Contract Price for the Work, as awarded.

11.9.3. The **Contractor** shall not include as part of the Cost of any Work Involved acceleration costs incurred, for the **Contractor's** benefit, to make-up Delay which warrant extensions in Contract Time but do not justify increases in Contract Price.

11.10 Costs Covered by the Fee for the Work Involved (and not Allowable as Cost of the Work Involved):

11.10.1. **Contractor** administrative costs and home office overhead, whether at the **Contractor's** principal or branch offices, shall not be allowable as elements of the Cost of Work Involved. Rather, those administrative costs and home office overhead shall be non-reimbursable expenses covered by the Fee for the Work

administrative staff not resident at the site and who are not part of the **Contractor's** general conditions personnel contingent.

11.10.1.3. Costs of engineers, architects, accountants, consultants, attorneys, and others, in the direct employ of the **Contractor** or otherwise, utilized for services related to a controversy or claim about the acceptability of the Work.

11.10.1.4. Costs incurred in the preparation of Contract Change Orders (whether or not ultimately authorized by the **Owner**), except as otherwise authorized by the **Owner**; and costs incurred in the preparation or filing of claims; and

11.10.1.5. Any interest on the Work Involved, unless otherwise allowed by the Michigan Court of Claims or an arbitration panel; charges for delinquent payments; lost interest on unpaid withholdings; lost profits and lost opportunities; and home office storage and yard facilities.

11.11 Limits on the Fee for the Work Involved:

11.11.1. Any adjustment in Contract Price made by *bilateral* Change Order which stipulates a lump sum price (developed from the **Contractor's** itemized estimate of the *anticipated* Cost of the Work Involved) without incorporating a **Contractor** reservation of rights to claim additional adjustments, shall include a Fee for costs under paragraph 11.10 and for profit, not to exceed the following:

11.11.1.1. For Work Involved to be self-performed by the **Contractor**, the **Contractor's** Fee shall not exceed fifteen percent (15%) of the Cost of the Work Involved. For Work Involved to be performed by any nominated Subcontractor, regardless of tier, the nominated, performing Subcontractor's Fee also shall not exceed fifteen percent (15%) of the Cost of the Work Involved.

11.11.1.2. For Work Involved to be performed by any nominated Subcontractor, the **Contractor's** Fee shall be five percent (5%) of the performing Subcontractor's Cost of the Work Involved, excluding that Subcontractor's Fee. For Work Involved of any nominated lower tier Subcontractor, any corresponding higher tier Subcontractors and the Contractor shall share equally a Fee of five percent (5%) of the performing lower tier Subcontractor's Cost of the Work Involved, excluding the lower tier Subcontractor's Fee.

11.11.2. Any adjustment in Contract Price made by a *bilateral* Change Order (whether based on a *lump sum* or on the *actual cost* of the Work Involved) which incorporates a **Contractor** reservation of rights to claim additional adjustments, shall include a Fee of only two-thirds (2/3) of the Fee otherwise resulting from the application of paragraphs 11.11.1 or 11.11.2.

11.11.3. The credit to be allowed to the **Owner** for any individual change consisting of deletions, or additions and deletions, that yields a negative net Cost of the Work Involved, shall be the amount of the net decrease and, if the negative net Cost of the Work Involved exceeds \$10,000.00, a Fee credit of one-fifth of the Fee resulting from the application of paragraphs 11.11.1.1 through 11.11.1.3 shall be added to that amount.

11.11.4. For any change in the Work combining additions, revisions, and deletions, one single Fee for the Work Involved shall be added to the net Cost of the Work Involved, unless the change in the Work combines self-performed **Contractor** Work and Subcontractor Work, or Work of more than one Subcontractor, or

11.13.3. If the **Contractor** requests that the Contract Times be shortened to eliminate the Contract Float on any such early completion Progress Schedule, and the **Owner** agrees to the **Contractor's** request, the **Owner** and **Contractor** may negotiate a reduction in the affected Contract Time. Concurrently, the **Owner** will develop a level of liquidated damages appropriate to the revised Contract Time(s) or, if more appropriate under the circumstances, the **Owner** will specify actual damages, applicable from the negotiated, earlier Contract Time to the Contract Time under revision. In such case, the aggregate actual damages shall not exceed the sum liquidated damages that may have resulted from the originally specified liquidated damages. Such agreement shall be memorialized through an appropriate Change Order.

both, in which case separate Fees for the **Contractor** Work and for the Subcontractor Work shall be calculated, as appropriate.

11.11.6. In the event unrelated changes in the Work are grouped in a Bulletin, or included in a claim, and each of the changes yields a net increase or decrease in the Cost of the Work Involved, the combined Fee for the changes in the Work so grouped shall be computed as the sum of the individual Fees otherwise calculated under paragraphs 11.11.1 through 11.11.5.

11.12 Fee for Unabsorbed Home Office Overhead:

11.12.1. It is intended that the Fee for the Work Involved allowed under paragraph 11.11 shall be included with any adjustment in Contract Price for any Cost of Work Involved. However, the Fee under paragraph 11.11.1 shall not be intended to cover unabsorbed home office overhead resulting from an extension of the Contract Time stated in paragraph 4.1.1 of Section 00500 Agreement. When justified under the Contract Documents, Fee for unabsorbed home office overhead shall be calculated as detailed in paragraph 11.12.2.

11.12.2. If an extension of the Contract Time stated in paragraph 4.1.1 of Section 00500 Agreement and an increase in Contract Price for such an extension in Contract Time is justified under the Contract Documents, the **Owner** shall negotiate with the **Contractor** the reimbursement of an amount for the **Contractor's** home office overhead (under paragraph 11.10) that will be or were unabsorbed before the expiration of that Contract Time. Any such reimbursement shall be based on the lesser of: (a) the product of the ratio of the **Contractor's** home office overhead to its contract billings times the Contract Price in paragraph 3.1 of Section 00500 Agreement that remains unbilled on the expiration of that Contract Time, or (b) that amount derived from the Eichleay formula.

11.13 Changes in Contract Time for Early Completion:

11.13.1. The Contract Times specified in paragraph 4.1 of Section 00500 Agreement represent the **Professional's** best estimate of the time required to complete the Work and take into account comparisons with completed work similar in scope and character to the Work and constructed under similar conditions.

11.13.2. Since "time is of the essence" in performing this Contract, any early completion Rev. 0 Progress Schedule considered acceptable by the **Owner** shall be construed as setting forth a corresponding amount of Contract Float, unless the **Contractor** delivers notice of a request for a shortening of the Contract Time within thirty (30) Calendar Days after receiving the **Owner's** written notice of "no objection" to such Rev. 0 Progress Schedule.

11.13.4. If the **Owner** and **Contractor** are unable to agree to such reduction in the Contract Times, or the **Contractor** rejects the **Owner's** assessment of liquidated or the stipulation of actual damages, or both, the Contract Times in question shall remain unaltered and the early completion Progress Schedule shall be employed as provided in the Contract Documents.

11.13.5. To the extent that the Progress Schedule supports an early completion date, and a Delay extends performance of the Work beyond the **Contractor's** early completion date but not beyond the corresponding Contract Time, if the **Contractor** pursues an increase in Contract Price for such Delay in early completion, the **Owner** shall consider such request, subject to the following: (a) the

early completion is reasonably achievable, i.e., includes proper allowances for weather, **Owner** and **Professional** activities, rework and other foreseeable events within the control of the **Contractor**, (b) the Progress Schedule used to support the request is loaded with Activity manpower data, and (c) the adjustment in Contract Price shall equal fifty percent (50%) of the **Contractor's** Delay costs otherwise allowable under this Article.

11.13.6. As a point of emphasis, under these provisions, an increase in Contract Time and an increase in Contract Price equaling the **Contractor's** costs occasioned by the Delay (as opposed to only fifty percent (50%) of the **Contractor's** Delay costs), shall be justified only if the Delay attributable to the **Owner** and/or **Professional** necessarily extends Substantial Completion of the Work, or the portion of the Work having a specified Contract Time, beyond the correspondingly specified Contract Time.

11.14 Access to Records:

11.14.1. The **Contractor** shall maintain and keep and shall require all Subcontractors and Suppliers to maintain and keep, in accordance with generally accepted accounting principles, Records pertaining to the bidding, award and performance of the Work, including, but not limited to payroll and employment Records and all data used in estimating the **Contractor's** Bid and in pricing and negotiating Work covered by any Change Order, Change Authorization, proposal or claim.

11.14.2. For changes payable on an *actual cost* basis, or in the event of any claim, dispute, litigation, audit exception or appeal or termination, the **Owner** and any of the **Owner's** duly authorized representatives shall have access to those Records for the purpose of inspection, audit/review and scanning/copying. The **Contractor** shall provide appropriate facilities for access promptly after receiving a request. The **Owner** and any of its duly authorized representatives shall have the right to interview **Contractor** employees. The **Contractor** shall make employees available on Business Days between 8:00 AM and 4:00 PM, as requested.

11.14.3. Payroll and other employment Records of workers assigned to the site, including apprentices and trainees, maintained to comply with the requirements of this provision, shall contain the name and address of each worker, correct wage classification, rate of pay (including contributions, or costs assumed to provide, for fringe benefits), daily and weekly number of hours worked, deductions made, and actual wages paid. The **Contractor** shall maintain Records that show: (a) the anticipated costs or actual costs incurred in providing such benefits, (b) that the commitment to provide such benefits is enforceable, and (c) that the plan or program is financially responsible and has been communicated in writing to the workers affected.

shall include appropriate sums for construction equipment costs, general conditions costs, administrative costs (paragraph 11.10) and profit, unless separate pay items are itemized for those costs.

*12.1.3. The Schedule of Values shall include the following close-out pay items: (a) two percent (2%) of the Contract Price for Fire Marshall approval, certificate of occupancy and other code approvals, as specified in the Contract Documents, (b) two percent (2%) of the Contract Price for manufacturer warranties, finalized operating and maintenance documentation, **Owner** training documentation, and test and balance reports, and (c) two percent (2%) of the Contract Price to cover finalized Record Documents.

11.14.4. Access to Records, as prescribed in this paragraph, shall be allowed at any time during the execution of the Work and shall remain in full force and effect for five (5) years after final payment, or termination (in the event of termination), or date of final resolution of any dispute, litigation, audit exception or appeal – whichever event actually applies to this Contract.

11.15 Price Reduction for Defective Cost and Pricing Data:

11.15.1. If at any time during the prosecution of the Work, there is good cause to doubt the **Contractor's** compliance with the Defective Cost and Pricing Data requirements of this paragraph 11.15, the **Owner** shall be entitled to make an appropriate withholding from any payment otherwise owed to the **Contractor**.

11.15.2. Whenever the **Contractor** signs a proposal for a Contract Price or Contract Time adjustment, a Change Order or a claim settlement, the **Contractor** will be deemed to have certified, to the **Contractor's** best knowledge and belief, that the representations made and data submitted in pricing and negotiating the Cost of the Work Involved in that price proposal, Change Order, or claim settlement: (a) were made in good faith and are consistent with the facts, (b) are consistent with the provisions of Articles 10 and 11, and (c) are complete, accurate and current as of the date agreement was reached on the corresponding adjustments in Contract Price and/or Contract Time. This certification shall apply in each and every respect to any Subcontractor and Supplier who signs any cost and pricing data attached to any such a proposal for a Contract Price or Contract Time adjustment, Change Order or claim settlement.

11.15.3. If any adjustment in Contract Price or Contract Time made by any Change Order, claim or dispute settlement was increased by a material and significant amount because the **Contractor**, or any Subcontractor or Supplier, at any tier, made representations or furnished cost or pricing data of any kind that were false, contained math errors or were incomplete, the Contract Price shall be correspondingly reduced by Change Order.

ARTICLE 12 PROGRESS PAYMENTS; FINAL PAYMENT

12.1 Schedule of Values:

12.1.1. The Schedule of Values shall be approved by the **Professional** and divide the Work into pay items for significant Sections and areas, facilities, or structures, with subtotals for first tier Subcontractors. If required in Division 1, the Schedule of Values shall be supported by a more detailed breakdown allocating the pay items to the Progress Schedule Activities.

12.1.2. The Schedule of Values shall tabulate labor costs, Subcontract costs and material and equipment costs. Labor costs

12.2 Requests for Payment:

12.2.1. Once each month, the **Contractor** shall submit to the **Professional** a Request for Payment on the **Owner's** form signed by the **Contractor** certifying Work completed and enclosing all supporting documentation. Each Request for Payment shall certify that all monies owed by the **Contractor** to Subcontractors and Suppliers for which payment previously has been sought has been paid from payments received and include a sworn statement. No Request for Payment shall include amounts for a Subcontractor or Supplier if the **Contractor** does not intend to use the payments

requested, when received, to reduce the **Contractor's** outstanding obligations on the Work.

12.2.2. **The State will only disburse payments under this Contract through Electronic Funds Transfer (EFT).** Contractor must register with the State at <http://www.michigan.gov/SIGMAVSS> to receive electronic fund transfer payments. If Contractor does not register, the State is not liable for failure to provide payment. Without prejudice to any other right or remedy it may have, the State reserves the right to set off at any time any amount then due and owing to it by Contractor against any amount payable by the State to Contractor under this Contract.

12.2.3. Payment to the **Contractor**, if approved by the **Owner**, will be made within thirty (30) Calendar Days after the **Owner** receives and approves a certified Request for Payment from the **Professional**. Payment for authorized reimbursable expenses shall be made monthly in the amount incurred before the cut-off date, provided each payment request expense is properly documented in spreadsheet form detailing the information about the request. The **Contractor** will provide a certification in writing that the payment request submittal is true and accurate.

12.2.4. If payment is requested based on materials and equipment stored at the site or at another location agreed to in writing, the Request for Payment also shall be accompanied by (a) consent of surety, (b) a bill of sale, invoice or other documentation warranting that the **Owner** has received the materials and equipment free and clear of all liens, and (c) evidence that the materials and equipment are covered by appropriate property insurance and other arrangements to protect them and the **Owner's** interests. If the documentation provided by the **Contractor** to comply with the intent of this paragraph is unsatisfactory, the **Owner** shall be entitled to withhold an appropriate amount from that Request for Payment until the **Contractor** provides documentation acceptable to the **Owner**.

12.2.5. The **Contractor** warrants and guarantees that title to all Work, materials and equipment covered by any Request for Payment, whether incorporated in the Work or not, will pass to the **Owner** free and clear of all liens no later than at the time of payment by the **Owner** to the **Contractor**.

12.3 Review of Request for Payment; Intent of Review:

12.3.1. Within ten (10) Calendar Days after receipt of a Request for Payment, the **Professional** shall certify to the **Owner** the amount the **Professional** determines to be due or shall return the Request for Payment to the **Contractor** indicating the reasons for withholding certification. Certification shall be based on the **Professional's** review of the Request for Payment and enclosed documentation, On-Site Inspections, and on-site Project representation, if any has been provided. If a Request for Payment is returned to the **Contractor**, the **Contractor** shall make the necessary corrections and resubmit that Request for Payment.

12.3.2. The **Professional's** certification of any Request for Payment constitutes a representation to the **Owner** that the Work has progressed to the point indicated; that to the best of the **Professional's** knowledge, information and belief, the quality of the Work is in accordance with the Contract Documents; and that the **Contractor** is entitled to payment in the amount certified. Any such representation by the **Professional**, however, shall be subject to an evaluation of the Work as a functioning whole before and upon Substantial Completion; to the results of any subsequent tests called for in the Contract Documents; to a final determination of quantities and classifications of Unit Price Work (if any is specified) and to any other qualifications stated in the certification.

12.3.3. In the case of final payment, the **Professional's** certification of final payment and recommendation that the Work is acceptable shall be a further representation that conditions governing final payment to the **Contractor** have been met.

12.4.1. The **Owner** may withhold from any payment an amount based on the **Professional's** refusal to recommend payment or the **Owner's** estimate of the fair value of items entitling the **Owner** to a withholding. Such may include, but not be limited to liquidated damages, claims made against the **Owner** arising out of or related to the Work, payment claims, or failure by the **Contractor** to reimburse the **Owner** any costs the **Owner** is entitled to recover. The **Owner** will give the **Contractor** reasonably prompt written notice supporting such action.

12.4.2. The **Professional** may refuse to recommend all or any part of any payment, or because of subsequently discovered evidence, inspections or tests or the value of the Punch List, nullify all or any portion of any payment previously recommended, as the **Professional** may consider necessary to protect the **Owner** from loss because (a) the Work is Defective or completed Work has been damaged requiring correction or replacement, (b) the Contract Price has been reduced by Change Order, (c) it has been necessary that the **Owner** correct Defective Work or complete Work, (d) reasonable evidence exists that all or a part of the Work will not be completed within the corresponding Contract Time, (e) of the **Contractor's** failure to comply with all material requirements of the Contract, including, but not limited to the failure to submit Progress Schedule Submittals or Record Documents when due, (f) stored materials for which payment has been made or is sought has been determined by the **Professional** to be damaged or missing, (g) amounts are requested for a Supplier which is not the Supplier named in the **Contractor's** completed Section 00440 Schedule of Materials and Equipment or a Supplier approved by the **Professional** through an "or equal" or substitution procedure, or (h) the **Professional** reasonably believes or knows of the occurrence of an event justifying termination for cause.

12.4 Refusal to Make or to Recommend Payment:

12.4.1. The **Owner** may withhold from any payment an amount based on the **Professional's** refusal to recommend payment or the **Owner's** estimate of the fair value of items entitling the **Owner** to a withholding. Such may include, but not be limited to liquidated damages, claims made against the **Owner** arising out of or related to the Work, payment claims, or failure by the **Contractor** to reimburse the **Owner** any costs the **Owner** is entitled to recover. The **Owner** will give the **Contractor** reasonably prompt written notice supporting such action.

12.4.2. The **Professional** may refuse to recommend all or any part of any payment, or because of subsequently discovered evidence, inspections or tests or the value of the Punch List, nullify all or any portion of any payment previously recommended, as the **Professional** may consider necessary to protect the **Owner** from loss because (a) the Work is Defective or completed Work has been damaged requiring correction or replacement, (b) the Contract Price has been reduced by Change Order, (c) it has been necessary that the **Owner** correct Defective Work or complete Work, (d) reasonable evidence exists that all or a part of the Work will not be completed within the corresponding Contract Time, (e) of the **Contractor's** failure to comply with all material requirements of the Contract, including, but not limited to the failure to submit Progress Schedule Submittals or Record Documents when due, (f) stored materials for which payment has been made or is sought has been determined by the **Professional** to be damaged or missing, (g) amounts are requested for a Supplier which is not the Supplier named in the **Contractor's** completed Section 00440 Schedule of Materials and Equipment or a Supplier approved by the **Professional** through an "or equal" or substitution procedure, or (h) the **Professional** reasonably believes or knows of the occurrence of an event justifying termination for cause.

12.5 Request for Final Payment:

12.5.1. The **Contractor** shall complete the Substantial Completion Punch List within the Contract Time and date fixed by the **Professional**. The **Contractor** shall assemble all requisite documentation before requesting final inspection.

immediately undertake all necessary measure to complete Work in the final completion inspection.

12.5.3. The **Contractor** may request final payment after completing the incomplete or Defective Work to the satisfaction of the **Professional** and delivering final operating and maintenance documentation (with revisions made after Substantial Completion),

warranties, inspection certificates, Record Documents (with revisions made after Substantial Completion), release of payment claim forms and all other required documents.

12.5.4. The **Contractor's** request for final payment shall enclose evidence of completed operations insurance and affidavit certifying that the insurance coverage will not be canceled, materially changed or renewal refused except as provided in paragraph 7.4.3, and an affidavit certifying that the surety agrees that final payment shall not relieve the surety of any of its obligations under the Performance Bond and Payment Bond. The **Contractor's** request for final payment shall further include (a) a **Contractor's** "Guarantee and Statement" (available from the **Owner**, form DTMB-0437) containing a statement of guaranteed indebtedness acceptable to the **Owner** in the full amount of the Contract Price, or a release of payment claims in the form of a release of liens, or a Bond or other security acceptable to the **Owner** to indemnify the **Owner** against any payment claim, and (b) a list of all pending insurance claims arising out of or resulting from the Work being handled by the **Contractor** and/or its insurer.

12.6 Final Payment and Acceptance:

12.6.1. If the **Professional** is satisfied that the Work, or a part of the Work for which separate final payment is specified in the Contract Documents, has been completed and the **Contractor's** other obligations under the Contract Documents have been fulfilled, the **Professional** will, within thirty (30) Calendar Days after receipt of the final payment request, furnish to the **Owner** and **Contractor** the **Professional's** certification of final payment and acceptance. If the **Professional** is not satisfied, the **Professional** will return that request to the **Contractor**, indicating in writing the reasons for not certifying final payment, in which case the **Contractor** shall make the necessary corrections and request that final payment again be considered.

12.6.2. If the **Owner** concurs with the **Professional's** certification of final payment, the **Owner** will, within thirty (30) Calendar Days after receipt by the **Owner** of the **Professional's** certified recommendation of final acceptance, pay the balance of the Contract Price, subject to those provisions governing final payment specified in the Contract Documents. If the **Owner** does not concur with the **Professional's** determination, the **Owner** will return the request for final payment to the **Contractor** indicating in writing the reasons for refusing final payment and acceptance. In that case, the **Contractor** shall make the necessary corrections and shall request that final payment be again considered by the **Owner**. The **Owner's** written determination will be binding upon the **Contractor**, unless the **Contractor** delivers a notice of a claim and a claim Submittal within the deadlines set forth in Article 15.

12.6.3. If final completion of the Work is significantly delayed through no fault of the **Contractor**, the **Owner** may, upon receipt of the **Contractor's** final Request for Payment, and without terminating the Agreement, make payment of the balance due for that portion of the Work fully completed and accepted. Payment of the balance due shall be made under the provisions for final payment but shall not constitute a waiver of claims.

are comparable provisions for the benefit of the **Contractor** in the contracts between those parties and the **Owner**.

12.6.4. The **Owner** shall pay with reasonable promptness any amounts deducted from the final payment, upon resolution of the claims justifying withholding of such monies.

12.7 Contractor's Continuing Obligation:

12.7.1. The following does not constitute acceptance of the Work in the event the Work or any Work is not in accordance with the Contract Documents, and therefore does not release the **Contractor** from its obligation to perform and furnish the Work in accordance with the Contract Documents: (a) a certification by the **Professional** of any Request for Payment or final payment; (b) the issuance of a Substantial Completion certificate; (c) any payment by the **Owner** to the **Contractor**; (d) any Partial Use; (e) any act of acceptance by the **Owner** or any failure to do so; (f) any review and approval of a Shop Drawing, sample, test procedure or other Submittal; (g) any review of a Progress Schedule; (h) any On-Site Inspection; (i) any inspection, test or approval; (j) any issuance of a notice of acceptability by the **Professional**; or (k) any correction of Defective Work or any completion of Work by the **Owner**.

12.8 Waiver of Claims:

12.8.1. The making and acceptance of final payment do not constitute a waiver by the **Owner** of any rights as to the **Contractor's** continuing obligations under the Contract Documents, nor will it constitute a waiver of any claims by the **Owner** against the **Contractor** still unsettled, or arising from unsettled payment claims, Defective Work appearing after final inspection or failure by the **Contractor** to comply with the Contract Documents or the terms of any special warranties provided by the Contract Documents or by Law.

12.8.2. The making and acceptance of final payment will constitute a waiver of all claims by the **Contractor** against the **Owner**, other than those claims previously made in writing, on a timely basis in accordance with Article 15, and still unsettled.

ARTICLE 13 OTHER WORK

13.1 Related Work at Site:

13.1.1. During the period allowed for the furnishing and performance and completion of the Work, the **Owner** may undertake other work at the site with its own forces, or have other work performed at the site by other parties (including, but not limited to contractors or Public Utilities). If the Contract Documents do not note the performance of any such other work, written notice will be given to the **Contractor** before starting that work.

13.1.2. Whenever Work to be performed by the **Contractor** interfaces with other work, the **Contractor** shall coordinate that Work with the interfacing work. Paragraphs 13.2 and 13.3 outline representative duties and responsibilities assumed by the **Contractor** under this requirement. Such duties and responsibilities are for the benefit of the parties on the other work to the extent there

13.2 Coordination Requirements:

13.2.1. If other work is ongoing concurrently with the Work, the **Contractor** shall afford the responsible party proper and safe access to the site. The **Contractor** shall afford the other party a

reasonable opportunity for the handling, unloading and storage of their materials and equipment and for the execution of their work.

13.2.2. If any part of the Work, for proper execution or results, interfaces on the work of the **Owner** or another party, the **Contractor** shall inspect and promptly report to the **Professional** in writing conditions in that work that render it unavailable or unsuitable for proper execution and results. The **Contractor's** failure to do so will constitute an acceptance of such other work as fit and proper for integration with the Work except for latent or non-apparent defects and deficiencies in the other work.

13.2.3. The **Contractor** shall do all cutting, fitting, patching, and interfacing of the Work that may be required to make any part of the Work come together properly and integrate with other work. The **Contractor** shall not cut, excavate, or otherwise alter any other work without prior written consent of the party responsible for such other work. The **Contractor** shall supply, install and/or cause items to be built into interfacing Work, verify dimensions of interfacing Work, and notify the **Professional** of interfacing work that is unsatisfactory for, or prevents satisfactory installation of, any Work. Installation of any Work shall constitute acceptance by the **Contractor** of all previously placed interfacing work.

13.2.4. The **Contractor** shall be responsible for cooperating with the **Professional** fully in the coordination of the **Contractor** Submittals with interfacing submittals of other parties whose work in any way integrates with the Work or vice versa. Any such coordinated Submittal of the **Contractor** shall identify, by specific written notation, Work which integrates with the other work and of which the **Contractor** knows or has reason to know.

13.2.5. If the **Owner** contracts for other work, the **Owner** will have authority and responsibility for coordinating the operations of the **Contractor** and the other work. The **Owner** may delegate the specific authority and responsibility for coordinating the operations of the **Contractor** and of those parties performing the other work to another organization either by provision in Section 00800 Supplementary Conditions or at the pre-construction conference.

13.3 Claims Between the Contractor and Other Parties:

13.3.1. If the **Contractor** causes damage to the work or property of others, or if a claim arising out of the **Contractor's** execution of Work is made by another party against the **Contractor**, **Owner** or **Professional**, the **Contractor** shall promptly attempt to settle with that party by agreement or otherwise resolve the claim. The **Contractor** shall in any event, defend, indemnify, and hold harmless the **Owner** and **Professional** from and against all claims, as provided in paragraph 1.4, and/or judgments arising out of or resulting from damage by the **Contractor** to the work or property of others.

13.3.2. If another party causes damage to the Work or property of the **Contractor**, or if the performance of other work results in any claim by the **Contractor**, the **Contractor** shall promptly resolve the issue by agreement or otherwise resolve the claim. The **Contractor** shall not begin any action against the **Owner** (or its departments, agencies, boards, commissions, officers, and employees) or **Professional** (or their consultants, agents or any of their directors, officers, shareholders, agents, or employees), or permit any action against them to be maintained in the **Contractor's** name or for the that the **Contractor** has the financial resources necessary to complete the Work within the Contract Time.

Contractor's benefit before any court or tribunal, which action seeks to impose liability or recover damages from the **Owner** or **Professional** for such claim.

13.3.3. If the **Contractor** becomes involved in settling or otherwise resolving claims and disputes with other parties performing other work from events covered under paragraphs 13.3.1 or 13.3.2, or because of any other similar controversy, including damage to the Work or other work, or a dispute about responsibility for clean-up or any other issue, neither the **Owner** or **Professional** nor any of their respective consultants, agents, directors, shareholders, officers or employees will be involved in any way in such action (unless subpoenaed or ordered by a court). If the **Owner** incurs costs or damages of the types barred by the provisions paragraphs 13.2.1 and 13.2.2, the **Contractor** shall reimburse those costs and damages to the **Owner**.

13.3.4. Except as excluded in paragraph 13.3.5, if any party performing other work causes Delay upon the Work and if, upon a request from the **Contractor**, the **Owner** determines that any such Delay justifies an increase in Contract Price and/or Contract Time, the **Owner** shall amend the Contract Documents to provide the necessary adjustment in Contract Price or Contract Time, or both.

13.3.5. If a party performing other work is granted an extension in a contract time only (on account of Delay not reasonably anticipatable under the circumstances nor caused, in whole or in part, by any act or omission of the other party, the **Owner**, **Professional** or the **Owner's** representative on that other work), and if, upon a request from the **Contractor**, the **Owner** determines that the time extension granted to the other work requires a change in a coterminous Contract Time in the Contract Documents, the **Owner** shall amend the Contract Documents to provide for the necessary change in Contract Time only.

ARTICLE 14 TERMINATION

14.1 Notice Requiring Assurance of Due Performance:

14.1.1. The **Owner** may request the **Contractor** (with copy to the surety) to provide written assurance of due performance if, at any time, any of the following non-conformances occur, any of which, if not corrected, may justify defaulting the **Contractor**:

14.1.1.1. The **Contractor** fails to complete the Work, or a specified part of the Work, within the corresponding Contract Time; fails or refuses to supply sufficient management, supervision, workers, materials, or equipment; or otherwise fails to prosecute the Work, or any specified part of the Work, with the diligence required to comply with the Contract Time(s).

*14.1.1.2. The **Contractor** persistently disregards the authority of the **Professional** or violates or disregards a provision of the Contract Documents or the Laws of any Political Subdivision with jurisdiction; or

14.1.1.3. The **Contractor** admits in writing, or the **Owner** otherwise establishes, the **Contractor's** inability or refusal to pay the **Contractor's** debts generally as they become due; or in response to the **Owner's** demand, fails to provide adequate, written assurance

14.1.2. Within seven (7) Calendar Days after the **Contractor** receives a notice requiring assurance of due performance, the **Contractor** shall meet with the **Owner** and present the

Contractor's plan to correct the non-performance with supporting documentation. If the **Owner** determines that the **Contractor's** plan provides adequate assurance of due performance, that determination shall not waive the **Owner's** right to subsequently default the **Contractor** or affect any rights or remedies of the **Owner** against the **Contractor** and/or surety then existing or that may accrue in the future.

14.2 Contractor Default and Termination for Cause:

14.2.1. The **Owner**, after giving the **Contractor** and surety seven (7) Calendar Days' written notice of intent to default, may declare the **Contractor** in default and terminate the services of the **Contractor** for cause upon the occurrence of one or more of the following events:

14.2.1.1. At or after the meeting referred to in paragraph 14.1.2, the **Owner** determines that there is sufficient cause, giving the issues raised, to default the **Contractor**.

*14.2.1.2. The **Contractor** fails to comply with the Michigan Residency requirements (1984 PA 431, as amended, MCL 18.1241a); or is found to be in violation of Section 4 of 1980 PA 278 concerning unfair labor practices, or any nondiscrimination requirements imposed by Law.

14.2.1.3. The **Contractor** violates or breaches any material provision of the Contract Documents which provides contractually for the for-cause termination or rescission of the Contract or of the **Contractor's** right to complete the Work.

14.2.1.4. A trustee, receiver, custodian, or agent of the **Contractor** is appointed under contract, as opposed to under bankruptcy Law, whose appointment or authority to take over the **Contractor's** property is for the purpose of enforcing a lien against such property or for the general administration of such property for the benefit of the **Contractor's** creditors; or

14.2.1.5. It is determined that gratuities, including, but not limited to entertainment, gifts or donations were given by or on behalf of the **Contractor** to an official, agent, servant, or employee of the **Owner** or **Professional** to secure the Contract or favorable treatment with respect to the awarding or amending or the making of any determination relative to the execution of the Work.

14.2.2. Unless otherwise agreed between the **Owner** and **Contractor**, at the expiration of the seven (7) Day (intent to default) period, the **Contractor** shall immediately stop all Work and proceed in accordance with the **Owner's** instructions. Following receipt, and expiration, of a second seven (7) Day written notice period intended to allow the surety to complete an investigation of the default, the surety shall immediately:

14.2.2.1. If approved by the **Owner**, arrange for the **Contractor** to continue with performance and prosecution of the Work to completion; or

14.2.2.2. Undertake to perform and complete the Work, in accordance with the Contract Documents, in place of the **Contractor**, either through the surety's agents or by executing Sub

agreements with qualified contractors (excluding the **Contractor** and any of the **Contractor's** affiliates), or both; and

14.2.2.3. If agreed to by the **Owner**, waive the surety's rights set forth elsewhere in this Article, and with reasonable promptness under the circumstances, after investigating in good faith and with due care and diligence, determine the amount for which it may be liable to the **Owner**, and present that determination to the **Owner**. If the **Owner** rejects that amount, the surety shall negotiate a sum acceptable to the **Owner** and promptly pay that amount to the **Owner** in full and with interest from the date the termination of the **Contractor's** services became effective. If the **Owner** rejects the sum determined by the surety, or if the surety fails to negotiate an agreement with the **Owner** on the amount of the surety's liability, the **Owner** shall have full power and authority to default the surety.

14.2.3. If the **Owner** has terminated the **Contractor**, and the surety elects to act under paragraph 14.2.2.2, the **Owner** will determine in good faith the amount necessary to cover the total direct, indirect and consequential costs (including, but not limited to liquidated damages, costs of correcting Work, fees and charges of engineers, architects, attorneys and others and any other costs and damages for which the surety is liable under Section 00610 Performance Bond) that the **Owner** believes it will sustain from that default. The **Owner** will communicate its determination to the surety, and the **Owner** will deduct that amount in its entirety from Requests for Payment under the Contract Documents. Upon completion of the Work, if the unpaid balance of the Contract Price is not sufficient to reimburse the **Owner** for all actual direct, indirect, and consequential costs resulting from the default of the **Contractor**, the surety and **Contractor**, jointly and severally, are liable to the **Owner** for the difference, which they shall pay to the **Owner** promptly.

14.2.4. If the **Owner** has terminated the **Contractor**, and the surety elects to act under paragraph 14.2.2.2, the surety's contract with another contractor makes that contractor a Subcontractor under the Contract, in which case: (a) the provisions of Article 11 shall remain in full force and effect, (b) the methods and criteria to be used to compute the surety's (in lieu of the **Contractor's**) and that contractor's Cost of and Fee for any Work involved shall be limited to those provided in Article 11, and (c) all Work performed by any such contractor pursuant to a Sub agreement with the surety shall be governed by the flow-through requirement in paragraph 5.1.6, the waiver of rights of subrogation provision in paragraph 7.8 and any other requirements of the Contract Documents governing Sub agreements.

14.2.5. If the **Owner** has terminated the **Contractor**, any such termination will not affect any rights or remedies of the **Owner** against the **Contractor** or surety, or both, then existing or that may accrue after termination. All provisions of the Contract Documents that, by their nature, survive final acceptance of the Work shall remain in full force and effect after a termination for cause of the **Contractor** or default of the surety, or both.

14.2.6. The **Owner** may, in its sole discretion, permit the **Contractor** to continue to perform Work when the **Contractor** is in default or has been defaulted. Such decision by the **Owner** shall in no way operate as a waiver of any of the **Owner's** rights under the Contract Documents or Section 00610 Performance Bond, nor in the event of a subsequent default, entitle the **Contractor** or surety to continue to perform or prosecute the Work to completion.

14.3 Surety Default:

14.3.1. If upon receipt of a notice of termination for cause, the surety fails to proceed immediately and as provided in paragraph 14.2.2, the **Owner** shall declare the surety in default under Section 00610 Performance Bond in accordance with the terms and conditions of this paragraph.

14.3.1.1. No default of the surety under the Section 00610 Performance Bond shall be declared, however, until the expiration of fifteen (15) Calendar Days after receipt by the surety of an additional written notice from the **Owner** demanding that the surety perform its obligations under Section 00610 Performance Bond.

14.3.2. If the **Owner** declares the surety in default, the **Owner** shall have full power and authority to exclude the surety and **Contractor** from the site, assume any Sub agreements that the **Owner** so selects and take possession of the Work and of all the surety's and **Contractor's** tools, plant and office, and construction equipment at the site (without liability to the surety or **Contractor** for trespass, rent or conversion). The **Owner** will (a) proceed to the full extent that the surety and **Contractor** could have proceeded, (b) incorporate into the Work all materials and equipment stored at the site or elsewhere, and (c) prosecute the Work to completion as the **Owner** may deem expedient. When the **Owner** exercises any of the rights or remedies provided in this paragraph, the **Owner** shall not be required to obtain the lowest price for Work performed.

14.3.3. If the **Owner** has defaulted the surety, any such termination or default will not affect any rights or remedies of the **Owner** against the **Contractor** or surety, or both, then existing or that may accrue after termination. Any retention or payment of monies due the **Contractor** or surety by the **Owner** will not release the **Contractor** or surety from liability. All provisions of the Contract Documents that, by their nature, survive final acceptance of the Work shall remain in full force and effect after a termination for cause of the **Contractor** or default of the surety, or both.

14.4 Termination for Convenience of the Owner:

14.4.1. Upon fifteen (15) Calendar Days' written notice to the **Contractor** and surety, or sooner if reasonable under the circumstances, the **Owner** may, without cause and without prejudice to any other right or remedy it may have, elect to terminate any part of the Work, or the Agreement in whole or in part, as the **Owner** may deem appropriate for its convenience. Upon receipt of any such termination notice, the **Contractor** shall immediately proceed in accordance with any specific instructions, protect and maintain the Work, and make reasonable and diligent efforts to mitigate costs associated with the termination.

14.4.2. In any termination for convenience, the **Contractor** shall be paid for (a) Work completed, in accordance with the Contract Documents, before receipt of the notice of termination, and (b) reasonable termination settlement costs for commitments that had become firm before the termination. The **Contractor** shall not be paid any anticipated and unrealized general conditions costs, administrative expenses, and profit for uncompleted Work. If no agreement can be reached as to reasonable termination costs, the **Owner** will make a determination in writing which shall be final and binding on the **Contractor** unless the **Contractor** delivers notice of a claim and a claim Submittal in accordance with the procedures and within the deadlines set forth in Article 15.

14.4.3. Upon termination for convenience, the **Owner** shall have full power and authority to take possession of the Work, assume any Sub agreements with Subcontractors and Suppliers that the **Owner** selects, and prosecute the Work to completion by contract or as the **Owner** may deem expedient.

14.4.4. If after notice of termination of the services of the **Contractor**, it is determined the **Contractor** was not in default, the termination shall be deemed to have been for the convenience of the **Owner**. In such event the **Contractor** may recover from the **Owner** payment in accordance with paragraph 14.4.2.

14.5 The Contractor May Suspend Work:

14.5.1. In addition to being entitled to earning interest on unpaid Requests for Payment, the **Contractor** may, upon fifteen (15) Calendar Days written notice to the **Owner**, suspend the Work for the **Owner's** convenience if, through no act or fault of the **Contractor**, the **Professional** fails, for thirty (30) Calendar Days, to initiate processing of any Request for Payment or the **Owner** fails, for ninety (90) Calendar Days, to pay the **Contractor** any Request for Payment finally certified by the **Professional** to be due.

14.5.2. Except as specifically provided in paragraph 14.5.1, this provision shall not relieve the **Contractor** of the **Contractor's** obligations to prosecute the Work in accordance with the Progress Schedule and without Delay during any disputes and disagreements with the **Owner**.

ARTICLE 15 DISPUTES**15.1 Claims Under This Article:**

15.1.1. All claims, counterclaims, disputes, and other matters in question between the **Owner** and **Contractor** arising out of or relating to the Contract Documents or the breach thereof, shall be submitted in writing to the **Professional** and otherwise processed and resolved as provided in this Article.

15.1.2. A claim means a written demand or assertion by the **Owner** or **Contractor**, which is properly certified, seeking an adjustment in Contract Price and/or payment of moneys due, an extension or shortening in Contract Time, the adjustment or interpretation of Contract terms, or other relief arising under or relating to the Contract, which becomes a claim or dispute after a written determination by the **Professional** or **Owner** under the appropriate provision of the Contract Documents.

15.1.3. Unless otherwise agreed between the parties, any claim that can be resolved under a provision of the Contract Documents providing for or excluding the relief sought by the claimant shall be resolved in accordance with that provision.

15.1.4. Notice of Claim - Except for **Owner** claims for liquidated damages, no claim shall be valid unless it is based upon written notice delivered by the claimant to the other party promptly, but in no event later than thirty (30) Calendar Days after the **Professional's** or **Owner's** determination giving rise to the claim. The notice shall include a supporting statement stating the nature of the dispute, the amount involved, if any, and the remedy sought. The claim submittal with all supporting data shall be delivered within sixty (60) Calendar Days after the determination giving rise to the claim (unless the **Professional** allows an extension). The responsibility to substantiate claims shall rest with the claimant.

*15.1.5. A claim by the **Contractor** shall be submitted to the **Professional** and **Owner** for a recommendation or decision from the **Professional** and, if necessary, an **Owner** determination. A claim by the **Owner** shall be submitted to the **Contractor** and the **Professional** for a written recommendation or decision by the **Professional**. The **Owner** reserves the right to audit, using the provisions in paragraph 11.14, any **Contractor** claim (or claim package) that the **Contractor** values at more than \$50,000.00.

15.1.6. Pending final resolution of any claim under this Article, the **Contractor** shall proceed diligently with the Work and comply with any decision of the **Owner** and/or **Professional**

15.2 Requirement for Certification of Contractor Claims:

15.2.1. For all **Contractor** claims seeking an increase in Contract Price or Contract Time, the **Contractor** shall submit an affidavit, certifying that the amount claimed accurately reflects any Delay and all costs that the **Contractor** is entitled from the occurrence of the claimed event and that supporting cost and pricing data are current, accurate, complete and represent the **Contractor's** best knowledge and belief. The affidavit shall be executed by an officer or partner of the **Contractor** with proper authority or his/her designee.

15.3 Recommendations or Decisions from the Professional:

*15.3.1. For **Contractor** claims under \$100,000.00, if requested in writing by the **Contractor**, the **Professional** will render a recommendation or decision within thirty (30) Calendar Days after the request and the **Owner** will issue, if necessary, a determination within thirty (30) Calendar Days after the **Professional's** recommendation or decision. For **Contractor** claims exceeding \$100,000.00, the **Professional** will issue its recommendation or decision and the **Owner**, if necessary, will issue its determination, within sixty (60) Calendar Days after completing an audit of the claim, or after deciding not to conduct such an audit or, in the alternative, will notify the **Contractor** of the date when the determination will be made. In the latter case, a final determination will be concluded within sixty (60) Calendar Days from the date of such notification.

*15.3.2. For **Owner** claims under \$100,000.00, the **Professional** will render a recommendation or decision within thirty (30) Calendar Days of the request. For **Owner** claims over \$100,000.00, the **Professional**, within sixty (60) Calendar Days, will render a recommendation or decision or notify the **Owner** and **Contractor** when such will be rendered.

*15.3.3. To the extent any **Professional's** decision is to deny a **Contractor** claim or to agree with an **Owner** claim, that decision shall be final and binding on the **Contractor**, without any determination by the **Owner**, unless the **Contractor** files a request for a presentation with the **Director-DCD** within thirty (30) Calendar Days as required by paragraph 15.4.1. Unless a claim is made in accordance with these requirements, it shall be waived.

*15.3.4. To the extent that any recommendation from the **Professional** is partly or wholly adverse to a claim from the **Owner**, that determination shall be final and binding on both the **Owner** and **Contractor** unless either party files a request for a presentation with the **Director-DCD** as required in paragraph 15.4.1.

*15.3.5. To the extent the **Professional** recommends payment of any **Contractor** claim which increases the Contract Price, that recommendation shall be subject to a determination from the **Owner**

in a written opinion. In the event any such determination from the **Owner** is partly or wholly adverse to the preceding recommendation from the **Professional**, that determination shall be final and binding on the **Contractor** unless the **Contractor** files suit in the Michigan Court of Claims within thirty (30) Calendar Days after receipt of such determination. Unless a claim is made in accordance with these requirements, it shall be waived.

15.4 Determinations by the Director-DCD:

*15.4.1. If either the **Contractor** or **Owner** is not satisfied with any decision of the **Professional** rendered pursuant to paragraph 15.3.3 or 15.3.4, that party shall, within thirty (30) Calendar Days of receiving that decision, file a written appeal with the **Director-DCD**. If a **Contractor** or **Owner** appeal is timely filed, the claimant shall be entitled to present its claim, unless waived, to the **Director-DCD**, or his/her designee, provided that a claim narrative with complete supporting documentation is delivered to the **Director-DCD**, or his/her designee, within thirty (30) Calendar Days of that party's written notice of appeal.

*15.4.2. Within thirty (30) Calendar Days after receipt of any such claim narrative, the **Director-DCD**, or his/her designee, shall schedule the time to start the presentations taking into account the dispute's complexity and the urgency of its resolution. Subject to any recognized privilege, discovery shall be available to either party as provided by the **Director-DCD**, and his/her designee, and shall be concluded thirty (30) Calendar Days before the start of the presentations.

*15.4.3. During the presentations, the **Director-DCD**, or his/her designee, shall hear presentations and receive evidence on the matters in dispute, as supported by the statement of the dispute. The **Director-DCD**, or his/her designee, shall have discretion concerning the allowability of evidence submitted, and shall not be bound to any rules of evidence other than those he/she promulgates.

*15.4.4. If the right to a presentation is waived or if a presentation is conducted and the dispute remains unresolved, the **Director-DCD**, or his/her designee, at his/her sole option, shall specify in which forum the dispute shall thereafter be conducted by issuing a written determination to the **Contractor** that the dispute if the **Contractor** so elects, be submitted in writing to:

*15.4.4.1. The Court of Claims maintained by the State of Michigan for the purpose of adjudicating claims against the State or other appropriate court, or

*15.4.4.2. Arbitration in accordance with the construction industry rules of arbitration of the American Arbitration Association, subject to the provisions of paragraphs 15.5.1 and 15.5.2, unless the parties mutually agree otherwise.

*15.4.5. The **Director-DCD's**, or his/her designee's, determination on the forum in which the dispute shall be conducted is final and binding upon the **Owner** and **Contractor**. The **Director-DCD's**, or his/her designee's determination on the dispute shall be final and binding on the **Contractor** unless the **Contractor** files a lawful action in the forum so chosen (Michigan Court of Claims or arbitration) within thirty (30) Calendar Days after receiving the **Director-DCD's**, or his/her designee's, determination.

*15.4.6. If, after such determination from the **Director-DCD**, or his/her designee, the **Contractor** properly submits the dispute to

the Michigan Court of Claims or requests arbitration, and the final determination of either forum does not increase the **Contractor's** recovery by thirty (30%) percent or more above that awarded by the **Director-DCD**, or his/her designee, or voluntarily withdraws the action, the **Contractor** shall pay all resulting expenses of the **Owner** (including, but not limited to reasonable charges of attorneys, engineers, others and court or arbitration costs)

15.5 Supplements to AAA Arbitration:

*15.5.1. No arbitration, arising out of, or relating to the Contract Documents shall include, by consolidation, joinder or in any other manner, any additional party not a party to this Contract, except by written consent containing a specific reference to the Agreement and signed by all the parties involved. Consent shall be deemed given by any party who has executed an agreement directly with the **Owner** affected by the Project and containing provisions comparable to those in this Article 15. Any consent to arbitration involving any additional party or parties shall not constitute consent to arbitration of any dispute not permitted in this Article. The agreement to arbitrate with any additional party or parties duly consented to by the parties to this Contract shall be specifically enforceable under the prevailing arbitration Law.

15.5.2. Subject to any recognized privilege, discovery shall be available to each party to the arbitration as it would be available under the general court rules of the Michigan Court of Claims which shall be enforced by the American Arbitration Association. All discovery and amendments to the prehearing summary shall conclude thirty (30) Calendar Days before the arbitration date. Failure to provide the foregoing discovery shall render any claim supported by witnesses or documents not so disclosed excludable by the arbitration panel in its discretion.

15.6 Interest on a Judgment; Payment of Judgment:

*15.6.1. If, subsequent to a determination by the **Director-DCD**, or his/her designee, the **Owner** or **Contractor** files a Michigan Claims Court or AAA arbitration action, and the party filing for such action increases its recovery by thirty (30%) percent or more above that awarded by the **Director-DCD**, or his/her designee, that party shall be entitled to interest calculated in accordance with MCL 600.6013, as amended, whether the action is filed with the Michigan Court of Claims or the American Arbitration Association.

*15.6.2. After settlement or final adjudication of any claim under this Article if, upon demand, payment by the **Contractor** is not made to the **Owner**, the **Owner** may offset the appropriate amounts against (a) payments due to the **Contractor** under any other contract between the **Owner** and the **Contractor**, or (b) any amounts for which the **Owner** may be obligated to the **Contractor** in any capacity.

15.7 Venue; Flow-Through Provision:

15.7.1. The **Contractor** agrees to waive jurisdiction and venue, to consent and submit to the jurisdiction of, and not commence any action in other than, a competent State court in Ingham County, Michigan, unless original jurisdiction is vested in the Michigan Court of Appeals, the Michigan Court of Claims, or the Michigan Supreme Court, regardless of residence or domicile, for any action or suit at law or in equity arising out of or under the Contract Documents. The **Contractor** further agrees that it will have each of its Suppliers and Subcontractors provide similar waivers as those required in this paragraph.

15.7.2. The **Contractor** shall insert the provisions of this Article in all Sub agreements, altering those paragraphs only to identify properly the contracting parties.

END OF SECTION 00700

SECTION 00800 SUPPLEMENTARY CONDITIONS

PROFESSIONAL – G.H. Forbes Associates Architects

WORK – Cadillac Place 15th Floor – Build (3) Judicial Suites

AGENCY No. 950 FUNDING CODE. _____ FILE No. 950/ 22357.MNB

The provisions of this Section 00800 Supplementary Conditions amend or supplement Section 00700 General Conditions and those other provisions of the Contract Documents, as indicated below. All other provisions of the Contract Documents that are not so amended or supplemented remain in full force and effect.

ARTICLE 4 CONTROL OF THE WORK – GENERAL PROVISIONS

ADD Section 4.4.14 as follows:

4.4.14 The Contractor shall note and comply with APPENDIX I SPECIAL WORKING CONDITIONS and APPENDIX II SPECIAL PROJECT PROCEDURES as part of and in conjunction with all other contract requirements. APPENDIX I & II immediately follow and are attached hereto SECTION 00800.

ARTICLE 7 LEGAL AND CONTRACTUAL REQUIREMENTS; INSURANCE

ADD Section 7.14.3 for projects with Federal Funding:

7.14.3 FEDERALLY FUNDED PROJECT PREVAILING WAGE REQUIREMENTS

If a project is funded in whole or in part by federal dollars, the Contractor and all Subcontractors must comply with the most recent version of Federal Provisions Addendum and all Laws pertaining to occupational classifications and prevailing wage requirements as follows:

1. FEDERAL PROVISIONS ADDENDUM
 - a. The most current version of Federal Provisions Addendum shall apply to this contract and is included in Appendix III.
2. DAVIS BACON ACT WAGE AND CLASSIFICATIONS
 - a. If applicable, the Contractor (and its Subcontractors) for prime construction contracts in excess of \$2,000 must comply with the Davis-Bacon Act ([40 USC 3141-3148](#)) as supplemented by Department of Labor regulations ([29 CFR Part 5](#), "Labor Standards Provisions Applicable to Contracts Covering Federally Financed and Assisted Construction").
 - b. The Contractor (and its Subcontractors) shall pay all mechanics and laborers employed directly on the site of the work, unconditionally and at least once a week, and without subsequent deduction or rebate on any account, the full amounts accrued at time of payment, computed at wage rates not less than those stated in the advertised specifications, regardless of any contractual relationship which may be alleged to exist between the Contractor or subcontractor and the laborers and mechanics.
 - c. The Contractor will post the scale of wages to be paid in a prominent and easily accessible place at the site of the work.
 - d. There may be withheld from the Contractor so much of accrued payments as the contracting officer considers necessary to pay to laborers and mechanics employed by the Contractor or any Subcontractor on the work the difference between the rates of wages required by the Contract to be paid laborers and mechanics on the work and the rates of wages received by the laborers and mechanics and not refunded to the Contractor or Subcontractors or their agents.
 - e. The Contractor shall maintain payrolls and basic records relating thereto for a period of three (3) years after the project; contractor shall submit Certified Payroll Reports using US Department of Labor Wage and Hour Division Form WH-347 for each weekly payroll to support and document compliance with the Davis Bacon Wage rates.
 - f. Davis Bacon wage and classification schedules applicable for this project/location are included in Appendix III.

7.14.4 STATE-FUNDED PROJECT PREVAILING WAGE REQUIREMENTS

1. The Contractor (and its Subcontractors) represents and warrants that it pays all mechanics and laborers employed directly on the site of the work, unconditionally and at least once a week, and without subsequent deduction or rebate on any account, the full amounts accrued at time of payment, computed at wage rates not less than those stated in the advertised specifications as prevailing wages based on locality, regardless of any contractual relationship which may be alleged to exist between the Contractor or subcontractor and the laborers and mechanics.
2. The Contractor represents and warrants that Contractor will post the scale of wages to be paid in a prominent and easily accessible place at the site of the work.

ARTICLE 15 DISPUTES

REPLACE Section 15.1.2 with the following:

15.1.2. A claim means a written demand or assertion by the Owner or Contractor, which is properly certified, seeking an adjustment in Contract Price and/or payment of moneys due, an extension or shortening in Contract Time, the adjustment or interpretation of Contract terms, or other relief arising under or relating to the Contract. If a Bulletin or specific request for proposal has been issued by the Professional or Owner and quoted by the Contractor, it may become a claim or dispute with proper written notice per 15.1.2.1 should the Contractor is object to a written determination and/or rejection by the Professional or Owner under the appropriate provision of the Contract Documents.

ADD Section 15.1.2.1 – Claims by either the Owner or Contractor must be initiated by written notice to the other party and to the Initial Decision Maker (Professional/PSC). Claims by either party must be initiated within 21 days after the occurrence of the event giving rise to such Claim or within 21 days after the claimant first recognized the condition giving rise to the claim. Provided such timely notice is delivered, a full and detailed breakdown of cost and time requested, with supporting documentation, if not provided with initial notice shall be delivered to Professional and Owner within 15 days of the notice, as noted in article 11.1.2, unless otherwise agreed in writing, by the Owner prior to expiration of such time.

ADD Section 15.1.2.2 – Pending final resolution of a Claim, except as otherwise agreed in writing or as provided under conditions of failure of timely progress payment or Article 14, the Contractor shall ensure the Work diligently proceeds with the performance of the Contract and the Owner shall continue to make payments in accordance with the Contract Documents. The Owner shall prepare Change Orders and PSC shall certify payment requests in accordance with the decisions of the Initial Decision Maker.

REPLACE Section 15.1.4 with the following:

15.1.4. Notice of Claim - Except for **Owner** claims for liquidated damages, no claim shall be valid unless it is based upon written notice delivered by the claimant to the other party and the Professional/PSC within 21 days as per 15.1.2 and 15.1.2.1. The notice shall include a supporting statement stating the nature of the dispute, the amount involved, if any, and the remedy sought. The claim submittal with all supporting data shall be delivered within thirty (30) Calendar Days after Notice (unless the **Professional** allows an extension). The responsibility to substantiate claims shall rest with the claimant.

END OF SECTION 00800

APPENDIX 1
SPECIAL PROJECT PROCEDURES

DEMOLITION/REMODELING PROJECT PROCEDURES

Furnish all equipment, materials, labor, and services necessary to complete all building demolition required in connection with the existing building, in order to permit the installation of new Work. The goal of the Owner is to generate the least amount of waste or debris possible. However, inevitable waste and debris that are generated shall be reused, salvaged, or recycled, and disposal in landfills shall be minimized to the extent economically feasible. The Contractor will be required to prepare waste management plan for the collection, handling, storage, transportation, and disposal of the waste generated at the construction site for the Owner's review and approval. The Contractor will be required to produce waste management progress reports.

1. Locations: Notations are made in various places on the Drawings to call attention to building demolition which is required; however, these Drawings are not intended to show each and every item to be removed. The Contractor and the Subcontractors for the various trades must remove the materials related to their respective trades as required to permit the construction of the new Work as shown.
2. Permits: The Contractor must secure from the appropriate agencies all required permits necessary for proper execution of the work before starting work on the project site. All fees for securing the permits must be paid by the Contractor, including all inspection costs which may be legally assessed by the Bureau of Construction Codes in accordance with the authority granted under the Public Act 1980 PA 371, as amended.
3. Enclosures: Where it is necessary to make alterations to walls, floors or roof of the existing building, the Contractor must provide and maintain dustproof partitions to separate the parts where Work is being done from the adjoining parts occupied by the State Agency. Where any parts are opened and exposed to the elements, the Contractor must provide weather tight enclosures to fully protect the structure and its contents.
4. Waste Management Plan: The management plan must address waste source identification and separation, returns, reuse and salvage, recycling, landfill options, alternatives to landfilling, materials handling procedures and transportation.
5. Preparation: Protect all existing Work that is to remain and restore in an approved manner any such Work that becomes damaged.
 - 5.1 Rubbish and debris resulting from the Work must be removed immediately from the site by the Contractor. However, any recyclable materials must be recycled; the Contractor will be required to use alternatives to landfills for waste disposal such as reuse or recycle of asphalt, bricks, concrete, masonry, plastics, paint, glass, carpet, metals, wood, drywall, insulation, and any other waste materials to the extent practical.
 - 5.2 Unless otherwise specified, the Agency will remove existing furniture, drapery tracks, draperies, window blinds, and other equipment items, which might interfere with the new construction.
6. Coordination: Demolition work, in connection with any new unit of Work, must not be commenced until all new materials required for completion of that new item of Work are at hand.
7. Waste Management Plan Progress Reports: Submit an updated report with the payment requests. The progress reports shall include:
 - a. The amount of waste sent to a landfill, tipping fees paid and the total disposal cost. Include supporting documents such as manifests, weight tickets, receipts and/or invoices.
 - b. Records for each material recycled/reused/salvaged from the project including the amount, date removed from the job site, final destination, transportation cost, recycled materials, and the net cost/ savings.
 - c. Breakdown of waste by type generated to date.
 - d. Recycling/salvage/landfill rates.
 - e. Percent of waste recycled/salvaged to date.

HAZARDOUS MATERIALS PROJECT PROCEDURES

1. The Contractor must use, handle, store, dispose of, process, transport and transfer any material considered a Hazardous Material in accordance with all federal, state, and local Laws. If the Contractor encounters material reasonably believed to be a Hazardous Material and which may present a substantial danger, the Contractor must immediately stop all affected work, give written notice to the Owner of the conditions encountered, and take appropriate health and safety precautions.
2. This project has been identified by the DTMB-SFA as having a possibility of containing Hazardous Waste materials to be legally removed from the Project job site in order to complete the Work as described in the Proposal And Contract. If removal of friable asbestos material is required, the Contractor must contact the Air Quality Division, Department of Environment, Great Lakes, and Energy, at **(517) 284-6773**, for a permit and furnish all training, labor, materials, services, insurance, and equipment necessary to carry out the removal operations of all Hazardous Materials from the Project job site, as identified by the Scope of Work, or encountered on the Project job site, in accordance with State and Federal Hazardous Waste Codes. A Contract Change Order will be written to modify the existing Contract to pay for the additional cost.
3. Environmental Hazards (air, water, land and liquid industrial) are handled by the Waste and Hazardous Materials Division, Michigan Department of Environment, Great Lakes, and Energy (EGLE) in carrying out the requirements of the Federal Environmental Protection Agency (EPA). For general information and/or a copy of the latest regulations and publications call (517) 335-2690.
4. The Michigan Occupational Safety and Health Administration (MIOSHA) provides protection and regulations for the safety and health of workers. The Department of Licensing and Regulatory Affairs provides for the safety of workers. The Department of Health & Human Services provides for the health of workers (517/373-3740) (TDD 517/373-3573).
 - 4.1 Contractor must post any applicable State and/or Federal government regulations at the job site in a prominent location.
 - 4.2 Contractor must be responsible for training their workers in safe work practices and in proper removal methods when coming in contact with hazardous chemicals.
5. Applicable Regulations:
 - 5.1 Natural Resources and Environmental Protection Act – PA 451 of 1994, as amended, including Part 111 – Hazardous Waste Management, Part 121 – Liquid Industrial Waste and Part 147 – PCB compounds.
 - 5.2 RCRA, 1976 - Resource Conservation and Recovery Act: This federal statute regulates generation, transportation, treatment, storage, or disposal of hazardous wastes nationally.
 - 5.3 TSCA, 1979 – Toxic Substances Control Act: This statute regulates the generation, transportation, storage, and disposal of industrial chemicals such as PCBs.
6. Definitions: Hazardous substances are ignitable, corrosive, reactive, and/or toxic, based on their chemical characteristics.
 - 6.1 Under Federal and Michigan Law, a Small Quantity Generator of hazardous waste provides from 220 to less than 2,000 lbs./month or never accumulates 2,200 lbs. or more.
 - 6.2 A Generator size provider of hazardous waste provides 2,200 lbs. or more/month or accumulates above 2,200 lbs.
7. Disposals: To use an off-site hazardous waste disposal facility, the Contractor must use the Uniform Hazardous Waste Manifest (shipping paper). Small quantities of hazardous waste may not be disposed of in sanitary landfills used for solid waste.
8. Federal, state, and local Laws and regulations may apply to the storage, handling and disposal of Hazardous Materials and wastes at each State Agency. Contact the **Environmental Assistance Center** of the Michigan Department of Environment, Great Lakes, and Energy (EGLE) at **1-800-662-9278**, Fax to: 517-241-0673 or e-mail to: DEQ-EAD-env-assist@michigan.gov for general EGLE information including direct and referral assistance on air, water and wetlands permits; contaminated site clean-ups; underground storage tank removals and remediation; hazardous and solid waste disposal; pollution prevention and recycling; and compliance-related assistance. The Center provides businesses, municipalities, and the general public with a single point of access to EGLE's environmental programs.

ASBESTOS ABATEMENT PROJECT PROCEDURES

Should this Work require the renovation or demolition of a building or structure initially constructed on or prior to 1980, the Contractor will use the attached copy of a Comprehensive Asbestos Building Survey for those portions of the building or structure being impacted and must plan his or her work to minimize disturbance of any known or assumed asbestos containing materials (ACM). In addition, if this building or structure was constructed on or prior to 1980, the Contractor's On-Site Superintendent and all Subcontractor On-Site Superintendents for trades that could potentially disturb known or assumed ACM, must, as a minimum, have and provide documentation of current Asbestos Awareness Training.

If the Comprehensive Asbestos Building Survey identifies known or assumed ACM that will potentially be disturbed as a part of the Contractor's renovation or demolition activities, the Contractor must remove, transport, and dispose of these materials at no additional cost to the Owner and prior to any other work taking place within the immediate vicinity of said material. If required, the Contractor must provide the Owner a minimum of 10 working day notification prior to the start of any asbestos abatement activities with abatement in occupied buildings being completed even if they will be conducted during off hours (nights, weekends, and state holidays).

If the Contractor encounters a suspected ACM that was not previously identified within the Comprehensive Asbestos Building Survey, the Contractor must immediately stop all affected work, give written notice to the Owner of the conditions encountered, and take appropriate health and safety precautions. If, after providing Owner notification, the Contractor is directed to sample and/or remove the suspected ACM in question, a Contract Change Order will be written to modify the existing Contract to pay for the additional cost. Any abatement shall be completed in accordance with the requirements of this Section.

If removal of ACM is required, removal must be completed by a contractor currently licensed to remove asbestos by the State of Michigan, Department of Licensing and Regulatory Affairs (DLARA) Asbestos Program and abatement must be performed in accordance with all federal, state, and local Laws and Regulations. Prior to commencing any asbestos abatement activities, the licensed abatement contractor must submit, as required by Federal, State and Local Laws and Regulations, a "Notification of Intent to Renovate/Demolish" to both the State of Michigan, Department of Environment, Great Lakes, and Energy (EGLE), Air Quality Division and to the DLARA, Asbestos Program, to comply with National Emission Standards for Hazardous Air Pollutants (NESHAP), and the Clean Air Act (CAA). All regulated ACM must be disposed of at an approved Type II (general refuse) landfill and must be in leak-tight wrapping or containers. ACM that is non friable and is not in poor condition or will not become regulated ACM at any time can be disposed of in a Type III (construction debris) landfill.

At the completion of each abatement activity, the Contractor must perform clearance testing in accordance with National Institute for Occupational Safety and Health (NIOSH) 582 "Sampling and Evaluating Airborne Asbestos Dust". All air samples shall indicate concentrations of less than 0.01 fibers/cc for clearance to be met. Clearance testing shall be performed by a third-party Asbestos Consultant. The Asbestos Consultant selected by the Contractor shall be experienced and knowledgeable about the methods for asbestos air sampling and be able to select representative numbers and locations of samples. It is mandatory that the Asbestos Consultant's on-site hygienist performing sampling and analysis have certification that he/she has passed a NIOSH 582 or equivalent course.

The NESHAP asbestos regulations, notification form, guidelines and fact sheets are available on EGLE's web site www.michigan.gov/egle under heading Air; then click on Compliance; then click on Asbestos NESHAP Program. For guidelines on submitting notifications pursuant to the Asbestos Contractors Licensing Act, contact the DLARA, Occupational Health Division, Asbestos Program at (517) 322-1320 or visit DLARA's web site www.michigan.gov/asbestos.

LEAD ABATEMENT PROJECT PROCEDURES

Should this Work require the renovation or demolition of a building or structure, the workers are assumed to be exposed to lead or materials containing lead above acceptable levels until proven otherwise through personal air sampling and analysis. The Contractor shall take all steps necessary to assure that his/her employees, are not exposed to lead at concentrations greater than the Permissible Exposure Limit as per the State of Michigan Department of Licensing and Regulatory Affairs Occupational Health Standards Part 603 "Lead Exposure in Construction". In addition, the Contractor shall convey this same requirement to all subcontractors that may be under his/her control.

The employer shall comply with the Michigan Lead Abatement Act, as amended, and the Lead Hazard Control rules and must communicate information concerning lead hazards according to the requirements of Michigan Occupational Safety and Health Administration (MIOSHA) Part 603 and the Occupational Safety and Health Administration's (OSHA's) Hazard Communication Standard for the construction industry, 29 CFR 1926.59, including but not limited to safety equipment (e.g. personal fit-tested and approved respirators and protective clothing), worker rotation (on a short-cycle and regular basis), working practices (e.g. sanding, cutting, grinding, abraded, burning and heat-gun stripping of lead based paint are not allowed), the requirements concerning warning signs and labels, material safety data sheets (MSDS), and employee information and training. Employers shall comply with the requirements of 29 CFR 1926.62(I) - Employee Information and Training.

If lead or materials containing lead will be disturbed as a part of the work to be performed, the Contractor must remove, transport, and dispose of these materials at no additional cost to the Owner and prior to any other work taking place within the immediate vicinity of said material. The Contractor must provide the Owner a minimum 10 working day notification prior to the start of any lead abatement activities with abatement in occupied buildings being completed even if they will be conducted during off hours (nights, weekends, and state holidays). Abatement is defined as an activity specifically designed to permanently remove lead paint, lead-contaminated dust or other lead containing materials, the installation of a permanent enclosure or encapsulation of lead paint or other lead containing materials, the replacement of lead-painted surfaces or fixtures, the removal or covering of lead-contaminated soil, and any preparation, cleanup, disposal, and post-abatement clearance testing associated with these activities. Renovation, remodeling, landscaping, or other activity, that is not designed to permanently eliminate lead paint hazards, but is instead designed to repair, restore, or remodel a structure, or housing unit even though the activity may incidentally result in a reduction or elimination of a lead paint hazard is not considered abatement.

If abatement of lead or materials containing lead is required, abatement must be completed by a qualified Lead Abatement Contractor. In addition, Specifications for the Lead Abatement should be based upon a Lead Inspection/Risk Assessment report. The Lead Inspection/Risk Assessment report and clearance testing upon completion should be performed by a Certified Inspector or Risk Assessor. Lead abatement including clearance testing shall be performed in accordance with the State of Michigan, Lead Abatement Act, Part 54A Lead Abatement and with all other federal, state, and local Laws and Regulations that may apply

For additional information about certifications, guidance, and regulations for lead hazard control activities, visit www.michigan.gov/lead.

APPENDIX 2

**STATE OF MICHIGAN PREVAILING WAGE SCHEDULES AND
FEDERAL PROVISIONS ADDENDUM
& WAGE RATE SCHEDULES**

Federal Provisions Addendum

This addendum applies to purchases that will be paid for in whole or in part with funds obtained from the federal government. The provisions below are required, and the language is not negotiable. If any provision below conflicts with the State's terms and conditions, including any attachments, schedules, or exhibits to the State's Contract, the provisions below take priority to the extent a provision is required by federal law; otherwise, the order of precedence set forth in the Contract applies. Hyperlinks are provided for convenience only; broken hyperlinks will not relieve Contractor from compliance with the law.

1. Equal Employment Opportunity

If this Contract is a "**federally assisted construction contract**" as defined in [41 CFR Part 60-1.3](#), and except as otherwise may be provided under [41 CFR Part 60](#), then during performance of this Contract, the Contractor agrees as follows:

- a. The Contractor will not discriminate against any employee or applicant for employment because of race, color, religion, sex, sexual orientation, gender identity, or national origin. The Contractor will take affirmative action to ensure that applicants are employed, and that employees are treated during employment without regard to their race, color, religion, sex, sexual orientation, gender identity, or national origin. Such action shall include, but not be limited to the following:

Employment, upgrading, demotion, or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship. The Contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices to be provided setting forth the provisions of this nondiscrimination clause.
- b. The Contractor will, in all solicitations or advertisements for employees placed by or on behalf of the Contractor, state that all qualified applicants will receive consideration for employment without regard to race, color, religion, sex, sexual orientation, gender identity, or national origin.
- c. The Contractor will not discharge or in any other manner discriminate against any employee or applicant for employment because such employee or applicant has inquired about, discussed, or disclosed the compensation of the employee or applicant or another employee or applicant. This provision shall not apply to instances in which an employee who has access to the compensation information of other employees or applicants as a part of such employee's essential job functions discloses the compensation of such other employees or applicants to individuals who do not otherwise have access to such information, unless such disclosure is in response to a formal complaint or charge, in furtherance of an investigation, proceeding, hearing, or action, including an investigation conducted by the employer, or is consistent with the Contractor's legal duty to furnish information.
- d. The Contractor will send to each labor union or representative of workers with which he has a collective bargaining agreement or other contract or understanding, a notice to be provided advising the said labor union or workers' representatives of the Contractor's commitments under this section and shall post copies of the notice in conspicuous places available to employees and applicants for employment.
- e. The Contractor will comply with all provisions of [Executive Order 11246](#) of September 24, 1965, and of the rules, regulations, and relevant orders of the Secretary of Labor.
- f. The Contractor will furnish all information and reports required by [Executive Order 11246](#) of September 24, 1965, and by rules, regulations, and orders of the Secretary of Labor, or pursuant thereto, and will permit access to his books, records, and accounts by the administering agency and the Secretary of Labor for purposes of investigation to ascertain compliance with such rules, regulations, and orders.
- g. In the event of the Contractor's noncompliance with the nondiscrimination clauses of this contract or with any of the said rules, regulations, or orders, this Contract may be canceled, terminated, or suspended in whole or in part and the Contractor may be declared ineligible for further Government contracts or federally assisted construction contracts in accordance with procedures authorized in [Executive Order 11246](#) of September 24, 1965, and such other sanctions may be imposed and remedies invoked as provided in [Executive Order 11246](#) of September 24, 1965, or by rule, regulation, or order of the Secretary of Labor, or as otherwise provided by law.
- h. The Contractor will include the portion of the sentence immediately preceding paragraph (1) and the provisions of paragraphs (1) through (8) in every subcontract or purchase order unless exempted by rules, regulations, or orders of the Secretary of Labor issued pursuant to section 204 of [Executive Order 11246](#) of September 24, 1965, so that such provisions will be binding upon each subcontractor or vendor. The Contractor will take such action with respect to any subcontract or purchase order as the administering agency may direct as a means of enforcing such provisions, including sanctions for noncompliance:

Provided, however, that in the event a Contractor becomes involved in, or is threatened with, litigation with

subcontractor or vendor as a result of such direction by the administering agency, the Contractor may request the United States to enter into such litigation to protect the interests of the United States.

The applicant further agrees that it will be bound by the above equal opportunity clause with respect to its own employment practices when it participates in federally assisted construction work: *Provided*, that if the applicant so participating is a State or local government, the above equal opportunity clause is not applicable to any agency, instrumentality or subdivision of such government which does not participate in work on or under the contract.

The applicant agrees that it will assist and cooperate actively with the administering agency and the Secretary of Labor in obtaining the compliance of contractors and subcontractors with the equal opportunity clause and the rules, regulations, and relevant orders of the Secretary of Labor, that it will furnish the administering agency and the Secretary of Labor such information as they may require for the supervision of such compliance, and that it will otherwise assist the administering agency in the discharge of the agency's primary responsibility for securing compliance.

The applicant further agrees that it will refrain from entering into any contract or contract modification subject to Executive Order 11246 of September 24, 1965, with a contractor debarred from, or who has not demonstrated eligibility for, Government contracts and federally assisted construction contracts pursuant to the Executive Order and will carry out such sanctions and penalties for violation of the equal opportunity clause as may be imposed upon contractors and subcontractors by the administering agency or the Secretary of Labor pursuant to Part II, Subpart D of the Executive Order. In addition, the applicant agrees that if it fails or refuses to comply with these undertakings, the administering agency may take any or all of the following actions: Cancel, terminate, or suspend in whole or in part this grant (contract, loan, insurance, guarantee); refrain from extending any further assistance to the applicant under the program with respect to which the failure or refund occurred until satisfactory assurance of future compliance has been received from such applicant; and refer the case to the Department of Justice for appropriate legal proceedings.

2. Davis-Bacon Act (Prevailing Wage)

If this Contract is a **prime construction contract** in excess of \$2,000, the Contractor (and its Subcontractors) must comply with the Davis-Bacon Act ([40 USC 3141-3148](#)) as supplemented by Department of Labor regulations ([29 CFR Part 5](#), "Labor Standards Provisions Applicable to Contracts Covering Federally Financed and Assisted Construction"), and during performance of this Contract the Contractor agrees as follows:

- a. All transactions regarding this contract shall be done in compliance with the Davis-Bacon Act (40 U.S.C. 3141-3144, and 3146-3148) and the requirements of 29 C.F.R. pt. 5 as may be applicable. The contractor shall comply with 40 U.S.C. 3141-3144, and 3146-3148 and the requirements of 29 C.F.R. pt. 5 as applicable.
- b. Contractors are required to pay wages to laborers and mechanics at a rate not less than the prevailing wages specified in a wage determination made by the Secretary of Labor.
- c. Additionally, contractors are required to pay wages not less than once a week.

3. Copeland "Anti-Kickback" Act

If this Contract is a contract for construction or repair work in excess of \$2,000 where the Davis-Bacon Act applies, the Contractor must comply with the Copeland "Anti-Kickback" Act ([40 USC 3145](#)), as supplemented by Department of Labor regulations ([29 CFR Part 3](#), "Contractors and Subcontractors on Public Building or Public Work Financed in Whole or in Part by Loans or Grants from the United States"), which prohibits the Contractor and subrecipients from inducing, by any means, any person employed in the construction, completion, or repair of public work, to give up any part of the compensation to which he or she is otherwise entitled, and during performance of this Contract the Contractor agrees as follows:

- a. **Contractor.** The Contractor shall comply with 18 U.S.C. § 874, 40 U.S.C. § 3145, and the requirements of 29 C.F.R. pt. 3 as may be applicable, which are incorporated by reference into this contract.
- b. **Subcontracts.** The Contractor or Subcontractor shall insert in any subcontracts the clause above and such other clauses as FEMA or the applicable federal awarding agency may by appropriate instructions require, and also a clause requiring the Subcontractors to include these clauses in any lower tier subcontracts. The prime contractor shall be responsible for the compliance by any subcontractor or lower tier subcontractor with all of these contract clauses.
- c. **Breach.** A breach of the contract clauses above may be grounds for termination of the contract, and for debarment as a Contractor and Subcontractor as provided in 29 C.F.R. § 5.12.

4. Contract Work Hours and Safety Standards Act

If the Contract is **in excess of \$100,000** and **involves the employment of mechanics or laborers**, the Contractor must comply with [40 USC 3702](#) and [3704](#), as supplemented by Department of Labor regulations ([29 CFR Part 5](#)), as applicable,

and during performance of this Contract the Contractor agrees as follows:

- a. **Overtime requirements.** No Contractor or Subcontractor contracting for any part of the contract work which may require or involve the employment of laborers or mechanics shall require or permit any such laborer or mechanic in any workweek in which he or she is employed on such work to work in excess of forty hours in such workweek unless such laborer or mechanic receives compensation at a rate not less than one and one-half times the basic rate of pay for all hours worked in excess of forty hours in such workweek.
- b. **Violation; liability for unpaid wages; liquidated damages.** In the event of any violation of the clause set forth in paragraph (1) of this section the Contractor and any Subcontractor responsible therefor shall be liable for the unpaid wages. In addition, such Contractor and Subcontractor shall be liable to the United States (in the case of work done under contract for the District of Columbia or a territory, to such District or to such territory), for liquidated damages. Such liquidated damages shall be computed with respect to each individual laborer or mechanic, including watchmen and guards, employed in violation of the clause set forth in paragraph (1) of this section, in the sum of \$27 for each calendar day on which such individual was required or permitted to work in excess of the standard work week of forty hours without payment of the overtime wages required by the clause set forth in paragraph (1) of this section.
- c. **Withholding for unpaid wages and liquidated damages.** The State shall upon its own action or upon written request of an authorized representative of the Department of Labor withhold or cause to be withheld, from any moneys payable on account of work performed by the Contractor or Subcontractor under any such contract or any other Federal contract with the same prime contractor, or any other federally-assisted contract subject to the Contract Work Hours and Safety Standards Act, which is held by the same prime contractor, such sums as may be determined to be necessary to satisfy any liabilities of such contractor or subcontractor for unpaid wages and liquidated damages as provided in the clause set forth in paragraph (2) of this section.
- d. **Subcontracts.** The Contractor or Subcontractor shall insert in any subcontracts the clauses set forth in paragraph (1) through (4) of this section and also a clause requiring the Subcontractors to include these clauses in any lower tier subcontracts. The prime contractor shall be responsible for compliance by any subcontractor or lower tier subcontractor with the clauses set forth in paragraphs (1) through (4) of this section.

5. Rights to Inventions Made Under a Contract or Agreement

If the Contract is funded by a federal "funding agreement" as defined under [37 CFR §401.2 \(a\)](#) and the recipient or subrecipient wishes to enter into a contract with a small business firm or nonprofit organization regarding the substitution of parties, assignment or performance of experimental, developmental, or research work under that "funding agreement," the recipient or subrecipient must comply with [37 CFR Part 401](#), "Rights to Inventions Made by Nonprofit Organizations and Small Business Firms Under Government Grants, Contracts and Cooperative Agreements," and any implementing regulations issued by the awarding agency.

6. Clean Air Act and the Federal Water Pollution Control Act

If this Contract is **in excess of \$150,000**, the Contractor must comply with all applicable standards, orders, and regulations issued under the Clean Air Act ([42 USC 7401-7671q](#)) and the Federal Water Pollution Control Act ([33 USC 1251-1387](#)), and during performance of this Contract the Contractor agrees as follows:

Clean Air Act

1. The Contractor agrees to comply with all applicable standards, orders or regulations issued pursuant to the Clean Air Act, as amended, 42 U.S.C. § 7401 et seq.
2. The Contractor agrees to report each violation to the State and understands and agrees that the State will, in turn, report each violation as required to assure notification to the Federal Emergency Management Agency or the applicable federal awarding agency, and the appropriate Environmental Protection Agency Regional Office.
3. The Contractor agrees to include these requirements in each subcontract exceeding \$150,000 financed in whole or in part with Federal assistance provided by FEMA or the applicable federal awarding agency.

Federal Water Pollution Control Act

1. The Contractor agrees to comply with all applicable standards, orders, or regulations issued pursuant to the Federal Water Pollution Control Act, as amended, 33 U.S.C. 1251 et seq.
2. The Contractor agrees to report each violation to the State and understands and agrees that the State will, in turn, report each violation as required to assure notification to the Federal Emergency Management Agency or the applicable federal awarding agency, and the appropriate Environmental Protection Agency Regional Office.

3. The Contractor agrees to include these requirements in each subcontract exceeding \$150,000 financed in whole or in part with Federal assistance provided by FEMA or the applicable federal awarding agency.

7. Debarment and Suspension

A "contract award" (see [2 CFR 180.220](#)) must not be made to parties listed on the government-wide exclusions in the [System for Award Management](#) (SAM), in accordance with the OMB guidelines at [2 CFR 180](#) that implement [Executive Orders 12549](#) (51 FR 6370; February 21, 1986) and 12689 (54 FR 34131; August 18, 1989), "Debarment and Suspension." SAM Exclusions contains the names of parties debarred, suspended, or otherwise excluded by agencies, as well as parties declared ineligible under statutory or regulatory authority other than [Executive Order 12549](#).

- a. This Contract is a covered transaction for purposes of 2 C.F.R. pt. 180 and 2 C.F.R. pt. 3000. As such, the Contractor is required to verify that none of the Contractor's principals (defined at 2 C.F.R. § 180.995) or its affiliates (defined at 2 C.F.R. § 180.905) are excluded (defined at 2 C.F.R. § 180.940) or disqualified (defined at 2 C.F.R. § 180.935).
- b. The Contractor must comply with 2 C.F.R. pt. 180, subpart C and 2 C.F.R. pt. 3000, subpart C, and must include a requirement to comply with these regulations in any lower tier covered transaction it enters into.
- c. This certification is a material representation of fact relied upon by the State. If it is later determined that the contractor did not comply with 2 C.F.R. pt. 180, subpart C and 2 C.F.R. pt. 3000, subpart C, in addition to remedies available to the State, the Federal Government may pursue available remedies, including but not limited to suspension and/or debarment.
- d. The bidder or proposer agrees to comply with the requirements of 2 C.F.R. pt. 180, subpart C and 2 C.F.R. pt. 3000, subpart C while this offer is valid and throughout the period of any contract that may arise from this offer. The bidder or proposer further agrees to include a provision requiring such compliance in its lower tier covered transactions.

8. Byrd Anti-Lobbying Amendment

Contractors who apply or bid for an award of **\$100,000 or more** shall file the required certification in *Exhibit 1 – Byrd Anti-Lobbying Certification* below. Each tier certifies to the tier above that it will not and has not used Federal appropriated funds to pay any person or organization for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, officer or employee of Congress, or an employee of a Member of Congress in connection with obtaining any Federal contract, grant, or any other award covered by 31 U.S.C. § 1352. Each tier shall also disclose any lobbying with non-Federal funds that takes place in connection with obtaining any Federal award. Such disclosures are forwarded from tier to tier, up to the recipient who in turn will forward the certification(s) to the awarding agency.

9. Procurement of Recovered Materials

Under [2 CFR 200.322](#), Contractors must comply with section 6002 of the Solid Waste Disposal Act, as amended by the Resource Conservation and Recovery Act.

- a. In the performance of this contract, the Contractor shall make maximum use of products containing recovered materials that are EPA-designated items unless the product cannot be acquired:
 - i. Competitively within a timeframe providing for compliance with the contract performance schedule.
 - ii. Meeting contract performance requirements; or
 - iii. At a reasonable price.
- b. Information about this requirement, along with the list of EPA-designated items, is available at EPA's Comprehensive Procurement Guidelines web site, <https://www.epa.gov/smm/comprehensive-procurement-guideline-cpg-program>.
- c. The Contractor also agrees to comply with all other applicable requirements of Section 6002 of the Solid Waste Disposal Act.

10. Additional FEMA Contract Provisions.

The following provisions apply to purchases that will be paid for in whole or in part with funds obtained from the Federal Emergency Management Agency (FEMA):

- a. **Access to Records.** The following access to records requirements applies to this contract:
 - i. The Contractor agrees to provide the State, the FEMA Administrator, the Comptroller General of the United States, or any of their authorized representatives access to any books, documents, papers, and records of the Contractor which are directly pertinent to this contract for the purposes of making audits, examinations, excerpts, and transcriptions.

- ii. The Contractor agrees to permit any of the foregoing parties to reproduce by any means whatsoever or to copy excerpts and transcriptions as reasonably needed.
- iii. The Contractor agrees to provide the FEMA Administrator or his authorized representatives access to construction or other work sites pertaining to the work being completed under the contract.

In compliance with the Disaster Recovery Act of 2018, the State and the Contractor acknowledge and agree that no language in this contract is intended to prohibit audits or internal reviews by the FEMA Administrator or the Comptroller General of the United States.

b. Changes.

See the provisions regarding modifications or change notice in the Contract Terms.

c. DHS Seal Logo and Flags.

The Contractor shall not use the DHS seal(s), logos, crests, or reproductions of flags or likenesses of DHS agency officials without specific FEMA pre-approval.

d. Compliance with Federal Law, Regulations, and Executive Orders.

This is an acknowledgement that FEMA financial assistance will be used to fund all or a portion of the contract. The Contractor will comply with all applicable Federal law, regulations, executive orders, FEMA policies, procedures, and directives.

e. No Obligation by Federal Government.

The Federal Government is not a party to this contract and is not subject to any obligations or liabilities to the State, Contractor, or any other party pertaining to any matter resulting from the Contract.”

f. Program Fraud and False or Fraudulent Statements or Related Acts

The Contractor acknowledges that 31 U.S.C. Chap. 38 (Administrative Remedies for False Claims and Statements) applies to the Contractor’s actions pertaining to this contract.

Exhibit 1 - Byrd Anti-Lobbying Certification

Contractor must complete this certification if the purchase will be paid for in whole or in part with funds obtained from the federal government and the purchase is greater than \$100,000.

APPENDIX A, 44 C.F.R. PART 18 – CERTIFICATION REGARDING LOBBYING

Certification for Contracts, Grants, Loans, and Cooperative Agreements

The undersigned certifies, to the best of his or her knowledge and belief, that:

- 1. No Federal appropriated funds have been paid or will be paid, by or on behalf of the undersigned, to any person for influencing or attempting to influence an officer or employee of an agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any Federal contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement.
- 2. If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this Federal contract, grant, loan, or cooperative agreement, the undersigned shall complete and submit Standard Form- LLL, "Disclosure Form to Report Lobbying," in accordance with its instructions.
- 3. The undersigned shall require that the language of this certification be included in the award documents for all subawards at all tiers (including subcontracts, subgrants, and contracts under grants, loans, and cooperative agreements) and that all subrecipients shall certify and disclose accordingly.

This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by section 1352, title 31, U.S. Code. Any person who fails to file the required certification shall be subject to a civil penalty of not less than \$10,000 and not more than \$100,000 for each such failure.

The Contractor, _____, certifies or affirms the truthfulness and accuracy of each statement of its certification and disclosure, if any. In addition, the Contractor understands and agrees that the provisions of 31 U.S.C. Chap. 38, Administrative Remedies for False Claims and Statements, apply to this certification and disclosure, if any.

Signature of Contractor's Authorized Official

Name and Title of Contractor's Authorized Official

Date

SECTION 01310 PROGRESS SCHEDULE**PART 1 - GENERAL****1.01 SUMMARY**

A. The **Contractor** will submit CPM Progress Schedules to the **Owner** depicting its approach to prosecution of the Work. This includes but is not limited to the **Contractor's** approach to recovering schedule and managing the effect of changes, substitutions, and Delays on Work sequencing.

B. The Progress Schedule will include the Rev. 0 Submittal (par. 3.02), Update Submittals (par. 3.03) and Revision Submittals (par. 3.04). Each Submittal will be assigned a unique number. For a resubmission, the initial number will be modified by the letter A, B, C, etc., as appropriate.

C. Through the Progress Schedule, the **Owner** will seek to stay current on progress, updated Activity and Milestone Dates, and the **Contractor's** approach to Work remaining.

D. References to the Critical Path Method (CPM) are to CPM construction industry standards that are consistent with the requirements of this Section 01310.

1.02 RELATED SECTIONS

A. Section 00440 Schedule of Materials and Equipment; Section 00500 Agreement; Section 00700 General Conditions; and Section 00800 Supplementary Conditions.

1.03 GLOSSARY OF TERMS

A. Capitalized terms not already defined in any Division 0 Specification have the following intent and meanings:

1. Milestone—A key point of progress, designating interim targets toward the Contract Times. They may pinpoint critical path foundations, key deliveries, building framing, start of MEP rough-in, building enclosure, partitions, interior finishes, conditioned space, commissioning stages, Substantial Completion, and other events of like import.
2. Official Schedule—The most recent Revision Submittal returned to the **Contractor** as Resubmittal Not Required. The Rev. 0 Official Schedule is the *As-Planned* Schedule.
3. Revision 0 Submittal—Progress Schedule submitted by the **Contractor** depicting the entire Work as awarded.
4. Update Submittal—A monthly Progress Schedule update reflecting progress and minor adjustments on the Activities, sequencing and restraints for Work remaining.

1.04 QUALITY ASSURANCE

A. The **Contractor** will obtain a written interpretation from the **Professional**, if the **Contractor** believes the selection of Activities, logic ties or restraints requires an interpretation of the Contract Documents. With each submission, the **Contractor** will point out by specific, written notation, any Progress Schedule feature that may reflect variations from any requirements of the Contract Documents.

B. The **Contractor** is responsible to obtain information from each Subcontractor and Supplier when scoping their respective Activities, Values, logic ties and restraints

C. No review of any Progress Schedule by or on behalf of the **Owner** will relieve the **Contractor** from complying with the Contract Times and any required sequence of Work or from completing Work omitted from the Progress Schedule. No review will imply approval of any variation from or interpretation of the Contract Documents, unless approved by the **Professional** through a written interpretation or by means of a separate, written notation.

1.05 ALLOWANCES

A. Work covered by Cash Allowances will be completed within the Contract Times. To the extent reasonable and consistent with the **Contractor's** plan, Work authorized by contingency allowances will be completed within the Contract Times. The Progress Schedule will incorporate the **Contractor's** best estimate of the Activities, logic and restraints required, using the information in the Contract Documents, or as indicated by the **Professional** in writing.

1.06 "OR EQUALS" AND SUBSTITUTIONS

A. Activities in the Rev. 0 Progress Schedule will be based on materials and equipment required by the Contract Documents and will not reflect any "or equal" or substitute materials or equipment, even if the **Contractor** intends to pursue "or equal" and substitution proposals. This limitation also applies to any Means and Methods indicated in or required by the Contract Documents.

1.07 MEASUREMENT AND PAYMENT

A. The Schedule of Values will include a Progress Schedule *pay item*. Fifteen percent (15%) of this *pay item* will be eligible for payment upon delivery of the *complete* Rev. 0 Submittal. The balance of this *pay item* will be eligible for payment, on a prorated basis, with each Request for Payment attaching an Update Submittal.

PART 2 - WORK PRODUCTS**2.01 PROGRESS SCHEDULE SUBMITTALS**

A. Each Progress Schedule Submittal will consist of an electronic disk with the **Contractor's** files, a narrative and three (3) copies of the required reports and plots.

B. The CPM scheduling software will be Primavera Project Planner®, SureTrak® or Microsoft Project®.

2.02 PRINTOUTS

A. Schedule Reports will include Activity (ID) code and description, duration, calendar, Early Dates, Late Dates and Total Float, all of which will comport with the requirements of paragraph 8.3.4 of Section 00700 General Conditions.

1. Late Finish Date for an Activity pinpointing a Contract Time will equal that Contract Time. Early Start Date for an Activity designating a Contract restraint will equal the proper Notice to Proceed date. Schedule Reports may or may not append CPM Plots (time-scaled Activity/logic).

2. For Precedence Diagram Method, separate Schedule Reports will tabulate, for each Activity, all preceding and succeeding logic types and lead times, whether CPM Plots displaying vertical logic ties are appended or not.

B. CPM Schedule Plots will be plotted on a suitable time scale and identify the Contract Times, Critical Paths, and sub-Critical Paths. Activities will be shown on the Early Dates with Total Floats noted by Late Date flags.

C. Line of Balance Plots will reflect industry practice for repetitive construction and will segregate the production lines for all trades within the hammock Activities.

2.03 NARRATIVE REQUIREMENTS

A. In general, a narrative will describe the **Contractor's** approach to prosecution of the Work, subject to the requirements of the Contract Documents. Further, each narrative will list the Critical Path Activities and compare Early and Late Dates with Contract Times and Milestone Dates. The basis for restraint dates will be explained.

B. For each Update Submittal, the narrative will compare current Dates to the respective Milestone Dates, describe changes in crewing and construction equipment and identify new Delays. For each Revision Submittal, the narrative also will itemize changes in Activities, logic ties and restraint dates made necessary by each change, Delay, schedule recovery, substitution and **Contractor**-initiated revision occurring since the previous Submittal.

2.04 ACTIVITY REQUIREMENTS

A. The Progress Schedule will detail Work sequencing only to the extent necessary to allow the **Owner** to correlate percent complete, compare actual dates with Milestones and Contract Times and the data in Requests for Payment.

B. Separate Activities will designate permits, construction, Submittal preparation/review (and resubmission and re-review, for same); MEP coordination drawings; deliveries; commissioning; and Punch List. Separate Activities will designate **Owner**-furnished items, interface with other work and the **Owner** and **Professional's** responsibilities.

PART 3 – EXECUTION

3.01 FLOAT TOLERANCES

A. Any Progress Schedule with Early Dates after a Contract Time will yield negative Total and Contract Floats, whether shown/calculated or not. Any Revision Submittal with less than negative twenty (20) Days of Float will be returned as "Revise and Resubmit," unless a time extension is requested, or the **Owner** withholds liquidated damages or asserts intent to do so in the event schedule is not recovered.

B. Floats calculated from the definitions given in Section 00020 Glossary supersede any conflicting Float values calculated within any early completion Progress Schedule.

3.02 REVISION 0 (Rev. 0) SUBMITTAL

A. The complete Revision 0 Submittal will be due with the first Request for Payment. The Rev. 0 Submittal will show the Work as awarded, without Delays, "or equal" or substitutions, Change Orders or Change Authorizations.

1. The Rev. 0 narrative will detail the **Contractor's** management of the site (lay down, parking, etc.). Further, the Rev. 0 narrative will identify shifts, weekend Work, Activity calendars, Delays since award and all pending and anticipated "or equal" and substitution proposals.

B. Activities will be detailed only to the extent required to show the transition of trade Work. Activities will detail the progression through site/excavation, foundations, building framing, start/completion of interior partitions, MEP rough-in, building enclosure, interior finishes, conditioned space, and commissioning.

1. Submittal Activities will segregate long-lead items, any item requiring structural access and other procurements that, in the **Contractor's** judgment, may bear on the rate of progress. Separate MEP coordination drawing Activities will be used for each floor. Beyond these requirements, it is not necessary to burden the Progress Schedule with Activities for less significant Submittals and deliveries.

2. For multiunit Work (e.g., rough-in overhead MEP for each floor, etc.), detailed Activities will be shown for a typical (often, the first) unit). Other or follow-on units may be replicated, as appropriate, or modeled with a hammock Activity combining the sum total of the typical detailed Activities. Separate Activities, as may be suitable to the Divisions of Work involved, will be identified for single-unit Work. This requirement applies to such scope as Work in mechanical rooms, building framing, commissioning, etc.

3. Activities will not combine separate or non-concurrent items of Unit Price or lump sum Work, Work in separate structures and Work in distinct areas, locations or floors within an area or structure; or rough-in and finish Work.

C. Activity durations will equal the Business Days required to sufficiently complete the Work designated by the Activity (i.e., when finish-to-start successors may start, even if the Activity is not quite 100% complete). Installation Activities will last from twenty (20) to forty (40) Days.

D. Activities will be assigned consistent descriptions and identification codes. Sort codes will group Activities by building or structure, floor or area, Change Order and Change Authorization and other meaningful scheme

E. Once endorsed by the **Owner** and returned as "Resubmittal Not Required," the Rev. 0 Progress Schedule (or Rev. 0A, etc.) will be the As-Planned Schedule and the basis for Update Submittals until the Rev. 1 Official Schedule is established. Once the As-Planned Schedule is established, the **Owner** will select Milestones and note Milestone Early and Late Dates. As the Official Schedule evolves, Milestone Dates will be revised accordingly.

F. If the **Owner** refuses to endorse the Rev. 0 Submittal (or Rev. 0A, for a resubmission) as "Resubmittal Not Required," the As-Planned Schedule will not be established. In that event, the **Contractor** will continue to submit Update and Revision Submittals reflecting progress and the **Contractor's** approach to remaining Work. The **Owner** will rely on the available Update and Revision Submittals, subject to whatever adjustments it determines appropriate.

3.03 UPDATE SUBMITTALS

A. Update Submittals with progress up to the closing date and updated Early and Late Dates for progress and remaining Activities will be due with each Request for Payment. As-built data will consist of actual start dates, percent complete, actual finish dates, changes, Delays, and other significant events occurring before the closing date.

3.04 REVISION SUBMITTALS

A. Progress Schedule Revisions will be submitted with the third Request for Payment and every two (2) months after that, or more often, if necessary due to schedule recovery or other Progress Schedule revisions. Revisions will revise the Update Submittal attached to the prior Request for Payment.

B. Progress Schedule revisions will detail all impacts on pre-existing Activity scope, logic ties and restraint dates and reflect the Contractor's current approach to Work remaining. Revisions may be required because of changes in the Work, substitutions, schedule recovery and Delays.

C. Once endorsed by the **Owner** and returned as "Resubmittal Not Required," a Revision Submittal becomes the Rev. 1, Rev. 2, etc. Official Schedule and the basis for subsequent Update Submittals until a more current Official Schedule is established.

If the **Owner** refuses to endorse a Revision Submittal as "Resubmittal Not Required," the **Contractor** will continue to submit Update and Revision Submittals when and as required in this Section.

3.05 RETROSPECTIVE DELAY ANALYSIS

A. If the **Owner** refuses to endorse any Revision Submittal as "Resubmittal Not Required," the **Contractor** and **Owner** will use the latest Official Schedule when evaluating the effect of Delays on Contract Time and/or Contract Price. The procedure will consist of progressively revising the latest Official Schedule at key Revision Submittal closing dates. For each Progress Schedule iteration, slippage between actual Milestone Dates and Rev. 0 Milestone Dates will be correlated to Delays occurring solely in that iteration. Revisions affecting Work after any iteration will be included only to the extent consented by the **Owner** at that time and/or if actually confirmed by as-built progress.

END OF SECTION 01310

This 01310 Specification uses the FORMSPEC™ Section 01310 Model Progress Schedule Specification (CPM Short Form). Title to and use of this Specification is strictly restricted. Except as may be appropriate for use in the bidding and execution of the Work, reproduction, translation or substantial use or quotation of any part of this Specification beyond that permitted by the 1976 United States Copyright Act without prior written permission of PMA Consultants LLC is unlawful.

SECTION 01 35 10 – HISTORIC BUILDING TREATMENT PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

- A. Treatment procedures shall comply with the Department of the Interior's Standards for Rehabilitation.
 - 1. This project is not intended to impact any historic materials. However, the building is designated as historic and historic materials outside of the contract area shall be handled in accordance with this specification.
- B. This section includes special procedures for historic treatment on Project including, but not limited to, the following:
 - 1. Storage and protection of existing historic materials.
 - 2. Temporary protection of historic materials during construction.
 - 3. Protection during application of chemicals.
 - 4. Protection during use of heat-generating equipment.
 - 5. Historic treatment procedures.
 - 6. Construction waste management.
- C. The Government is providing the references included in this sub-section for information purposes only and is not intended to provide a comprehensive, all-inclusive list of any and all potentially relevant portions of the Contract Documents. Related Sections:
 - 1. Division 1 Section "Selective Demolition"
 - 2. Division 1 Section "Construction Waste Management".

1.2 DEFINITIONS

- A. "Preservation": To apply measures necessary to sustain the existing form, integrity, and materials of a historic property. Work may include preliminary measures to protect and stabilize the property.
- B. "Rehabilitation": To make possible a compatible use for a property through repair, alterations, or additions while preserving those portions or features that convey its historical or cultural values.
- C. "Restoration": To accurately depict the form, features, and character of a property as it appeared at a particular period of time by means of the removal of features from other periods in its history and the reconstruction of missing features from the restoration period.
- D. "Reconstruction": To reproduce and match in the exact form and detail a building, structure, or artifact as it appeared at a specific period in time.
- E. "Stabilize": To apply measures designed to reestablish a weather-resistant enclosure and the structural reinforcement of an item or portion of the building while maintaining the essential form as it exists at present.

- F. "Protect and Maintain": To remove deteriorating corrosion, reapply protective coatings, and install protective measures such as temporary guards; to provide the least degree of intervention.
- G. "Repair": To stabilize, consolidate, or conserve; to retain existing materials and features while employing as little new material as possible. Repair includes patching, piecing-in, splicing, consolidating, or otherwise reinforcing or upgrading materials. Repair includes limited replacement in kind, rehabilitation, and reconstruction, with compatible substitute materials for deteriorated or missing parts of features when there are surviving prototypes.
- H. "Replace": To duplicate and replace entire features with new material in kind. Replacement includes the following conditions:
 - 1. Duplication: Includes replacing elements damaged beyond repair or missing. Original material is indicated as the pattern for creating new duplicated elements.
 - 2. Replacement with New Materials: Includes replacement with new material when original material is not available as patterns for creating new duplicated elements.
 - 3. Replacement with Substitute Materials: Includes replacement with compatible substitute materials. Substitute materials are not allowed, unless otherwise indicated.
- I. "Remove": To detach items from existing construction and legally dispose of them off-site unless indicated to be removed and salvaged or removed and reinstalled.
- J. "Remove and Salvage": or "Dismantle". To detach items from existing construction and deliver them to The Government ready for reuse. Items of interest or value to The Government that may be encountered during removal and dismantling work remain The Government's property. Carefully dismantle and salvage each item or object, and store in a manner that the items do not deteriorate.
- K. "Remove and Reinstall": To detach items from existing construction, repair and clean them for reuse, and reinstall them where indicated.
- L. "Existing to Remain" or "Retain": Existing items that are not to be removed.
- M. "Match": This means to blend with adjacent building fabric to appear identical to the original in terms of size, color, material, texture, finish, and if applicable method of attachment.
- N. "Material in Kind": Material that matches existing materials, as much as possible, in species, cut, color, grain, finish and composition.
- O. "Consolidate": To strengthen loose or deteriorated materials in place.
- P. "Stabilize": To provide structural reinforcement of unsafe or deteriorated items while maintaining the essential form as it exists at present; also, to reestablish a weather-resistant enclosure.
- Q. "Strip": To remove existing finish strip down to base material unless otherwise indicated.

1.3 SUBMITTALS

- A. Material Samples: For mock ups and in kind repair or replication of historic materials. Submit material samples showing accurate replication of historic material color, finish, form, detailing, texture, and other visual qualities.
- B. Historic Treatment Program: Submit a written plan for each phase or process including storage of restoration materials and protection of surrounding materials during operations. Describe in detail materials, methods, and equipment to be used for each phase of work. Provide sequencing of work, and how the contractor will work with the Government to assure continuity of government operations and services during the work. Describe how the Contractor's Preservation Construction Manager and other supervisory personnel will minimize the risks of adverse effects on historic materials and project delays resulting from unforeseen conditions or execution challenges. Historic Treatment Program must be approved by the Contracting Officer in conjunction with the Government Preservation and Project staff prior to construction commencement in historic areas.
- C. Alternative Methods and Materials: Alternative methods and materials to those indicated must be approved by the Contracting Officer and the Government Preservation Staff. For any phase of work, provide a written description including evidence of successful use on other, comparable projects, and program of testing to demonstrate effectiveness for use on this Project.
- D. Qualification Data: For historic treatment specialists and supervisory personnel. Include photographs showing compatibility of new and old work and descriptions of completed projects with the scope of work, budget, references, and specialist technicians who performed the work for each. All preservation specialists must meet the Sectary of Interiors Professional Qualifications Standards.. Provide separate project documentation for proposed technicians who did not participate in the submitted projects. For major modernizations and limited scope projects, as warranted by project complexity and risk, include qualification data for the Preservation Construction Manager who will oversee work affecting historic spaces and materials.
- E. Photographs or Videotape: Show existing conditions of adjoining construction and site improvements, including finish surfaces that might be misconstrued as damage caused by historic treatment operations. Submit before work begins.
- F. Record Documents: Include modifications to manufacturer's written instructions and procedures, as documented in the historic treatment preconstruction conference and as the Work progresses.

1.4 QUALITY ASSURANCE

- A. Historic Treatment Preconstruction Conference: Conduct conference at Project site to comply with requirements in Division 1
 - 1. Review manufacturer's written instructions for precautions and effects of products and procedures on building materials, components, and vegetation.
 - a. Record procedures established as a result of the review and distribute to affected parties.
 - 2. Both field supervisor(s) and workers who will conduct the work will be present, and provide credentials to certify their qualifications to conduct the work

1.5 STORAGE AND PROTECTION OF HISTORIC MATERIALS

- A. Removed and Salvaged Historic Materials:
 - 1. Clean salvaged historic items.
 - 2. Pack or crate items after cleaning. Identify contents of containers.
 - 3. Store items in a secure area until delivery to the Government.
 - 4. Transport items to the Government's storage area designated by the Government.
 - 5. Protect items from damage during transport and storage.
 - 6. Do not dispose of items removed from existing construction without prior written consent of the Government.

- B. Removed and Reinstalled Historic Materials:
 - 1. Clean and repair historic items to functional condition adequate for intended reuse.
 - 2. Pack or crate items after cleaning and repairing. Identify contents of containers.
 - 3. Protect items from damage during transport and storage.
 - 4. Reinstall items in locations indicated. Comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make item functional for use indicated.

- C. Existing Historic Materials to Remain: Protect construction indicated to remain against damage and soiling during historic treatment. When permitted by The Government, items may be removed to a suitable, protected storage location during historic treatment [and cleaned] and reinstalled in their original locations after historic treatment operations are complete.

- D. Storage and Protection: When removed from their existing location, store historic materials within a weather-tight enclosure where they are protected from wetting by rain, snow, or ground water, and temperature variations. Secure stored materials to protect from theft.
 - 1. Identify removed items with an inconspicuous mark indicating their original location.

PART 2 - PRODUCTS (not used)

PART 3 - EXECUTION

3.1 PROTECTION, GENERAL

- A. Comply with manufacturer's written instructions for precautions and effects of products and procedures on adjacent building materials, components, and vegetation.

- B. Ensure that supervisory personnel are present when work begins and during its progress.

- C. Temporary Protection of Historic Materials during Construction:

1. Protect existing materials during installation of temporary protections and construction. Do not deface or remove existing materials.
2. Attachments of temporary protection to existing construction shall be approved by THE GOVERNMENT prior to installation.

3.2 PROTECTION DURING USE OF HEAT-GENERATING EQUIPMENT

1. Comply with the Division 1 Hot Work procedures. Before work with heat-generating equipment commences in historic work areas, furnish qualified personnel to serve as fire watch (or watches) for location(s) where work is to be performed.

3.3 HISTORIC TREATMENT PROCEDURES

- A. Historic Treatment Program: Prepare a written plan for approval by the Government of historic treatment throughout the performance of the Work, including each phase or process and protection of surrounding materials during operations. Describe in detail materials, methods, and equipment to be used for each phase of work. Show compliance with indicated methods and procedures specified in this and other Sections.

1. Dust and Noise Control: Include locations of proposed temporary dust- and noise-control partitions and means of egress from occupied areas coordinated with continuing on-site operations and other known work in progress.
2. Debris Hauling: Include plans clearly marked to show debris hauling routes, turning radii, and locations and details of temporary protective barriers.

B. Examination

1. Preparation for Removal and Dismantling: Examine construction to be removed or dismantled to determine best methods to safely and effectively perform removal and dismantling work. Examine adjacent work to determine what protective measures will be necessary. Make explorations, probes, and inquiries as necessary to determine condition of construction to be removed or dismantled and location of utilities and services to remain that may be hidden by construction that is to be removed or dismantled.
2. Verify that affected utilities have been disconnected and capped.
3. Inventory and record the condition of items to be removed and dismantled for reinstallation or salvage.
4. Before removal or dismantling of existing building elements that will be reproduced or duplicated in final Work, make permanent record of measurements, materials, and construction details required to make exact reproduction.

- C. The principal aim of preservation work is to halt the process of deterioration and stabilize the item's condition. Repair is required where specifically indicated. The following procedures shall be followed:

1. Retain as much existing material as possible; repair and consolidate rather than replace.
2. Use additional material or structure to reinforce, strengthen, prop, tie, and support existing material or structure.

3. Use reversible processes wherever possible. This means that the preservation treatment can be undone to return to the condition before treatment commenced.
 4. Use traditional replacement materials and techniques.
 5. Record the work before the procedure with preconstruction photos and during the work with periodic construction photos. Photographic documentation is specified in Division 1 Section "Construction Progress Documentation."
- D. Ensure that supervisory personnel are on-site and on duty when historic treatment work begins and during its progress.
 - E. Prohibit smoking by personnel performing work on or near historic building fabric.
 - F. Obtain the government's review and written approval in the form of a Constructive Change Directive or Supplemental Instruction before making changes or additions to construction or removing historic materials.
 - G. Notify The Government of visible changes in the integrity of material or components whether due to environmental causes including biological attack, UV degradation, freezing, or thawing; or due to structural defects including cracks, movement, or distortion.
 1. Do not proceed with the work in question until directed by the Government.
 - H. Where missing features are indicated to be repaired or replaced, provide features whose designs are based on accurate duplications rather than on conjectural designs, subject to the approval of The Government.
 - I. Where Work requires existing features to be removed, cleaned, and reused, perform these operations without damage to the material itself, to adjacent materials, or to the substrate.
 - J. Identify new or replacement materials and features with inconspicuous, permanent marks to distinguish them from original materials. Record the legend of identification marks and the locations of these marks on Record Drawings.
 - K. When cleaning, match samples of existing materials that have been cleaned and identified for acceptable cleaning levels. Avoid over-cleaning to prevent damage to existing materials.
 - L. Rinse thoroughly to prevent formation of subsurface salts or surface residue. Test damp surface with pH strip before and after cleaning to confirm that rinsing is complete.
- 3.4 PROTECTION DURING APPLICATION OF CHEMICALS
- A. Comply with Division 1 requirements. Refer to Division 06 Woodworking specification section for more information.
 - B. Cover adjacent surfaces with protective materials that are proven to resist chemicals selected for Project unless chemicals being used will not damage adjacent surfaces as indicated in historic treatment program. Use covering materials and masking agents that are waterproof, UV-resistant, and will not stain or leave residue on surfaces to

which they are applied. Apply protective materials according to manufacturer's written instructions. Do not apply liquid masking agents or adhesives to painted or porous surfaces. When no longer needed, promptly remove protective materials staining.

- C. Do not apply chemicals during winds of sufficient force to spread them to unprotected surfaces.
- D. Neutralize and collect alkaline and acid wastes and legally dispose of off Government's property.

END OF SECTION 01 35 10

**SECTION 01 35 25 – FIRE PREVENTION & PROTECTION IN CONSTRUCTION,
ALTERATION, AND DEMOLITION PROJECTS**

PART 1 - GENERAL

1.1 Scope

- A. This specification shall apply to structures in the course of construction, alteration, or demolition, including those in underground locations.

1.2 Purpose

- A. This specification is intended to prescribe minimum safeguards for construction, alteration, and demolition operations in order to provide reasonable safety to life and property from fire during such operations.

1.3 Application

- A. This specification provides measures for preventing or minimizing fire damage during construction, alteration, and demolition operations.
- B. The Authority Having Jurisdiction (AHJ) for all technical aspects of this specification and application thereof is LARA.
- C. Alteration activities shall be permitted to require the use of both the demolition and construction activity requirements, as applicable.
- D. A fire safety program shall be included in all construction, alteration, or demolition projects, and the right of the government to administer and enforce this program shall be established, even if the building is entirely under the jurisdiction of the contractor.

1.4 Equivalent Technologies

- A. Nothing in this specification is intended to prevent the use of systems, methods, or devices of equivalent or superior quality, strength, fire resistance, effectiveness, durability, and safety over those prescribed in this specification. Technical documentation shall be submitted to determine equivalency. The system, method, or device shall be approved for the intended prior to being utilized. Systems, methods, or devices that are submitted for review after construction, alteration, or demolition starts, or after the systems, methods, or devices have been used, may be summarily rejected due to contractual considerations and/or technical considerations.

PART 2 – REFERENCES

2.1 Applicable Publications: Perform construction, alteration, and demolition operations in a manner conforming to the requirements of the latest edition of the following publications including all amendments to these publications:

A. International Code Council (ICC):

1. International Building Code
2. International Fire Code
3. International Mechanical Code

B. National Fire Protection Association (NFPA):

1. 10 Standard for Portable Fire Extinguishers
2. 30 Flammable and Combustible Liquids Code
3. 51B Standard for Fire Prevention During Welding, Cutting, and Other Hot Work
4. 54 National Fuel Gas Code
5. 58 Liquefied Petroleum Gas Code
6. 70 National Electrical Code (NEC)
7. 72 National Fire Alarm Code
8. 80 Standard for Fire Doors and Fire Windows
9. 101 Life Safety Code
10. 241 Standard for Safeguarding Construction, Alteration, and Demolition Operations

C. Code of Federal Regulations

1. 29 CFR, Part 1910: Occupational Safety and Health Administration (OSHA) General Industry and Health Standards.
2. 29 CFR, Part 1926: OSHA Construction Industry Standards.

E. Testing Services or Laboratories: Construction shall be done and equipment and materials used that are in accordance with the latest edition of the following publications from Underwriters Laboratories Inc. (UL), or Factory Mutual Engineering Corporation (FM):

1. UL Building Materials Directory
2. UL Fire Protection Equipment Directory
3. UL Fire Resistance Directory
4. UL Electrical Construction Materials Directory
5. FM P7825 Approval Guide

2.2 Acquisition of Publications: Referenced CFR publications may be purchased from the Superintendent of Documents, U.S. Government Printing Office, U.S. Government

Bookstore Chicago, IL 60605, Milwaukee, WI 53203, Detroit, MI 48226, Cleveland, OH www.gpoaccess.gov]. The National Fire Protection Association publications are available from the NFPA, Quincy, MA 02269 [1-800-344-3555 or www.nfpacatalog.org]. The International Code Council Publications are available through the ICC Store [1-800-786-4452 or www.iccsafe.org/store].

PART 3 – EXECUTION

3.1 FIRE SAFETY PROGRAM

- A. Prior to commencing construction, the contractor shall appoint an on site fire safety program manager. This can be the superintendent.
- B. The fire safety program manager shall have knowledge of the applicable fire protection standards, available fire protection systems, and fire inspection procedures.
- C. The fire safety program manager shall assure that all requirements of this specification and of referenced codes and standards are being complied with throughout. This manager shall also have the authority to enforce provisions of this specification to assure compliance herewith.
- D. The Contractor's site specific fire safety program shall be reviewed, and implementation of fire safety provisions pertinent to the work shall be discussed. For this reason, a copy of the contractor's site specific fire safety program shall be submitted at least 15 days prior to the beginning of construction, alteration, or demolition activities. Refer to paragraphs 1.3.B., 1.3.D and 3.3.A in this section for further information.
- E. In case of a conflict between applicable regulations, the more stringent requirements shall apply.

3.2 COMPLIANCE WITH REGULATIONS

- A. Contractor Responsibility: The Contractor shall assume full responsibility and liability for compliance with all applicable codes, standards, and regulations pertaining to the fire & life safety of persons during execution of the work, and shall hold the government harmless for any action or omission on the Contractor's part, or that of the Contractor's employees or subcontractors, that results in illness, injury, or death.
- B. The Contractor shall have written fire safety programs in compliance with NFPA 241 and the International Fire Code.
- C. The Contractor shall provide for required fire department pre-planning, fire department notification procedures and equipment as required by this specification, training of all on site contractor personnel on fire safety procedures,

provision of fire extinguishers as required, protection of existing fire protection equipment and systems, and all other required equipment, procedures, and staff required by LARA standards and codes cited therein.

- D. Any contractor found operating outside of the approved fire safety program/plan shall be identified and removed from the project for the duration of the project. The contractor shall have neither extension of schedule nor any additional payment for delays as a result of contract personnel failing to comply with the approved fire prevention and protection plan.

3.3 EMERGENCY SUSPENSION OF WORK

- A. When the Contractor is notified of non-compliance with the fire safety provisions of the Contract, the Contractor shall immediately, unless otherwise instructed, correct the unsafe or unhealthy condition.
- B. If the Contractor fails to comply promptly, all or part of the Work will be stopped by notice from DTMB.
- C. When, in the opinion of and by notice given by DTMB or their authorized representative, satisfactory corrective action has been taken by the Contractor, work shall resume.
- D. The Contractor shall not be allowed any extension of time or compensation for damages in connection with a work stoppage for an unsafe or unhealthy condition.

3.4 SUBMITTALS

- A. Fire Safety Programs: The Contractor shall submit, for approval, copies of the project fire safety program, as applicable to the work scope, or required as a result of the fire safety program review, including but not necessarily limited to the following:
 - 1. Hot Work procedures.
 - 2. Temporary Heating Equipment.
 - 3. Ban on Smoking in Building and provisions for smokers.
 - 4. Waste Disposal/Housekeeping
 - 6. Flammable and Combustible Liquids and Flammable Gases.
 - 7. Utilities
 - 8. On Site Security
 - 9. Development of prefire plan with the local responding fire department.
 - 10. Access for the local responding fire department, clear access to facility fire department connections, and access roadways where required.

11. Rapid communication with everyone within the work site of a fire and evacuation. Provisions for rapid notification of building occupants outside of the work site of a fire and evacuation.
12. Protection of existing structures and equipment from exposure fires resulting from construction, alteration, and demolition operations.
13. Life safety measures to be provided to assure adequate life safety systems of egress for building occupants affected by the construction, alteration, or demolition. (i.e. alternate egress routes, temporary emergency lighting, relocated exit signage, training of floor fire wardens, etc.)
14. The inspection/oversight program to assure that elements of the fire safety program are in place and personnel properly trained.
15. Storage procedures to assure that project fire safety systems and procedures are not overwhelmed by an unanticipated fire load.
16. Protection of tenants, visitors, and others not related to operation.

3.5 FIRE AND EXPLOSION REPORTS

- A. A copy of each loss report that the Contractor or Subcontractors submits to their insurance carriers as a result of a fire or explosion shall be submitted to DTMB within seven calendar days after the date of the incident.
- B. In the event a fire or explosion results in the injury of any individual(s) or the death of any individual(s), the Contractor, shall verbally notify the DTMB immediately. If the incident results in an evacuation of the facility for 1 hour or longer or if the building is deemed unsafe or uninhabitable by local authorities after an incident, the Contractor shall verbally notify the DTMB immediately. A written report shall be forwarded to the DTMB no later than 48 hours following the incident.
- C. In the event a fire or explosion takes place in a construction, alteration, or demolition site, the Contractor shall cooperate with Federal, State, and Local fire investigators to determine the cause. If the incident triggers a Federal Board of Inquiry, the Contractor shall provide all information and contractor personnel required by the Board.

3.6 PROTECTION OF PERSONNEL

- A. The Contractor shall take all necessary precautions to prevent injury to the public, occupants, or damage to property of others. The public and occupants includes all persons not employed by the Contractor or a subcontractor.
- B. Where practical, the work area shall be fenced, barricaded, or otherwise blocked off from the public or occupants to prevent unauthorized entry into the work area.

Care must be taken not to eliminate the means of egress for occupants of occupied areas of the building.

3.7 OPERATIONS WITHIN GOVERNMENT BUILDINGS

- A. Temporary storage of equipment to be installed, combustible construction materials, or combustible packing materials shall not be permitted in structures under construction or alteration unless authorized by DTMB.
 - 1. Yard storage of equipment to be installed or combustible construction materials shall not be stored closer than 9 m (30 ft.) from the structure under construction or alteration.
- B. Where a fire watch is required by codes referenced therein, that fire watch shall be provided with at least one approved means for notification of the fire department, and their sole duty shall be to perform constant patrols and watch for the occurrence of fire. Fire watches assigned as a part of any fire safety or impairment plan shall be trained and have documentation of hands on fire extinguisher training complying with 29 CFR 1910 within the previous twelve months. Likewise, they shall be trained on how to sound the alarm within the building during any impairment and to independently notify the public fire department of a fire emergency within the building. All fire watch personnel shall have a direct means of communication with the project superintendent.

END OF SECTION 01 35 25

SECTION 01 50 00 - TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.1 SUMMARY

- A. This section includes requirements for temporary utilities, support facilities and protection.
 - 1. Temporary utilities include but are not limited to the following:
 - a. Temporary electric power and lighting.
 - b. Temporary heat and ventilation.
 - 2. Protection includes but is not limited to the following:
 - a. Barricades, warning signs, and lights.
 - b. Enclosure fence.
 - c. Environmental protection.
 - d. Enclosure partitions.
- B. Provide temporary facilities and controls required for construction activities except, for facilities and controls indicated as existing or provided by the Government or others.
- C. Provide temporary heat, as necessary, to maintain a minimum temperature of 50 degrees within the Palm House throughout the duration of construction.
- D. Provide temporary cooling, as necessary, to maintain a maximum temperature of 100 degrees within the Palm House throughout the duration of construction.

1.2 UTILITY USE CHARGES

- A. Contractor may use the existing utility services without payment of use charges.

1.3 SUBMITTALS

- A. Site Plan: Show temporary facilities, utility hookups, staging areas, and parking areas for construction personnel.
- B. Reports: Submit reports of tests, inspections, and similar procedures for temporary utilities.
- C. Implementation and Termination Schedule: Within 15 calendar days after the date established for the submittal of the Contractor's Construction Schedule, submit a schedule indicating implementation and termination of each temporary utility.
- D. Weather Protection:

1. Provide protection for work areas affected by moisture and thermal change. Including building floor areas, scaffolds and fabrication areas. Covering, enclose and heat to maintain a relatively dry work area with a minimum temperature of 40°F at the working surface. Weather protection is not required for operations normally completed in the open.
2. Submit weather protection plan to DTMB for approval. Future changes must be approved by DTMB.
3. Provide accurate Fahrenheit thermometers for every 2,000 square feet of floor space located as directed.

1.4 QUALITY ASSURANCE

- A. Standards and Regulations: In temporary facilities, comply with industry standards, applicable laws, and regulations of authorities having jurisdiction, including but not limited to the following:
1. Building code requirements.
 2. Health and Safety regulations.
 3. Utility company regulations.
 4. Police, fire department, local fire marshal and rescue squad rules.
 5. Environmental protection regulations.
 6. For temporary egress, ABAAS regulations.
 7. NFPA 241 "Standards for Safeguarding Construction, Alterations and Demolition Operations".
 8. ANSI-A10 Series standards for "Safety Requirements for Construction and Demolition".
 9. NECA Electrical Design Library "Temporary Electrical Facilities", NFPA 70, and NEMA, NECA and UL standards and regulations for temporary electric service.
- B. Inspections: Arrange for authorities having jurisdiction to inspect and test each temporary utility before use. Obtain required certifications and permits.

1.5 PROJECT CONDITIONS

- A. Install, operate, maintain and protect temporary facilities and controls.
1. Keep temporary facilities clean and neat in appearance.
 2. Operate temporary facilities in a safe and efficient manner.
 3. Relocate temporary facilities if needed as Work progresses.
 4. Do not overload temporary services and facilities or permit them to interfere with progress.
 5. Provide fire prevention.
 6. Do not allow hazardous, dangerous or unsanitary conditions, or public nuisances to be on-site.

- B. At the earliest feasible time, when acceptable to DTMB, change over from temporary services to use of permanent services and remove temporary facilities when no longer needed.
- C. Temporary Use of Permanent Facilities and Services: Contractor shall assume responsibility for the operation, maintenance and protection of the facility and each permanent service during its use as a construction facility prior to the Government's acceptance.
- D. Existing Equipment and Items: Cover or otherwise protect and provide security for existing equipment and other items that are to remain in place, to prevent soiling, damage and loss, the cost of which is the responsibility of the Contractor.
 - 1. Temporarily move equipment and other items that interfere with the performance of required work.
 - 2. Store equipment and other items that have been temporarily removed. Upon reinstallation, clean and, if damaged, repair or replace equipment and items to match their condition prior to removal.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Provide undamaged materials in serviceable conditions and suitable for use intended.
- B. Wood: Lumber complying with DOC PS 20 and applicable grading rules of an inspection agency certified by ALSC's Board of Review for specific use. Provide preservative treated lumber where partially or fully in contact with the earth, concrete or masonry. Provide fire retardant treated lumber for temporary purposes where fire rated products are normally required.
- C. Safety Barrier and Covered Walkway Materials: Unless otherwise indicated, products shall be as follows.
 - 1. Panels: Minimum 5/8 inch (16 mm) thick exterior plywood.
- D. Dust control:
 - 1. Dust Control Adhesive-Surface Walk-off Mats: Provide mats minimum 914 by 1624 mm (36 by 60 inches).
 - 2. Polyethylene Sheet: Reinforced, fire-resistive sheet, 0.25 mm (10 mils) minimum thickness, with flame-spread rating of 15 or less per ASTM E 84 and passing NFPA 701 Test 2.

2.2 EQUIPMENT

- A. Provide equipment in serviceable condition and suitable for use intended.

1. Heating Units: Temporary heating units that have been tested and labeled by UL, FM or another recognized trade association related to the type of fuel consumed.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Use qualified personnel for installation of temporary facilities.
- B. Locate facilities where they will serve the project with minimum interference to performance of construction activities. Maintain, relocate and modify facilities as required for the duration of the performance of the Work.

3.2 TEMPORARY UTILITIES

- A. Engage the appropriate local utility companies to install temporary services or connect to existing services. Where a utility company provides only part of a service, provide the remainder with matching and compatible materials and equipment in compliance with utility company recommendations. Coordinate interruptions and outages with DTMB Building Manager and any affected stakeholders, provide adequate utility capacities, and obtain easements if necessary. At Substantial Completion, restore these facilities to condition existing before initial use.
 1. Heat and Cooling and Ventilation: Provide temporary heat and Cooling and ventilation required for the construction activities, including but not limited to curing or drying completed installations and protecting construction from adverse effects of low temperatures and high humidity. Use safe equipment that will not have a harmful effect on elements being installed and on completed installations. Coordinate ventilation requirements to produce the ambient condition required for the work and to minimize energy consumption, and to protect personnel from fumes and other harmful effects. Avoid storing any odor producing equipment or materials near fresh air intakes.
 2. Heating Facilities: Provide vented self-contained heaters with individual space thermostatic control. Do not use gasoline-burning space heaters or other open flame devices.
- B. Telephone: Provide a cellular phone for the Contractor's Superintendent's use. Distribute cellular phone number to Contracting Officer's Representative and Field Office personnel during the pre-construction meeting.
- C. Temporary Enclosures: Provide temporary enclosures for protection of construction, in progress or completed, from exposure, inclement weather, other construction operations and similar conditions.
 1. Where heat is needed and the building enclosure is not complete, provide temporary enclosures where there is no other provision for containment of heat.

- Coordinate enclosure with ventilating and material drying or curing requirements to avoid dangerous conditions or unacceptable effects to the materials.
2. Install tarpaulins securely with incombustible framing. Close openings of 25 sq. ft. (2.3 sq. m.) or less with plywood or similar materials.
 3. Close openings through floor or roof decks and other horizontal surfaces with load-bearing wood-framed construction.
 4. Where enclosure exceeds 100 sq. ft. (9.2 sq. m) in plan area, use UL labeled fire-retardant-treated wood and plywood for framing and sheathing.
- D. Temporary Cranes, Lifts and Hoists: Provide protection of facilities, personnel and landscaping for hoisting materials.
- E. Collection and Disposal of Waste/Salvaged Material: Collect waste from construction areas and elsewhere daily. Collect salvaged/recycled material from construction areas and elsewhere as necessary. Enforce requirements strictly and dispose of material lawfully.
1. Comply with NFPA 241 for removal of combustible waste material and debris.
 2. Do not hold waste materials more than 7 days during periods when the ambient temperature remains continuously less than 80°F (27°C), or more than 3 days when the temperature exceeds or is expected to rise above 80° (27°C).
 3. Handle and properly containerize hazardous, dangerous or unsanitary waste materials separately from other waste.
 4. Comply with Construction Waste Management and Disposal requirements in Section 017419.

3.3 TEMPORARY PROTECTION FACILITIES

- A. Temporary Facility Changeover: Except for using permanent fire protection facilities as soon as available, do not change over from temporary protection facilities until authorized by DTMB.
- B. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction as required to comply with environmental regulations and that minimize possible air, stormwater, sanitary, waterway, and subsoil contamination or pollution or other undesirable effects. Restrict use of noise-making tools and equipment to hours that will minimize complaints from persons near the site. When working in or near existing facilities, provide dustproof enclosures for protection where dirty work is performed. Dampen debris when removed to avoid dusting.
- C. Temporary Fire Protection: Until fire protection needs are supplied by permanent facilities, install and maintain temporary fire protection measures and devices of types needed to protect against reasonably predictable and controlled fire losses.
1. Comply with NFPA 10 "Standard for Portable Fire Extinguishers" and NFPA 241 "Standard for Safeguarding Construction, Alterations, and Demolition Operations".

2. Locate fire extinguishers where convenient and effective for their intended purpose, but not less than one extinguisher at or near each access route exit or entrance.
 3. Store combustible materials in containers in fire-safe locations.
 4. Maintain unobstructed access to fire extinguishers, fire hydrants and access routes. Prohibit smoking.
 5. Provide supervision of welding operations, combustion-type temporary heating units and other sources of fire ignition.
- D. Permanent Fire Protection: At the earliest feasible date in each area of the Project, complete installation of the permanent fire protection facilities including connected services, and place into operation and use. Instruct key personnel in the use of the facilities.
- E. Provide measures to prevent discharge of water runoff and airborne dust to undisturbed areas and to adjacent vegetation and walkways, as indicated in accordance with authorities having jurisdiction.
1. Verify that flows of water generated by construction activity do not enter or cross tree- or plant- zones.
- F. Barricades, Warning Signs, and Lights: Comply with standards and code requirements for erecting structurally adequate barricades. Paint with appropriate colors, graphics, and warning signs to inform personnel and the public of the hazard involved. Where appropriate and needed, provide lighting, including flashing red or amber lights.

3.4 OPERATION, TERMINATION, AND REMOVAL

- A. Supervision: Enforce strict discipline in use of temporary facilities. Limit availability of temporary facilities to essential uses to minimize waste and abuse.
- B. Maintenance: Maintain facilities in good operating condition until removal. Protect from damage by freezing temperatures and similar elements.
1. Maintain operation of temporary enclosures, heating, ventilation, and similar facilities on a 24-hour basis to avoid possibility of damage.
- C. Termination and Removal: Unless DTMB requests that a temporary facility be maintained longer, each temporary facility shall be removed not later than at Substantial Completion when the need for its service has ended and can be replaced by use of a permanent facility. Complete, restore, and replace permanent construction that may have been delayed and damaged because of interference with the temporary facility.
1. Materials and facilities that constitute temporary facilities are the property of the Contractor, except the Government reserves the right to take possession of project identification signs.
 2. Prior to project completion, replace, clean, and restore permanent facilities used during the construction period including, but not limited to, the following:

- a. Replace significantly worn parts and parts subject to unusual operating conditions.
- b. Comply with Division 01 Closeout Procedures.

END OF SECTION 01 50 00

SECTION 01 73 20 - SELECTIVE DEMOLITION

PART 1 - GENERAL

1.1 SUMMARY

- A. This section includes the following:
 - 1. Demolition and removal of selected portions of an existing building.
 - 2. Demolition and removal of selected site elements.
 - 3. Demolition and removal of roofing materials that may contain asbestos.
 - 4. Repair procedures for selective demolition operations.
- B. Definitions:
 - 1. Remove: Detach items from existing construction and legally dispose of them.
 - 2. Remove and Salvage or Recycling: Detach items from existing construction and deliver them to Government undamaged and ready for reuse or recycling
 - 3. Remove and Reinstall: Detach items from existing construction, prepare them for reuse, and reinstall them where indicated.
 - 4. Existing to Remain: Existing items of construction that are not to be removed.
- C. Refer to Division 2 for hazardous materials procedures.

1.2 MATERIALS OWNERSHIP

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

1.3 SUBMITTALS

- A. Qualification Data: List of demolition firm's completed projects with project addresses, and names and addresses of architects and owners.
- B. Proposed dust-control measures.
- C. Proposed noise-control measures.
- D. Schedule of Selective Demolition Activities: Indicate the following:
 - 1. Detailed sequence of selective demolition work, with starting and ending dates for each activity.
 - 2. Interruption of utility services.
 - 3. Coordination for shutoff, capping, and continuation of utility services.

4. Locations of temporary partitions and means of egress.
 5. Procedures to ensure uninterrupted progress of Government's on-site operations.
 6. Coordination of Government's continuing occupancy of portions of existing building and of Government's partial occupancy of completed Work.
- E. Inventory: Items to be removed and salvaged.
- F. Photographs or Videotape: Before work begins, submit sufficiently detailed digital photographs or videotapes showing existing conditions of adjoining construction including finish surfaces, to record preexisting damage.
- G. Landfill Records: Indicate receipt and acceptance of all wastes, hazardous and otherwise. In accordance with EPA regulations hazardous materials must be disposed of at a landfill facility licensed to accept hazardous wastes.
- H. Qualification Data: For certified refrigerant recover technician.
- I. Completed Vendor Request for Shipping: For excess refrigerant to be prepared for pick-up by the DoD or its contractor.

1.4 QUALITY CONTROL

- A. Demolition Firm Qualifications: Firm shall be a Specialist in demolition work of similar materials and extent to that indicated for this Project.
- B. Regulatory Requirements: Comply with governing EPA notification regulations before starting selective demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.
- C. Standards: Comply with NFPA 241 and ANSI A10.6.
- D. Pre-Demolition Conference: Conduct conference at Project site to comply with requirements in Division 1 section "Project Management and Coordination." Review methods and procedures related to selective demolition including, but not limited to, the following:
1. Inspect and discuss condition of construction to be selectively demolished.
 2. Review structural load limitations of existing structure.
 3. Review and finalize demolition schedule and verify availability of materials, demolition personnel, equipment, and facilities needed to make progress and avoid delays.
 4. Review requirements of work performed by other trades that rely on substrates exposed by demolition operations.
 5. Review procedures when hazardous materials are encountered.

1.5 PROJECT CONDITIONS

- A. Government will occupy portions of the building immediately adjacent to selective demolition area.
 - 1. Conduct selective demolition so Government operations will not be disrupted.
 - 2. Provide DTMB with not less than 72 hours notice prior to activities that will affect Government operations.
- B. Maintain access to existing walkways, corridors and other adjacent occupied or used facilities. Do not close or obstruct walkways, corridors, or other occupied or used facilities without written permission from authorities having jurisdiction.
- C. The Government will remove or tie -back the existing items indicated on the Drawings.
 - 1. Vegetation
- D. Contractor shall remove and reinstall the existing items indicated on the Drawings, including but not limited to:
 - 1. Bar caps
- E. Contractor shall remove and salvage the existing items indicated on the Drawings, including but not limited to:
 - 1. Original Ribbed Glass – (24) pieces
 - 2. Weather Station
- F. The Contractor shall recycle all items noted to be removed on the drawings wherever possible.
- G. Hazardous Materials: Hazardous materials are present. A report on the presence of hazardous materials is included in Appendix III of the Specifications. Examine the report to become aware of locations where hazardous materials are present.
 - 1. Hazardous materials abatement is specified elsewhere in the Contract Documents.
 - 2. Do not disturb hazardous materials or any material suspected of containing hazardous materials except under the procedures specified elsewhere in the Contract Documents.
- H. On-site storage or sale of removed items or materials is not permitted.
- I. Utility Service: Maintain existing utilities indicated to remain in service and protect them against damage during selective demolition operations.

PART 2 - PRODUCTS

2.1 REPAIR MATERIALS

- A. Where available and appropriate for use, provide repair materials that are identical to existing materials.

- B. Where identical materials are unavailable or cannot be used for exposed surfaces, use materials that visually match existing adjacent surfaces to the fullest extent possible.
- C. Use materials whose installed performance equal or surpasses that of existing materials.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Survey existing conditions and correlate with requirements indicated to determine extent of selective demolition required.
- B. Inventory and record the before and after condition of items to be removed and reinstalled, and items to be removed and salvaged. Protect any removed items during demolition.
- C. When encountering unanticipated mechanical, electrical or structural elements that conflict with the intended function or design, investigate and measure the nature and extent of the conflict. Promptly submit a written report to the Architect.
- D. Survey the condition of the building to determine whether removing any element might result in a structural deficiency or unplanned collapse of any portion of the structure or adjacent structures during selective demolition. Report findings to the Architect.
- E. Perform surveys as the selective demolition progresses to detect hazards resulting from the activities. Report findings to the Architect.

3.2 UTILITY SERVICES

- A. Existing Utilities: Maintain services indicated to remain and protect them against damage during selective demolition operations.
- B. Do not interrupt existing utilities serving occupied or operating facilities, except when authorized in writing by authorities having jurisdiction.
 - 1. Provide temporary services during interruptions to existing utilities, as acceptable to governing authorities.
 - 2. Provide at least 72 hours notice to DTMB if shutdown of service is required during changeover.
- C. Utility Requirements: Locate, identify, disconnect, and seal or cap off indicated utility services serving areas to be selectively demolished.
 - 1. When applicable Government will arrange to shut off indicated utilities when requested by Contractor.
 - 2. Arrange to shut off indicated utilities with utility companies.

3. Where utility services are required to be removed, relocated or abandoned, provide bypass connections to maintain continuity of service to other parts of the building before proceeding with selective demolition.
4. Cut off pipe or conduit in walls or partitions to be removed. Cap, valve or plug and seal the remaining portion of pipe or conduit after bypassing.
5. Do not start selective demolition work until utility disconnection and sealing have been completed and verified.

3.3 PREPARATION

- A. Hazardous Materials: Drain, purge or otherwise remove, collect and dispose of chemicals, gases, explosives, acids, flammables or other hazardous materials before proceeding with selective demolition operations. Advise the Government immediately if suspected hazardous materials are encountered in the course of the Work.
- B. Temporary Site Control: Remove debris and conduct demolition operations in a manner to ensure minimum interference with roads, streets, walks, walkways, corridors, and other adjacent occupied or used facilities.
 1. Do not close or obstruct streets, walks, walkways, corridors, or other adjacent occupied or used facilities without permission from the Government and authorities having jurisdiction.
 2. Provide alternate routes around closed or obstructed traffic ways if required by governing regulations.
- C. Temporary Facilities: Conduct demolition operations in a manner to prevent injury to people and damage to adjacent building and facilities to remain. Provide for safe passage of people around selective demolition area.
 1. Erect temporary protection, such as walks, fences, railings, canopies and covered passageways, where required by authorities having jurisdiction.
 2. Protect existing site improvements, appurtenances and landscaping to remain.
 3. Provide temporary weather protection, during interval between demolition and removal of existing construction, on exterior surfaces and new construction to prevent water leakage or damage to structure or interior areas.
 4. Protect walls, ceilings, floors and other existing finish work that are to remain and are exposed during selective demolition operations.
 5. Cover and protect furnishings, plants and equipment that have not been removed.
- D. Temporary Enclosures: Erect and maintain dustproof partitions and temporary enclosures to limit dust and dirt migration and to separate areas from fumes and noise.
- E. Temporary Shoring: Provide and maintain shoring, bracing or other structural support to preserve stability and prevent movement, settlement or collapse of building to be selectively demolished. Strengthen or add new supports when required during the progress of selective demolition.

3.4 POLLUTION CONTROLS

- A. Dust Control: Use temporary enclosures and other suitable methods complying with governing environmental protection regulations to limit the spread of dust and dirt.
 - 1. Do not use water when it may damage existing construction or create hazardous or objectionable conditions, such as ice, flooding or pollution.
 - 2. Wet mop floors to eliminate trackable dirt, and wipe down walls and doors of demolition enclosure.
- B. Disposal: Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
 - 1. Remove debris from upper levels of building by chute, hoist, or other device that will convey debris to grade level.
- C. Cleaning: Clean adjacent structures and site improvements of dust, dirt and debris caused by selective demolition operations. Return adjacent areas to condition existing before start of selective demolition.

3.5 SELECTIVE DEMOLITION

- A. Demolish and remove existing construction only to the extent required by new construction and as indicated. Use methods required to complete selective demolition within limitations of governing regulations and as follows:
 - 1. Proceed with selective demolition systematically. Conduct work in an order that avoids transporting removed items and debris through areas with completed selective demolition work, and that allows for removal of items before supports for those items are removed in another area.
 - 2. Neatly cut openings and holes plumb, square, and true to dimensions required. Use cutting methods least likely to damage adjoining construction to remain. Use hand or small power tools designed for sawing or grinding, not for hammering and chopping, to minimize disturbance of adjacent surfaces. Temporarily cover openings to remain.
 - 3. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.
 - 4. Before using cutting torches contractor must request a burning permit from the Government at least 72 hours before performing the work. Clear work area of flammable materials. At concealed spaces, such as duct and pipe interiors, verify condition and contents of hidden space before starting flame-cutting operations. Maintain portable fire-suppression devices during flame-cutting operations, and maintain adequate ventilation when using cutting torches.
 - 5. Remove decayed, vermin-infested and other hazardous or unsuitable materials, and promptly dispose of these materials off-site.
 - 6. Lower removed structural framing members to ground by method suitable to avoid free fall and to prevent ground impact or dust generation.

7. Locate selective demolition equipment throughout the structure and remove debris and materials so as not to impose excessive loads on supporting walls, floors or framing.
 8. Return elements of construction and surfaces to remain to condition existing before start of selective demolition operations.
- B. Existing Facilities: Comply with building manager's regulations for using and protecting elevators, stairs, walkways, loading docks, building entries and other building facilities during selective demolition operations.
- C. Repair and Storage of Salvaged Items and Items to be Reinstalled:
1. Repair: Clean and repair the materials and equipment to functional condition adequate for intended reuse. Paint damaged or deteriorated painted surfaces of equipment to match new equipment.
 2. Storage: Store the materials and equipment in a secure dry area until final reinstallation or disposal.
- D. Salvaged Items and Items to be Reinstalled:
1. Reinstallation: Where items are indicated to be removed and reinstalled, install the materials and equipment in locations indicated. Comply with installation requirements for new materials and equipment.
 2. Delivery to Government: Where items are indicated to be removed and salvaged, transport the materials and equipment to the area on-site designated by the Government or indicated on the Drawings. Properly protect all salvaged items.
- E. Protection of Salvaged Items: For items which must be reinstalled at the same removal site, mark each item indelibly in concealed fashion and codify a document such that the items can be placed back in to the place where they were removed. Pack or crate salvaged materials and equipment after removal. Identify contents of containers. Protect items from damage during transport and storage.
- F. Existing Items to Remain: Protect construction indicated to remain against damage and soiling during selective demolition. When permitted by DTMB, items may be removed to a suitable, protected storage location during selective demolition and then cleaned and reinstalled in their original locations.
- G. Recycling: Provide separate bins or roll-offs for each material to be recycled onsite.
- 3.6 PATCHING AND REPAIRS
- A. The Government shall determine the acceptability of patch and repair work.
 - B. Promptly patch and repair holes and damaged surfaces caused to adjacent construction by selective demolition operations.

- C. Repairs: Where repairs to existing surfaces are required, patch to produce surfaces suitable for new materials.
 - 1. Completely fill holes and depressions in existing masonry walls to remain with an approved masonry patching material applied according to the manufacturer's written recommendations.
 - D. Finishes: Restore exposed finishes of patched areas and extend finish restoration into adjoining construction to remain in a manner that eliminates evidence of patching and refinishing.
- 3.7 DISPOSAL OF DEMOLISHED MATERIALS -refer to Sections 017419 Construction Waste Management & Disposal.
- A. Promptly dispose of demolished materials. Do not allow demolished materials to accumulate on-site.
 - B. Dispose of any small refrigerant containing equipment (i.e. room air conditioners, water fountains, refrigerators, etc.) that was demolished with its charge intact in accordance with all Federal, State and local safe disposal requirements."
 - C. Do not burn demolished materials.
 - D. Burning of demolished materials will be permitted only at designated areas on Government property, providing required permits are obtained. Provide full-time monitoring for burning materials until fires are extinguished.
 - E. Disposal: Transport demolished materials off Government property and legally dispose of them.
 - F. Disposal: Transport demolished materials to be recycled to a qualified recycling center for the specific material. Provide weight-ticket receipts for each load delivered.

END OF SECTION 01 73 20

SECTION 01 74 19 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes administrative and procedural requirements for the following:
 - 1. Recycling nonhazardous demolition and construction waste.
 - 2. Disposing of nonhazardous demolition and construction waste.
- B. Related Requirements:
 - 1. Section 01 73 20 Selective Demolition
 - 2. Refer to Division 2 for hazardous materials procedures.

1.2 DEFINITIONS

- A. Construction Waste: Building, structure, and site improvement materials and other solid waste resulting from construction, remodeling, renovation, or repair operations. Construction waste includes packaging.
- B. Demolition Waste: Building, structure, and site improvement materials resulting from demolition operations.
- C. Disposal: Removal of demolition or construction waste and subsequent salvage, sale, recycling, or deposit in landfill, incinerator acceptable to authorities having jurisdiction, or designated spoil areas on Owner's property.
- D. Recycle: Recovery of demolition or construction waste for subsequent processing in preparation for reuse.
- E. Salvage: Recovery of demolition or construction waste and subsequent sale or reuse in another facility.
- F. Salvage and Reuse: Recovery of demolition or construction waste and subsequent incorporation into the Work.

1.3 ACTION SUBMITTALS

- A. Waste Management Plan: Submit plan within 7 days of date established for the Notice to Proceed.

1.4 INFORMATIONAL SUBMITTALS

- A. Waste Reduction Progress Reports: Concurrent with each Application for Payment, submit report. Include the following information:
 - 1. Material category.
 - 2. Generation points of waste.
 - 3. Total quantity of waste in tons.
 - 4. Quantity of waste salvaged, both estimated and actual in tons.
 - 5. Quantity of waste recycled, both estimated and actual in tons.
 - 6. Total quantity of waste recovered (salvaged plus recycled) in tons.
 - 7. Total quantity of waste recovered (salvaged plus recycled) as a percentage of total waste.
- B. Waste Reduction Calculations: Before request for Substantial Completion, submit calculated end-of-Project rates for salvage, recycling, and disposal as a percentage of total waste generated by the Work.
- C. Records of Donations: Indicate receipt and acceptance of salvageable waste donated to individuals and organizations. Indicate whether organization is tax exempt.
- D. Records of Sales: Indicate receipt and acceptance of salvageable waste sold to individuals and organizations. Indicate whether organization is tax exempt.
- E. Recycling and Processing Facility Records: Indicate receipt and acceptance of recyclable waste by recycling and processing facilities licensed to accept them. Include manifests, weight tickets, receipts, and invoices.
- F. Landfill and Incinerator Disposal Records: Indicate receipt and acceptance of waste by landfills and incinerator facilities licensed to accept them. Include manifests, weight tickets, receipts, and invoices.

1.5 QUALITY ASSURANCE

- A. Waste Management Coordinator Qualifications: Experienced firm, or individual employed and assigned by General Contractor, with a record of successful waste management coordination of projects with similar requirements.
- B. Waste Management Conference(s): Conduct conference(s) at Project site to comply with requirements in Section 013100 "Project Management and Coordination."

1.6 WASTE MANAGEMENT PLAN

- A. General: Develop a waste management plan according to requirements in this Section. Plan shall consist of waste identification, waste reduction work plan, and cost/revenue analysis. Indicate quantities by weight or volume, but use same units of measure throughout waste management plan.

- B. Waste Identification: Indicate anticipated types and quantities of demolition and construction waste generated by the Work. Include estimated quantities and assumptions for estimates.
- C. Waste Reduction Work Plan: List each type of waste and whether it will be salvaged, recycled, or disposed of in landfill or incinerator. Include points of waste generation, total quantity of each type of waste, quantity for each means of recovery, and handling and transportation procedures.
 - 1. Salvaged Materials for Reuse: For materials that will be salvaged and reused in this Project, describe methods for preparing salvaged materials before incorporation into the Work.
 - 2. Salvaged Materials for Sale: For materials that will be sold to individuals and organizations, include list of their names, addresses, and telephone numbers.
 - 3. Salvaged Materials for Donation: For materials that will be donated to individuals and organizations, include list of their names, addresses, and telephone numbers.
 - 4. Recycled Materials: Include list of local receivers and processors and type of recycled materials each will accept. Include names, addresses, and telephone numbers.
 - 5. Disposed Materials: Indicate how and where materials will be disposed of. Include name, address, and telephone number of each landfill and incinerator facility.
 - 6. Handling and Transportation Procedures: Include method that will be used for separating recyclable waste including sizes of containers, container labeling, and designated location where materials separation will be performed.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. General: Achieve end-of-Project rates for salvage/recycling of 50 percent by weight of total nonhazardous solid waste generated by the Work. Facilitate recycling and salvage of materials, including the following:
 - 1. Glass
 - 2. Steel

PART 3 - EXECUTION

3.1 PLAN IMPLEMENTATION

- A. General: Implement approved waste management plan. Provide handling, containers, storage, signage, transportation, and other items as required to implement waste management plan during the entire duration of the Contract.

- B. Waste Management Coordinator: Engage a waste management coordinator to be responsible for implementing, monitoring, and reporting status of waste management work plan.
- C. Training: Train workers, subcontractors, and suppliers on proper waste management procedures, as appropriate for the Work.
 - 1. Distribute waste management plan to everyone concerned within 3 days of submittal return.
 - 2. Distribute waste management plan to entities when they first begin work on-site. Review plan procedures and locations established for salvage, recycling, and disposal.
- D. Site Access and Temporary Controls: Conduct waste management operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.
 - 1. Designate and label specific areas on Project site necessary for separating materials that are to be salvaged and recycled.
 - 2. Comply with Section 015000 "Temporary Facilities and Controls" for controlling dust and dirt, environmental protection, and noise control.
- E. Waste Management in Historic Zones or Areas: Transportation equipment and other materials shall be of sizes that clear surfaces within historic spaces, areas, rooms, and openings, by 12 inches or more.

3.2 SALVAGING DEMOLITION WASTE

- A. Comply with requirements in Section 01 35 10 Historic Building Treatment Procedures and 01 73 20 Selective Demolition for salvaging demolition waste.
- B. Salvaged Items for Reuse in the Work:
 - 1. Clean salvaged items.
 - 2. Pack or crate items after cleaning. Identify contents of containers with label indicating elements, date of removal, quantity, and location where removed.
 - 3. Store items in a secure area until installation.
 - 4. Protect items from damage during transport and storage.
 - 5. Install salvaged items to comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make items functional for use indicated.
- C. Salvaged Items for Owner's Use:
 - 1. Clean salvaged items.
 - 2. Pack or crate items after cleaning. Identify contents of containers with label indicating elements, date of removal, quantity, and location where removed.
 - 3. Store items in a secure area until delivery to Owner.
 - 4. Transport items to Owner's storage area as designated by Owner.

5. Protect items from damage during transport and storage.

3.3 RECYCLING DEMOLITION AND CONSTRUCTION WASTE, GENERAL

- A. General: Recycle paper and beverage containers used by on-site workers.
- B. Preparation of Waste: Prepare and maintain recyclable waste materials according to recycling or reuse facility requirements. Maintain materials free of dirt, adhesives, solvents, petroleum contamination, and other substances deleterious to the recycling process.
- C. Procedures: Separate recyclable waste from other waste materials, trash, and debris. Separate recyclable waste by type at Project site to the maximum extent practical according to approved construction waste management plan.
 1. Provide appropriately marked containers or bins for controlling recyclable waste until removed from Project site. Include list of acceptable and unacceptable materials at each container and bin.
 - a. Inspect containers and bins for contamination and remove contaminated materials if found.
 2. Stockpile processed materials on-site without intermixing with other materials. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.
 3. Stockpile materials away from construction area. Do not store within drip line of remaining trees.
 4. Store components off the ground and protect from the weather.
 5. Remove recyclable waste from Owner's property and transport to recycling receiver or processor as often as required to prevent overfilling bins.

3.4 RECYCLING DEMOLITION WASTE

- A. Concrete: Remove reinforcement and other metals from concrete and sort with other metals.
 1. Pulverize concrete to maximum 4" size – verify with facility.
- B. Masonry: Remove metal reinforcement, anchors, and ties from masonry and sort with other metals.
 1. Pulverize masonry to maximum 4" size – verify with facility.
 2. Clean and stack undamaged, whole masonry units on wood pallets.
- C. Wood Materials: Sort and stack members according to size, type, and length. Separate lumber, engineered wood products, panel products, and treated wood materials.
- D. Metals: Separate metals by type.

1. Structural Steel: Stack members according to size, type of member, and length.
 2. Remove and dispose of bolts, nuts, washers, and other rough hardware.
- E. Piping: Reduce piping to straight lengths and store by material and size. Separate supports, hangers, valves, sprinklers, and other components by material and size.
- F. Conduit: Reduce conduit to straight lengths and store by material and size.

3.5 RECYCLING CONSTRUCTION WASTE

A. Packaging:

1. Cardboard and Boxes: Break down packaging into flat sheets. Bundle and store in a dry location.
2. Polystyrene Packaging: Separate and bag materials.
3. Pallets: As much as possible, require deliveries using pallets to remove pallets from Project site. For pallets that remain on-site, break down pallets into component wood pieces and comply with requirements for recycling wood.
4. Crates: Break down crates into component wood pieces and comply with requirements for recycling wood.

B. Wood Materials:

1. Clean Cut-Offs of Lumber: Grind or chip into small pieces.
2. Clean Sawdust: Bag sawdust that does not contain painted or treated wood.

C. Gypsum Board: Stack large clean pieces on wood pallets or in container and store in a dry location.

1. Clean Gypsum Board: Grind scraps of clean gypsum board using small mobile chipper or hammer mill. Screen out paper after grinding.

D. Paint: Seal containers and store by type.

3.6 DISPOSAL OF WASTE

A. General: Except for items or materials to be salvaged or recycled, remove waste materials from Project site and legally dispose of them in a landfill or incinerator acceptable to authorities having jurisdiction.

1. Except as otherwise specified, do not allow waste materials that are to be disposed of accumulate on-site.
2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.

B. General: Except for items or materials to be salvaged or recycled, remove waste materials and legally dispose of at designated spoil areas on Owner's property.

- C. Burning: Do not burn waste materials.
- D. Burning: Burning of waste materials is permitted only at designated areas on Owner's property, provided required permits are obtained. Provide full-time monitoring for burning materials until fires are extinguished.

END OF SECTION 01 74 19

SECTION 01 77 00 - CLOSEOUT PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

- A. See section III of the Agreement for Definition of Substantial Completion.
- B. This Section includes administrative and procedural requirements for Contract closeout including, but not limited to, the following:
 - 1. Substantial Completion procedures.
 - 2. Project record document submittal.
 - 3. Operation and maintenance manual submittal.
 - 4. Final cleaning
 - 5. Repair of the Work.
- C. Closeout requirements for specific construction activities are included in the individual sections in Divisions 2 through 28.

1.2 SUBSTANTIAL COMPLETION

- A. Preliminary Procedures: Before requesting inspection for Substantial Completion, complete the following.
 - 1. Provide supporting documentation for completion as indicated elsewhere in the Contract Documents.
 - 2. Submit a list to the Government, of incomplete items, the value of incomplete construction, and reasons the Work is not complete.
 - 3. Obtain and submit releases enabling the Government unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
 - 4. Submit closeout submittals from other Division 1 sections, project record documents including electronic documents, operation and maintenance manuals, final project photographs, damage or settlement survey, and utility lines survey.
 - 5. Warranties and guarantees shall not begin until substantial completion. Warranties and guarantees for any equipment that comes on line at a later date which is accepted by the Government shall commence on that date.
 - 6. Contractor shall make final changeover of permanent locks and transmit all keys (including duplicates) to DTMB. Complete startup testing of systems and instruction of the Government operation and maintenance personnel. Discontinue and remove temporary facilities from the site, along with mockups, construction tools, and similar elements. Submit test/adjust/balance records.
 - 7. HVAC Balance and Testing must be completed within seasonal limitations.
 - 8. Commissioning must be completed within seasonal limitations.

9. Warranty of any systems or items being used during the occupancy period shall have been completed and submitted at the time of government's written acceptance including the date for Notice of Substantial Completion. The Authority Having Jurisdiction is the Government.
10. The punch list of non-completed work and items shall be entire, valued, and submitted.
11. Completion of punch list items must be completed within one month.
12. The electronic format for Operations and Maintenance materials must contain word search features.

B. Inspection Procedures: On receipt of a request for inspection, DTMB will either proceed with inspection or advise the Contractor of unfulfilled requirements. DTMB will notify the Contractor of Substantial Completion following the inspection or advise the Contractor of construction that must be completed or corrected before Substantial Completion.

1. DTMB will repeat the inspection when requested and when assured that the Work is substantially complete.
2. Results of the completed inspection will form the basis of the requirements for Final Acceptance.
3. Items that are not included on the punch-list will not relieve the Contractor from performing all work required and in accordance with the construction documents.

1.3 FINAL ACCEPTANCE FOR CONTRACT COMPLETION

A. Preliminary Procedures: Before requesting re-inspection for Final Acceptance, complete the following:

1. Submit an updated final statement, accounting for final additional changes to the Contract price.
2. Submit a certified copy of the previous Substantial Completion inspection list of items to be completed or corrected. The certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance, and shall be endorsed and dated by the Contractor.
3. Submit specific warranties, workmanship bonds, maintenance agreements, final certifications and similar documents. State warranty commencement dates.
4. Scan warranties and bonds and assemble complete warranty and bond submittal package into a single indexed electronic PDF file with links enabling navigation to each item.
5. Scan warranties and bonds and assemble complete warranty and bond submittal package as individual electronic PDF files.
6. Submit record documents including BIM, model and data and similar final record information.
7. Deliver tools, spare parts, extra stock and similar items.
8. Complete final clean-up requirements including touch-up painting of marred surfaces.

9. Submit final meter readings for utilities, a measured record of stored fuel, and similar data as of the date when the Government took possession of and assumed responsibility for corresponding elements of the work.
 10. At the end of the acceptance submit final payment request with releases and supporting documentation not previously submitted and accepted.
- B. Re-inspection Procedure: DTMB will re-inspect the Work upon receipt of notice from the Contractor that the Work, including inspection list items from earlier inspections, has been completed, except for items whose completion is delayed under circumstances acceptable to DTMB.
1. Upon completion of re-inspection, DTMB will notify the Contractor of Final Acceptance or will advise the Contractor of Work that is incomplete or of obligations that have not been fulfilled and are required for Final Acceptance.
 2. If necessary, re-inspection will be repeated.
- C. Contractor's Responsibility for Re-Inspection Following Substantial Completion: If the final completion or acceptance is delayed for more than [thirty (30)?] calendar days following substantial completion through no fault of the Government, CM, or the A/E; the Contractor shall be responsible for the Government's additional costs associated with re-inspections. During this 30-day period, the CM and/or A/E will make only one (1) re-inspection to verify completion of the punch list. Any additional re-inspections, administrative services, or direct costs will be considered CM and/or A/E additional services. The Government's actual costs for CM and/or A/E additional re-inspections, administrative services, or direct costs will be charged to the Contractor through an appropriate contract modification in the form of a credit to the Government.
- D. Contractor's Responsibility for Repeated Efforts to Commission: If acceptance is delayed for more than 30 calendar days following the initial efforts to commission through no fault of the Government, CM, or the A/E; the Contractor shall be responsible for the Government's additional costs associated with resolving continued commissioning efforts. During this 30-day period, the CM and/or A/E will make only one (1) additional effort to resolve and commission. Any additional effort to resolve and commission, administrative services, or direct costs will be considered CM and/or A/E additional services. The Government's actual costs for CM and/or A/E additional effort to resolve and commission, administrative services, or direct costs will be charged to the Contractor through an appropriate Change Order.
- 1.4 RECORD DOCUMENT SUBMITTALS
- A. Certificates of Release: From authorities having jurisdiction.
 - B. Certificate of Insurance: For continuing coverage.
 - C. Do not use record documents for construction purposes. Protect record documents from deterioration and loss in a secure, fire-resistant location. Provide access to record documents for DTMB's reference during normal working hours.

- D. Record As-Built Drawings: Maintain both electronic media copies and a clean, undamaged set of blue or black line white-prints of all Contract Documents. Mark the set to show the actual installation where the installation varies substantially from the Work as originally shown. Mark the drawing that is most capable of showing conditions fully and accurately. Where Shop Drawings are used, record a cross-reference at the corresponding location on the Contract Drawings. Give particular attention to concealed elements that would be difficult to measure and record at a later date. Electronic record copies showing changes shall be done clearly such that the changes are understood so that they can be constructed. Upload to ePM.
1. Mark record print sets with red erasable pencil. Use other colors to distinguish between variations in separate categories of the Work.
 2. Mark new information not shown on Contract Drawings or Shop Drawings.
 3. Note related modification numbers where applicable.
 4. Organize record drawing sheets into manageable sets. Bind sets with durable-paper cover sheets. Print suitable titles, dates, and other identification on the cover of each set.
- E. Record Specifications: Maintain one complete copy of the Specifications with addenda. Include one copy of other written construction documents, such as modifications issued in printed form during construction.
1. Mark these documents to show substantial variations in actual Work performed in comparison with the text of the original contract Specifications and modifications.
 2. Give particular attention to substitutions and selection of options, and information about concealed construction that cannot otherwise be readily determined later by direct observation. Provide digital photos or videos of construction areas before being concealed.
 3. Note related record drawing information and Product Data.
- F. Record Product Data: Maintain one copy of each Product Data submittal. Note related modifications and markups of Record Drawings and Specifications.
1. Mark these documents to show significant variations in actual Work performed in comparison with information submitted. Include variations in products delivered to the site and from the manufacturer's installation instructions and recommendations.
 2. Before concealing areas document with digital photos or video on a CD or DVD. Give particular attention to concealed products and portions of the Work that cannot otherwise be readily determined later by direct observation.
- G. Record Samples: Immediately prior to Substantial Completion, the Contractor shall meet with DTMB's Representative at the Project site to determine which samples are to be transmitted to the Government for record purposes. Comply with DTMB's instructions regarding delivery to the Government's Sample storage area.
- H. Miscellaneous Record Submittals: Refer to other Specification sections for requirements for miscellaneous record keeping and submittals in connection with

actual performance of the Work. Place miscellaneous records in good order. Identify records properly and bind or otherwise organize to allow for use and reference.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Cleaning Agents: Use cleaning materials and agents recommended by manufacturer or fabricator of the surface to be cleaned. Do not use cleaning agents that are potentially hazardous to health or property or that might damage finished surfaces.
- B. Use cleaning products that comply with Green Seal GS-37, or if GS-37 is not applicable, use products that comply with the California Code of Regulations maximum allowable Volatile Organic Compounds (VOC) levels.

PART 3 - EXECUTION

3.1 CLOSEOUT PROCEDURES

- A. Operation and Maintenance Instructions: Arrange for each Installer of equipment that requires regular maintenance to meet with the Government's personnel to provide instruction in proper operation and maintenance. Provide instruction by manufacturer's representatives if installers are not experienced in operation and maintenance procedures. Include a detailed review of the following:
 - 1. Electronic File: Scan warranties and bonds and assemble complete warranty and bond submittal package as individual electronic PDF files.
 - 2. Operation and Maintenance manuals.
 - 3. Material and Finishes Maintenance Manuals
 - 4. Record documents.
 - 5. Photo CDs or DVDs of any hidden or concealed construction areas.
 - 6. Spare parts and materials.
 - 7. Attic stock.
 - 8. Tools.
 - 9. Lubricants.
 - 10. Fuels.
 - 11. Identification systems.
 - 12. Control sequences.
 - 13. Hazards.
 - 14. Cleaning.
 - 15. Warranties and bonds.
 - 16. Maintenance agreements and similar continuing commitments
 - 17. Keys, security hardware or security information.
- B. As part of instruction for operating equipment, demonstrate the following procedures:

1. Startup.
2. Final commissioning coordination.
3. Shutdown.
4. Emergency operations.
5. Noise and vibration adjustments.
6. Safety procedures.
7. Economy and efficiency adjustments.
8. Effective energy utilization.

3.2 FINAL CLEANING – TO BE COMPLETED AT EACH PHASE

- A. Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to the condition expected in a normal, commercial cleaning and maintenance program. Comply with manufacturer's instructions.
- B. Do not use caustic or acidic cleaning materials that will mar or etch finished work.
 1. Complete the following cleaning operations before requesting inspection for Final Acceptance.
 - a. Remove labels that are not permanent labels.
 - b. Clean transparent materials, including mirrors and glass in doors and windows. Removing glazing compounds and other substances that are noticeable vision-obscuring materials. Replace chipped or broken glass and other damaged transparent materials.
 - c. Clean exposed exterior and interior hard-surfaced finishes to a dust-free condition, free of stains, films, and similar foreign substances. Restore reflective surfaces to their original condition. Leave concrete floors broom clean. Vacuum carpeted surfaces on floors and soft surfaces in any other location.
 - d. Wipe surfaces of mechanical and electrical equipment. Remove excess lubrication and other substances. Clean plumbing fixtures to a sanitary condition. Clean light fixtures and lamps. Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills. Clean interiors of all ductwork to render facility safe for human occupancy.
 - e. Clean the site, including landscape development areas, of rubbish, litter and other foreign substances. Sweep paved areas broom clean, and remove stains, spills, and other foreign deposits. Rake grounds that are neither paved nor planted to a smooth, even-textured surface.
 - f. Remove debris and surface dust from limited-access spaces including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics and similar spaces.
 - g. Clean food service equipment, if present, to a condition of sanitation ready and acceptable for intended food service use.
- C. Pest Control: Engage an experienced, licensed exterminator to make a final inspection and rid the Project of rodents, insects, and other pests.

- D. Removal of Protection: Remove temporary protection and facilities installed for the protection of the Work during construction.
- E. Compliance: Comply with the regulations of authorities having jurisdiction and with safety standards for cleaning. Do not burn waste materials. Do not bury debris or excess materials on Government property. Do not discharge volatile, harmful, or dangerous materials into drainage systems. Remove waste materials from the site and dispose of it lawfully.
- F. Remaining Materials of value that remain after completion of associated work, become Government property. Dispose of or salvage/recycle these materials as directed by DTMB.

3.3 REPAIR OF THE WORK

- A. Complete repair and restoration operations before requesting inspection for determination of Substantial Completion.
- B. Repair, or remove and replace, defective construction. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment. Where damaged or worn items cannot be repaired or restored, provide replacements. Remove and replace operating components that cannot be repaired. Restore damaged construction and permanent facilities used during construction to specified condition. All components of the construction including operational and material shall be in new condition and new working order at the completion of Repair of the Work.

END OF SECTION 01 77 00

SECTION 02 8000 - HAZARDOUS MATERIALS REMEDIATION

PART 1 - GENERAL

1.01 SUMMARY OF WORK

- A. Provide all labor, materials, equipment, transportation, packaging, sampling and testing, and incidentals required to remove and dispose of hazardous materials in accordance with all Federal, State and local laws and regulations. Hazardous materials identified at the Cadillac Place 15th Floor – Building Three Judicial Suites renovation project. The Cadillac Place Building is located at 3044 W. Grand Boulevard in Detroit, Michigan. The potentially hazardous materials that may be disturbed during renovation activities include, but are not limited to:
1. Mercury containing lamps;
 2. Exit signs (Radioactive self-illuminating signs);
- B. Information on hazardous materials found in the buildings listed in this specification document is presented in **Attachment I**. Verify all information.

1.02 RELATED SECTIONS

- A. Section 02 8200 - Asbestos Remediation
- B. Section 02 8300 – Lead Remediation

1.03 GENERAL REQUIREMENTS

- A. Contractor Responsibility: Assume full responsibility and liability for compliance with all applicable federal, state, and local regulations pertaining to work practices, hauling, disposal, and protection of workers, visitors to the Site, and persons occupying areas adjacent to the Site. Provide medical examinations and maintain medical records of personnel as required by the applicable Federal, State, and local regulations. Hold the Owner and Owner's Representative harmless for failure to comply with any applicable work, hauling, disposal, safety, health, or other regulation on the part of Contractor, Contractor's employees, or subcontractors.
- B. Decontamination area location, dumpster location, and entrances that may be used for the movement of supplies and personnel are subject to Owner or Owner's Representative approval.

1.04 REFERENCES

- A. General Applicability of Codes, Regulations, and Standards: Except to the extent that more explicit or more stringent requirements are written directly into the contract documents, all applicable codes, regulations, and standards have the same force and effect (and are made a part of the contract documents by reference) as if copied directly into the contract documents, or as if published copies are bound herewith.
- B. The references in this Article may apply to the work under this Section. This list shall not be considered complete, and it is the Contractor's responsibility to perform all work in accordance with all Federal, State and local laws and regulations.
- C. Hazardous and Regulated Materials Survey Report for Oxbow Restroom prepared by Beam, Longest, and Neff (BLN Project ID:23022), dated May 15, 2023.

It is the Contractor's responsibility to verify all information and to interpret all data and reports for removal purposes.

D. CODE OF FEDERAL REGULATIONS (CFR)

29 CFR Part 1910	Occupational Safety and Health Standards
29 CFR Part 1926	Safety and Health Regulations for Construction
40 CFR Part 61	Subpart M National Emission Standard for Hazardous Air Pollutants (NESHAP)
40 CFR Part 261	Identification and Listing of Hazardous Waste
40 CFR Part 262	Standards Applicable to Generators of Hazardous Waste
40 CFR Part 263	Standards Applicable to Transporters of Hazardous Waste
40 CFR Part 264	Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities
40 CFR Part 265	Interim Status Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities

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| 40 CFR Part 171 | Department of Transportation Regulations to Stipulate Requirements for Containers and Procedures for Shipment of Hazardous Waste |
| 40 CFR Part 761 | Polychlorinated Biphenyls (PCB) Manufacturing, Processing, Distribution in Commerce and Use Prohibitions |
| E. | NATIONAL FIRE PROTECTION ASSOCIATION (NFPA) |
| NFPA 30 | Flammable and Combustible Liquids Code |
| NFPA 70 B | Recommended Practice for Electrical Equipment Maintenance |
| NFPA HAZ | Fire Protection Guide to Hazardous Materials |
| F. | STATE OF MICHIGAN |
| PA 451, PART 201 | Michigan Natural Resources and Environmental Protection Act |
| PA 451, PART 111 | Michigan, NREPA Hazardous Waste Management Act |
| PA 451, PART 115 | Michigan, NREPA Solid Waste Management Act |
| PA 451, PART 121 | Michigan Liquid Industrial By-Product Act (effective March 2016) |
| PART 309 | Michigan Occupational Safety and Health Administration – Cadmium |
| PART 603 | Michigan Occupational Safety and Health Administration – Lead Exposure in Construction |

1.05 SUBMITTALS

At least **10 business days prior to the start of the work**, submit the following items. Do not begin work until they are acknowledged as received.

- A. Work Plan
 - 1. Prior to proceeding with any removal and disposal work, submit a work plan for the removal and disposal of hazardous materials. Provide a detailed description of the methods and equipment to be used for each operation, and sequence of operations.

- B. Submit a health and safety plan in accordance with Michigan Occupational Safety and Health Act (MIOSHA) requirements.
- C. For all disposal or recycling facilities:
 - 1. Submit the name, location, 24-hour telephone number, and Federal, State and local license or permit numbers.
 - 2. Submit the name and address, and federal, state and local permit or identification numbers of the proposed transportation contractor.
 - 3. Submit for Owner's Representative to review prior to Owner's signature, the disposal facility's approval application (waste profile) filled out in its entirety, inclusive of required laboratory data. Within 5 days, the Owner's Representative will either return the Owner signed waste profile to the Contractor or reject the application. Contractor is responsible for the contents of the waste profile, and disposal facility rejection of an Owner signed waste profile shall not be cause for additional compensation.
 - 4. Submit the approved waste profile after receiving disposal facility approval prior to removing hazardous material from the Site. The approval shall contain the facility's waste approval number.
- D. Submit the name and address of any environmental testing laboratory to be utilized.

1.06 SAMPLING AND ANALYTICAL TESTING

- A. Retain a laboratory, which routinely provides analysis acceptable to the Michigan Department of Environmental Quality (MDEQ), to perform required analytical testing and sampling. Costs of sample collection, shipping, and testing shall be borne by Contractor and are incidental to the Contract. Sampling as required or as specified by the Owner Representative or Consultant shall be performed by the Contractor or Contractor's personnel. The sampling and testing requirements for hazardous material disposal shall be the Contractor's responsibility.

1.07 QUALITY ASSURANCE

- A. Contractor will be experienced in the removal, packaging, handling, transportation, and proper disposal of hazardous material and have all necessary local permits and/or approvals.
- B. Contractor shall be responsible for the proper handling of material being disposed from the time the Contractor moves the material until the material is disposed off-site at the licensed disposal facility. The Contractor shall be

responsible to clean up all spills that occur during loading, hauling and final disposal at no cost to the Owner. Contractor shall immediately notify the Owner's Representative of any spills and appropriately clean up and dispose of all material and impacted media required for cleanup.

- C. Do all work required by and in accordance with all applicable federal, state and local government regulatory agencies and arrange for all permits and licenses for the packaging, loading, hauling, and final disposal operations.
- D. If additional data is required to obtain disposal facility approval, collect and analyze appropriate samples. Notify the Owner's Consultant in writing at least one week in advance of sampling with an explanation for the additional testing and the date and time of the sampling so that the Owner's Consultant will have the opportunity to collect co-located samples.

PART 2 – PRODUCTS

NOT USED

PART 3 – EXECUTION

3.01 GENERAL

- A. Preparation
 - 1. Obtain all required permits, including confined space entry permits (if necessary). Provide approved containers, vehicles, equipment, labor, labels, and manifests and other documents necessary for accomplishment of the work.
- B. Safety Guidelines
 - 1. Perform work associated with hazardous materials using appropriate Personal Protection Equipment, as defined by MIOSHA or more stringent if required.
 - 2. Ensure that personnel conducting work under this Section are trained and thoroughly familiar with the safety precautions, procedures, and equipment required for controlling the potential hazards associated with this work.

3.02 REMOVAL

- A. General Packaging and Handling Requirements

1. Prior to the start of removal operations, determine which waste materials may be hazardous. Keep hazardous waste segregated from solid waste, so that proper disposal of the waste material can be achieved.
 2. Inspect containers to determine if they are broken, leaking or deformed. In the case of over-packed, leaking, or broken containers of hazardous materials, remove hazardous contents, and place in new drums.
 3. Categorize and containerize materials by contents and disposal compatibility. Perform compatibility tests, so wastes can be segregated in the interim storage area without risk of fire or explosion.
 4. Package small containers of waste to meet all applicable U.S. Department of Transportation (DOT) and/or Michigan Department of Transportation (MDOT) requirements. Collect liquid waste in drums (55-gallons or smaller).
 5. Properly evacuate refrigerants and fire suppression contents into appropriate containers for transportation and disposal.
 6. Properly evacuate oils and/or other contaminants hydraulic equipment into appropriate containers for transportation and disposal.
 7. Properly label all containers prior to shipment in accordance with all MDOT and other applicable regulations
 8. Provide for the safe storage of waste on-site prior to disposal. For security reasons, restrict access to waste storage areas.
 9. Provide covered dumpsters and storage containers with appropriate hazard labels.
 10. Do not place waste on the unprotected ground. Adequately shield waste to prevent dispersion of the debris by wind or rainwater.
 11. Evidence of improper storage shall be cause for immediate shutdown of the project until corrective action is taken.
- B. Hazardous Waste Packaging and Handling Requirements
1. Store and handle the on-site hazardous waste debris in accordance with the requirements of 40 CFR 262 and 40 CFR 265, with special attention given to proper labeling, use of proper containers, and personnel training. Provide preparedness, prevention, and contingency plans (PPCP) in accordance with 40 CFR 265 Subpart C and Subpart D for the steps to be taken in the event of an unplanned release or emergency.

2. Do not exceed hazardous waste accumulation limits or storage time limits set forth in Federal and State regulations for the Owner's generator size status.
3. Inspect hazardous waste storage areas as required by Federal and State regulations.

C. Additional Requirements

1. Lead and Cadmium were detected in paint in the buildings; therefore, contractors shall comply with the requirements outlined in the following MIOSHA regulations:
 - a. MIOSHA Part 309: Cadmium
 - b. MIOSHA Part 603: Lead Exposure in Construction

3.03 DISPOSAL AT A LICENSED DISPOSAL OR RECYCLING FACILITY

A. General

1. If required to obtain disposal approval, characterize the material to be disposed by collecting samples at a frequency required by the disposal facility and have the samples analyzed by the independent analytical laboratory for parameters required by the disposal facility. Provide results to Owner's Representative. The Contractor shall be responsible for all costs and coordination for this testing.
2. Take special care when removing waste from the Site in order to avoid environmental contamination or injury to workers. Containers shall be moved and packed into the truck with care. When possible, use hand trucks, dollies, or pull carts, along with ramps or trucks with lift gates. These procedures will help minimize container breakage.
3. All vehicles hauling material shall comply with applicable DOT and MDOT regulations. Vehicles shall be properly licensed under and comply with all applicable federal, state, and local laws and regulations.
4. Trucks and trailers used for transporting material shall be in good repair, free from holes, have tailgates in good working order, and have tarps that cover the truck's box and trailers.
5. Vehicles found to be leaking vehicle fluids shall not be loaded until the source of the leak is located, contained, and repaired to the satisfaction of the Owner's Representative. Report all spills immediately to the Owner's Representative. Cleanup of vehicle fluids released to the ground is the Contractors' responsibility.

6. Prior to loading, provide Owner's Consultant with one manifest for each load of material. Each manifest will be pre-printed with the Site name and address, the Owner's name and address, the name of the disposal facility, the name of the transporter, and the disposal facility approval number.
 7. During loading, the Owner's Consultant will provide a manifest signed on behalf of the Owner for each load.
 8. Transport hazardous materials, universal waste and non-hazardous waste to a licensed treatment storage and disposal facility or recycling facility for disposal.
 9. Within 24 hours of the load arriving at the disposal or recycling facility , provide to the Owner's Representative an original manifest and a corresponding disposal facility receipt ticket that have been signed by the disposal or recycling facility.
- B. Liquid and Hazardous Waste Disposal:
1. Transport hazardous waste in accordance with the requirements of 40 CFR 263 and other applicable state and federal requirements, and disposed of properly. Use only licensed transporters. Transporters shall have an EPA ID Number and must meet DOT requirements for shipping containers.
 2. Dispose of hazardous waste in accordance with 40 CFR 264 and 40 CFR 268 at a disposal facility licensed to accept the waste.

END OF SECTION

SECTION 02 8300 - LEAD PAINT REMEDIATION

PART 1: GENERAL

1.01 SUMMARY OF WORK

- A. The type of work under this specification involves removal of lead-containing paint from plaster ceilings and concrete floors as part of the Cadillac Place 15th Floor – Building Three Judicial Suites renovation project. The Cadillac Place Building is located at 3044 W. Grand Boulevard in Detroit, Michigan. The removal work is required prior to coring through floors and ceilings.
- B. Information on paint testing in these exterior components is presented in **Attachment I**. Verify all information.

1.02 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 02 8000 – Hazardous Materials Remediation
- B. Section 02 8200: Asbestos Remediation

1.03 REFERENCES

- A. General Applicability of Codes, Regulations, and Standards: Except to the extent that more explicit or more stringent requirements are written directly into the contract documents, all applicable codes, regulations, and standards have the same force and effect (and are made a part of the contract documents by reference) as if copied directly into the contract documents, or as if published copies are bound herewith.
- B. The references in this Article may apply to the work under this Section. This list shall not be considered complete, and it is the Contractor's responsibility to perform all work in accordance with all Federal, State and local laws and regulations.
- C. Hazardous and Regulated Materials Survey Report for Oxbow Restroom prepared by Beam, Longest, and Neff (BLN Project ID:23022), dated May 15, 2023.

It is the Contractor's responsibility to verify all information and to interpret all data and reports for removal purposes.
- D. Michigan Labor and Economic Opportunity (LEO) and Michigan Occupational Safety and Health Administration (MIOSHA) Safety Standards relating to lead include but are not limited to:

1. Part 1 General Provision
2. Part 451 Respiratory Protection
3. Part 42 Hazard Communication
4. Part 20 Demolition
5. Part 45 Fall Protection
6. Part 6 Personal Protective Equipment
7. Part 7 Welding & Cutting
8. Part 19 Tools
9. Part 12 Scaffolds & Scaffold Platforms
10. Part 451 Respiratory Protection
11. Part 603 Lead Exposure in Construction

E. Code of Federal Regulations:

1. 40 CFR 50, "National Primary and Secondary Ambient Air Quality Standards"
2. 40 CFR 117, "Determination of Reportable Quantities for Hazardous Substances"
3. 40 CFR 122, "EPA Administered Permit Program: The National Pollutant Discharge Elimination System"
4. 40 CFR 261, "Identification and Listing of Hazardous Waste"
5. 40 CFR 262, "Standards Applicable to Generators of Hazardous Waste"
6. 40 CFR 263, "Standards Applicable to Transporters of Hazardous Waste"
7. 40 CFR 264, "Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities"
8. 40 CFR 265, "Interim Status Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities"

9. 40 CFR 268, "Land Disposal Restrictions"
 10. 40 CFR 300, "National Oil and Hazardous Substances Pollution Contingency Plan."
 11. 40 CFR 302, "Designation, Reportable Quantities, and Notification."
- F. State of Michigan:
1. Michigan Codified Laws Annotated MCLA 299.9101 - 299.11107 "Michigan Hazardous Waste Management"
- G. National Institute for Occupational Health and Safety: NIOSH Method 7082, "Lead".
- H. American Society for Testing and Materials
1. ASTM D3335, "Test Method for Low Concentrations for Lead, Cadmium, and Cobalt in Paint by Atomic Absorption Spectroscopy."
- I. EPA (Environmental Protection Agency) Publications:
1. SW-846, Test Methods for Evaluating Solid Waste - Physical/Chemical Methods.
 2. EPA Method 3050, "Acid Digestion of Sediments, Sludges, and Soils."
- J. SSPC (Steel Structures Painting Council): Guide 61 (CON) Guide for Containing Debris Generated During Paint Removal Operations.
- K. "Industrial Lead Paint Removal Handbook", 2nd Edition, Kenneth A. Trimmer.

1.04 GENERAL REQUIREMENTS

- A. Contractor Responsibility: Assume full responsibility and liability for compliance with all applicable federal, state, and local regulations pertaining to work practices, hauling, disposal, and protection of workers, visitors to the site, and persons occupying areas adjacent to the site. Provide medical examinations and maintain medical records of personnel as required by the applicable Federal, State, and local regulations. Hold the Owner and Owner's Consultant harmless for failure to comply with any applicable work, hauling, disposal, safety, health, or other regulation on the part of Contractor, Contractor's employees, or subcontractors.

- B. Decontamination area location, dumpster location, and entrances that may be used for the movement of supplies and personnel are subject to the Owner and Owner's Consultant approval.
- C. Allow the Owner's Consultant to inspect and approve all equipment and materials used before the start of any work.
- D. Allow the Owner's Consultant to check or evaluate field/air monitoring methods, procedures and quality assurance

1.05 DEFINITIONS

- A. Abatement: Any set of measures designed to permanently eliminate LBP or LCP, or to eliminate lead paint hazards for an expected design life of at least 20 years. Abatement includes the removal of LBP or LCP and associated dust hazards, the replacement of components or fixtures painted with LBP or LCP, and the removal or permanent covering of soil-lead hazards; and all preparation, cleanup, disposal, and post abatement clearance testing activities associated with such measures.
- B. Accredited laboratory: A laboratory that has been evaluated and given approval to perform a specified measurement or task (such as the American Industrial Hygiene Association or National Lead Laboratory Accreditation Program), usually for a specific property or analyze for a specified period of time.
- C. Breathing Zone: A hemisphere forward of the shoulders with a radius of approximately 6 to 9 inches around the nose and mouth of the face.
- D. Competent Person: An agent of the Contractor who is a Competent Person as defined by OSHA in 29 CFR 1926.62. This person must be capable of identifying existing and predictable lead and cadmium hazards in the surroundings or working conditions and who has authorization by the Contractor to take prompt corrective measures to eliminate them.
- F. Lead-Containing Paint Surface: Paint containing any amount of lead by weight at or above the laboratory method detection limit.
- G. Lead-Based Paint Surface: Paint having a lead content of greater than or equal to 0.50% by weight.
- H. Engineering Controls: Measure which are put into place at the work site to implement containment and control and/or the reduction of lead and cadmium dust exposure.

- I. Encapsulation The application of a covering or coating that acts as a barrier between the LBP or LCP and the environment and that relies for its durability on adhesion between the encapsulant and the painted surface, and on the integrity of the existing bonds between paint layers and between the paint and the substrate.
- J. Enclosure: The use of rigid, durable construction materials that are mechanically fastened to the substrate in order to act as a barrier between LBP or LCP and the environment.
- K. FieldBlank: A non-exposed sample of the medium used for testing, such as a wipe or filter, which is analyzed like other samples to determine whether (1) samples are contaminated with lead or cadmium before samples are collected (e.g., at the factory, or at the testing site), (2) the samples are contaminated after sample collection (e.g., during transportation to the laboratory or in the laboratory).
- L. FinalClearanceInspection: An inspection by a qualified inspector to determine whether abatement and cleanup are complete and unit tests pass the final clearance standards as set forth herein.
- M. Generator: The facility owner or operator or person who first creates or produces the hazardous waste. Generator size statuses are:
 - 1. Large Quantity Generator: Generates over 2,200 pounds (1,000 kilograms) of hazardous waste or 2.2 pounds of acutely hazardous waste per month or stores more than 13,200 (6,000 kilograms) pounds of waste or more than 2.2 pounds of acutely hazardous waste at the site at any one time.
 - 2. Small Quantity Generator: Generates more than 220 pounds (100 kilograms), but less than 2,200 pounds (1,000 kilograms) of hazardous waste per month and accumulates less than 13,200 pounds (6,000 kilograms) at any one time.
 - 3. Conditionally Exempt Small Quantity Generator: Generates less than 220 pounds (100 kilograms) of hazardous waste per month, and accumulates no more than 1,000 kilograms (2,200 pounds) of hazardous waste at any time.
- N. HazardousWaste: Paint debris is classified as hazardous waste due to the characteristic of toxicity, if after testing by Toxicity Characteristic Leaching Procedures (TCLP), the leachate contains any of the elements in the concentrations listed below (or greater):

Arsenic

5 ppm

Lead

5 ppm

Barium	100 ppm	Mercury	0.2 ppm
Chromium	5 ppm	Silver	5 ppm

Note: Other characteristics can cause a material to be hazardous as defined in 40 CFR 261 and must be taken into consideration. The list above includes only those elements typically associated with paint solids. If chemical strippers are used, the debris may be hazardous waste, due to characteristics of the chemical(s), or if the pH is less than or equal to 2 or greater than or equal to 12.5.

- O. HEPA-HighEfficiencyParticulateAir: A filter capable of filtering out particles of 0.3 microns or greater from a body of air at 99.97% efficiency or greater.
- P. High-PhosphateDetergent: Detergent that contains at least 5% tri-sodium phosphate (TSP).
- Q. LeadDustContamination: Dust containing lead at levels above the clearance criteria, generated by the deterioration of lead-based paint, by environmental factors or by the abatement of leaded surfaces.
- R. Monitoring: A systematic means of inspection to assure compliance with the safety standards contained herein, which shall include, but not limited to, visual inspection, air sampling, and surface lead and cadmium dust sampling by the OWNER'S CONSULTANT.
- S. NegativePressureRespirator: A respirator in which the air pressure inside the respiratory inlet covering is positive during exhalation in relation to the air pressure of the outside atmosphere and negative during inhalation in relation to the air pressure of the outside atmosphere.
- T. PersonalSamples(forsamplingleadandcadmiumdust): Air samples collected from within the breathing zone of a worker, but outside the respirator. The samples are collected with a personal sampling pump, pulling 1 to 4 liters/minute of air.
- U. ProtectionFactor: The ratio of the ambient concentration of an airborne substance to the concentration of the substance inside the respirator at the breathing zone of the wearer. The protection factor is a measure of the degree of protection provided by a respirator to the wearer.
- V. RegulatedArea: Area established by the Contractor where the airborne concentrations exceeds or may reasonably be expected to exceed the MIOSHA Lead Action Level of $30.0 \mu\text{g}/\text{m}^3$. The regulated area is demarcated and/or isolated to prevent the spread of lead and cadmium dust or debris, and entry by unauthorized personnel.

- W. TCLP(ToxicityCharacteristicLeachingProcedure): A test defined in Appendix II of 40 CFR 261 that is designed to identify wastes likely to leach hazardous concentrations of particular toxic constituents into the ground water as a result of improper management.
- X. TimeWeightedAverage(TWA): The average concentration of a contaminant in air during a specific time period.
- Y. WetCleaning(WetDetergentWash): The process of eliminating lead and cadmium dust contamination from building surfaces and objects by using cloths, mops, or other cleaning utensils which have been dampened with a solution of water and trisodium phosphate (TSP) or appropriate substitute and afterwards thoroughly decontaminated or disposed of as lead and cadmium contaminated waste.
- Z. WorkArea: The area where LBP or LCP removal or related work is performed, where dust collection or abrasive recycling equipment is located, and locations where LBP or LCP debris is handled or transferred to storage containers. Work areas are defined and/or isolated to prevent the spread of lead or cadmium dust, or debris and entry by unauthorized personnel. Regulated areas are within work areas.
- AA. WorkPractice: A procedure followed by workers, which is intended to minimize exposure to the worker and the environment.

1.06 SUBMITTALS

At least 2 weeks prior to beginning work, submit a written plan which includes the following items. Do not begin work until they are acknowledged as received.

- A. Abatement: The written plan shall include methods to be employed for surface preparation, LBP or LCP abatement, area set up, and collection of debris.
 - 1. Describe the proposed methods and locations for abatement for each type of substrate.
 - 2. Include details for establishing regulated areas. When designing the system, thoroughly examine building components to verify their ability to support containment system; include wind loads (if applicable).
 - 3. If required, detail the methods and procedures for lead abatement of historically significant features.
- B. ProgramsfortheProtectionofAmbientAir,andWater: The written plan shall include information regarding testing and evaluation programs that will be used to confirm that the work does not violate Federal,

State and local regulations. Refer to Article 1.07 for acceptance criteria.

1. AirQuality: The following shall be addressed:

- a. VisibleEmissions: Submit a written plan for the observations that will be made to verify that the visible emissions criteria of this Specification are not exceeded.
- b. PersonalMonitoringandNegativeExposureAssessment: The Contractor shall submit a program that identifies the proposed activities for the use of personal monitors in accordance with Part 603 Lead Exposure in Construction Standard and NIOSH Method 7082. The duration of monitoring, provisions for background monitoring, laboratory qualifications, and evaluation procedures to be employed shall be included.

C. Handling,DisposalandAnalysisofDebris:

1. HandlingandSiteStorage: The written plan shall address handling and site storage of LBP or LCP debris in accordance with the requirements of 40 CFR 262 and 40 CFR 265. The plan will at a minimum include container requirements, contingency plan, labeling and personnel training, storage area inspections, and emergency response.
2. SamplingandTestingofDebris: Written procedures that will be followed for the sampling and testing of debris to determine if it is a hazardous waste. The sampling procedure shall be in accordance with the requirements of SW 846, with the analysis accomplished by TCLP, as defined in Appendix II of 40 CFR 261. The plan shall include the name of the testing laboratory to be utilized. The testing laboratory shall hold certifications or accreditations relevant to the testing and documentation of such shall be included in the plan.
3. Transportation: The written plan shall how waste will be properly transported in accordance with the requirements of 40 CFR 263 and other state and federal regulations. The name of the transporter shall be included.
4. For the proposed disposal facility, submit the name, location, 24-hour telephone number, and Federal, State and local license or permit numbers.
5. Submit the name and address, and federal, state and local permit or identification numbers of the proposed transportation contractor.

6. Submit, for review Owner's Consultant prior to Owner's signature, the disposal facility's approval application (waste profile) filled out in its entirety, inclusive of landfill required laboratory data. Within 5 days, the Owner's Consultant will either return the Owner signed waste profile to the Contractor or reject the application. Contractor is responsible for the contents of the waste profile, and disposal facility rejection of an Owner signed waste profile shall not be cause for additional compensation.
7. Submit the approved waste profile after receiving disposal facility approval prior to beginning work. The approval shall contain the disposal facility's waste approval number.
8. Equipment Decontamination: A written plan for the decontamination of reusable items prior to removal from the project site, or for the proper testing and disposal of the materials if decontamination is not possible or desirable.

D. WorkerProtection:

1. The written plan shall address worker protection consistent with MIOSHA, Part 603 - Lead Exposure in Construction including, but not limited to, exposure assessments and methods for selection of appropriate respiratory protection, personal protective equipment, hygiene facilities and practices, and medical surveillance.

1.07 CRITERIA FOR CONTROL OF LEAD DUST EMISSIONS

A. Ambient Air Quality - Particulate Matter and Visible Emissions: Monitor and control ambient air particulate matter and visible emissions in accordance with the following criteria:

1. Visible Emissions: Visible emissions shall be used as a criterion for project shut down until corrections to the containment, removal methods or the regulated area are made. The Owner's Consultant has the authority to shut down the project if any visible emissions are observed outside the containment, work, or regulated area.

B. Air Monitoring to Establish Regulated Areas:

1. Determine the extent of the regulated area surrounding activities where exposures may exceed the MIOSHA Lead Action Level of 30.0 $\mu\text{g}/\text{m}^3$.
2. Emissions of in excess of MIOSHA's Lead Action Level over an eight-hour period shall be cause for shut down of the project until correction are made to comply with these levels.

- C. Water Quality: Do not allow the release of lead into bodies of water or storm sewers. Stop work if spills or emissions are observed entering into bodies of water, or are found in areas where storm water run-off could carry the debris into bodies of water or storm sewers.
 - 1. Provide protection at drains to prevent paint debris from entering the storm sewer system.

- D. ClearanceCriteria:
 - 1. Clearance will be conducted using a visual inspection of the work area and surrounding areas to ensure that no dust or debris remains.
 - a. If criteria are met, the work area may be released for general use.
 - b. If the clearance criteria are not met, the work area(s) shall be re-cleaned by the contractor and the clearance inspection repeated at no cost to the project.

1.08 WORKER TRAINING AND CERTIFICATION

- A. LARA MIOSHA-Required Training: All workers are to be trained in the dangers inherent in handling, breathing or ingesting lead dust and in the proper work procedures and personal and area protective measures prior to the time of initial job assignment and at least annually thereafter in accordance with Part 603.

1.09 RELEASES

- A. Contractor shall be responsible for the proper handling of material being disposed from the time the Contractor removes the material until the material is disposed of site in a landfill. The Contractor shall be responsible to clean up all spills that occur during loading, hauling and final disposal at no cost to the Owner. Contractor shall immediately notify the Owner's Consultant of any spills and appropriately clean up and dispose of all material and impacted media required for cleanup.

1.10 RECORD KEEPING AND REMOVAL MANAGEMENT

- A. Document and maintain records of the removal process. Submit the records to the Owner, for their use upon completion of the removal and prior to final payment. The records shall clearly describe in non-technical language where the lead were found, and how it was removed.
- B. Records shall include a detailed written description of the abatement, including the abatement methods used, locations of room and/or components where

abatement occurred, and reasons for selecting particular abatement methods for each component.

1.11 QUALITY ASSURANCE

- A. Contractor will be experienced in the removal, packaging, handling, transportation, and proper disposal of LBP or LCP and have all necessary local permits and/or approvals.
- B. Contractor shall be responsible for the proper handling of material being disposed from the time the Contractor moves the material until the material is disposed of site at the licensed disposal facility. The Contractor shall be responsible to clean up all spills that occur during loading, hauling and final disposal at no cost to the Owner. Contractor shall immediately notify the Owner's Consultant of any spills and appropriately clean up and dispose of all material and impacted media required for cleanup.
- C. Do all work required by and in accordance with all applicable federal, state and local government regulatory agencies and arrange for all permits and licenses for the packaging, loading, hauling, and final disposal operations.

1.12 OWNER'S CONSULTANT'S ROLE

- A. The Owner's Consultant, will perform the following activities:
 - 1. Review the Contractor's submittals for compliance with the specifications.
 - 2. Conduct air monitoring outside of the regulated area. Perform sampling in accordance with NIOSH 7082. Send samples to an accredited laboratory with a 24-hour turn-around-time. Shut down the project if the Action Level is exceeded and do not resume until corrections to the containment, removal methods or the regulated area are made.
 - 3. Perform clearance visual inspection.
 - 4. Periodically monitor for visible emissions from the work area and regulated area.
- B. The Owner or Owner's Consultant has the right to stop any work that does not comply with the intent of the specifications. If the Owner presents a written stop work order, immediately stop all work. Do not recommence work until authorized by the Owner.

PART 2: PRODUCTS

2.01 EQUIPMENT

- A. HEPA vacuums: Utilize HEPA vacuums to clean surfaces during and after lead and cadmium remediation.
 - 1. Related attachments: As necessary for the conditions encountered, and including items such as brushes of various sizes, crevice tools, and angular tools.
- B. Air-filtration devices (AFDs): Utilize AFDs in containments and work and regulated areas to filter air and keep dust levels down.
- C. Other equipment, including personal safety equipment, as necessary to comply with the requirements of this specification.

2.02 MATERIALS

- A. The following materials may be used to set up the work area:
 - 1. Polyethylene sheeting: 4-mil and 6-mil thickness.
 - 2. Polyethylene spray glue: Product MSDS shall be approved by the OWNER'S CONSULTANT.
 - 3. Heavy duty tape (e.g., duct tape) to fasten plastic sheets;
 - 4. Staple gun with heavy duty staples for fastening plastic sheets;
 - 5. Miscellaneous materials such as storage drums, framing lumber, masking, as necessary to meet the requirements of this specification.
- B. Non-flammable chemical paint strippers that do not contain methylene chloride.

PART 3 - EXECUTION

3.01 GENERAL PROCEDURES

- A. Provide on-site, full time competent person (or persons) to ensure that the worker protection program is effective.
- B. Site Preparation: Prior to work start:
 - 1. Ensure the ventilation system in the vicinity of the work area is off.

2. Demarcate work areas and regulated areas by use of ropes, tape, walls, or other similar means, and post appropriate warning signs; maintain egress. At a minimum, provide barrier warning tape at the perimeter of the work area and post warning signs with the following:

**“DANGER
LEAD WORK AREA
MAY DAMAGE FERTILITY OR THE UNBORN CHILD CAUSES DAMAGE
TO THE CENTRAL NERVOUS SYSTEM DO NOT EAT, DRINK OR
SMOKE IN THIS AREA”**

3. When activities are used for removal which are likely to cause airborne concentrations to exceed the MIOSHA Lead Action Level, erect containment to protect surfaces and contain and control dust and debris as specified in Article 3.03.
 4. When possible, remove components whole (i.e., radiators pipe hangers, etc.), without disturbing the paint.
 5. Conduct an on-site safety meeting to discuss possible work place/work practice hazards.
- C. Prohibited on-site removal methods:
1. Open flame burning or torching (includes propane-fueled heat grids).
 2. Machine sanding or grinding without HEPA local vacuum exhaust tool.
 3. Uncontained hydroblasting or high-pressure wash.
 4. Dry sanding or scraping (except in limited circumstances as permitted by Federal regulations).
 5. Abrasive blasting or sandblasting without HEPA local vacuum exhaust tool.
 6. Heat guns operating above 1,100 °F.
 7. Methylene chloride chemical paint removers.
 8. Other methods prohibited by Federal, State or local regulations.
- D. Approved Removal Methods: Mitigation of lead-bearing substances shall employ only the following methods:

1. Replacement. Any component part of a building may be abated by removing the component whole (without disturbing paint) and replacing it with a part free of lead -bearing substances.
 2. Removal. Paint shall be removed from the substrate using the following techniques:
 - a. Offsite chemical stripping;
 - b. Heat gun (The temperature of the heat gun shall not exceed 1,100~ F.);
 - c. Nonflammable chemical strippers which do not contain methylene chloride;
 - d. Wet scraping or sanding;
 - e. Sander equipped with HEPA vacuum;
 - f. Vacuum-blasting in exterior work areas only;
 - g. Mechanical paint removal systems equipped with a HEPA vacuum.
- E. Exercise caution to avoid the release of dust into the air. Contain dust and debris on polyethylene sheeting. Prevent emissions from the regulated area in excess of the MIOSHA Lead Action Limit. These activities include, but are not limited to: manual demolition, scraping, sanding, abrasive blasting, welding, cutting and torch cutting. Use of chemical paint stripper does not require a containment.
- F. HEPA vacuum and wet-wipe the exterior of the filled waste containers before removing from the work area to remove residual contamination. If plastic bags are used, bag again as they come out of the work area.
- G. Limit access to the work area to those persons properly trained and protected in accordance with Article 1.08 and the submitted worker protection program.
- H. Require persons entering a regulated area to wear appropriate respiratory protection in accordance with appropriate Federal and State laws and regulations, and with this Specification.
- I. Perform personal/exposure air monitoring on employees for compliance with MIOSHA's Part 603 Lead Exposure in Construction. The Owner's Consultant has the authority to shut down the project if the personal air monitoring results indicated that workers' respiratory protection is inadequate until workers wear

respirator with appropriate protection factors and/or engineering controls are implemented to reduce exposures to lead dust.

- J. Do not allow unacceptable activities within the work area including, but not limited to, eating, drinking, smoking, chewing tobacco or gum, or applying cosmetics.
- K. Provide access to Owner's Consultant and allow them to utilize ladders, lifts or other equipment to access above-grade areas for inspections and tests.

3.02 CONTROLLING DISPERSAL

- A. Limiting access: Prior to satisfactory clearance testing, limit access to the work areas to the following:
 - 1. Contractor and designated employees;
 - 2. State, county, or local enforcement officials, or their designees;
 - 3. Inspectors representing the Owner;
 - 4. Owner's Consultant
- B. Limiting Tracking of Dust and Debris:
 - 1. Require persons entering the work area to wear disposable coveralls, and shoe covers. The coveralls and shoe covers shall be removed upon leaving the work area and placed with removal waste.
 - 2. Remove waste from work areas at times when worker traffic is low. Select transit and hauling routes to minimize interaction with non-lead workers.
- C. Regularly clean all tools, equipment, and worker protection equipment to minimize worker exposure and the risk of transferring lead and cadmium outside of the work area.

3.03 EXTERIOR WORK PROCEDURES

- B. Work Area Isolation and Preparation:
 - 1. Isolate the work area to prevent unauthorized access.
 - a. Post OSHA-compliant lead warning signs at each entrance to the work area.

- b. Construct a physical barrier such as warning tape to delineate the regulated area with a perimeter of at least twenty (20) feet around the work area.
 2. Remove all movable belongings and items from below the work area.
 3. Completely cover all immovable items with protective sheeting. Seal seams and edges with tape.
 4. Cover the ground in the work area with 6-mil thick poly sheeting or equivalent impermeable material to six (6) feet in each direction beyond the perimeter of surfaces undergoing renovation.
 - a. If renovations occur in warmer climate, use white plastic sheeting to avoid damage to vegetation.
 - b. Erect a vertical containment or use equivalent extra precautions if renovations occur within ten (10) feet of the property line.
 - c. Place disposable tack pads at the edge of protective ground covering where workers will leave the area.
 5. Close and seal all windows within twenty (20) feet of the work area with 6-mil thick poly sheeting or equivalent impermeable material sealed with tape.
 6. Close and seal all doors in the work area with 6-mil thick poly sheeting or equivalent impermeable material sealed with tape.
 - a. Any doors that will be used for entry to the building shall be set-up with an overlapped poly flap doorway entrance.
 7. Seal all other penetrations within twenty (20) feet of the work area with 6-mil thick poly sheeting or equivalent impermeable material sealed with tape.
 8. Construct a decontamination area that consists of an equipment removal area, wash area (equipped at a minimum with hands and face wash station, running warm water, clean towels, and lead reducing soap), and clean area.
- C. Clean-up:
 1. Conduct prompt clean-up of dust and debris using a HEPA vacuum and wet methods using a lead specific cleaner on a continuous basis.

2. Conduct cleaning of all tools and equipment using a HEPA vacuum and wet methods using a lead specific cleaner prior to leaving the containment area.
3. At the end of each shift and upon completion, clean drop cloth and any dust or debris on the ground using a HEPA vacuum and wet methods using a lead specific cleaner.
4. Upon completion, clean all surfaces (horizontal and vertical) in the work area using a HEPA vacuum and wet methods using a lead specific cleaner following a “top to bottom, back your way out” approach.
5. Clean at least four (4) feet beyond the contained work area.

D. Disposal:

1. Dispose of any dust or debris in leak-tight 6-mil thick poly bags.
2. Dispose of drop cloth by misting, folding inwards, securing with duct tape, and placing in leak-tight 6-mil thick poly bags.
3. Dispose of all other work related items (e.g. PPE, mops, wipes, filters, etc.) in leak-tight 6-mil thick poly bags.
4. If items are too large to fit into bags, wrap items in plastic and seal with tape prior to removal from the plastic containment area.
5. Seal poly bags with duct tape in a gooseneck configuration.
6. Use a HEPA vacuum and wet methods using a lead specific cleaner to clean the outside of the bags and larger wrapped items before removing them from the plastic containment area.
7. Move bags out of the work area into a designated secure storage area.
8. Dispose of wastewater in accordance with local, state, and Federal regulatory requirements.
9. Submit a representative bag of waste prepared in accordance with laboratory requirements for testing to an EPA accredited lab for Toxicity Characteristic Leaching Procedure (TCLP) analysis.
 - a. If the concentration of lead is equal to or greater than 5.0 mg/l as determined by the TCLP, the handling and disposal of hazardous waste must be conducted in accordance with applicable local,

state, and the Resource Conservation and Recovery Act (RCRA) regulations applicable to the activity being conducted.

- b. Do not store hazardous waste on-site for greater than 90 days (or 180 days for a small-quantity generator; 270 days for a small-quantity generator that transports waste greater than 200 miles) without a RCRA permit.
 - c. Label all waste bags and larger items with appropriate hazardous material disposal information.
 - d. If the material is determined to be non-hazardous, it may be treated as a municipal solid waste, construction debris, or scrap metal as appropriate.
10. Carefully place the containers into the truck or dumpster used for disposal. Ensure that all waste is transported in covered vehicles to an appropriate landfill based on the results of the waste determination.

3.04 CLEARANCE:

- A. Following the completion of final clean-up, coordinate with the Owner's Consultant for clearance inspection of the area.
- B. Clearance will be conducted using a visual inspection of the work area and surrounding areas to ensure that no dust or debris remains.
 1. If criteria are met, the work area may be released for general use.
 2. If the clearance criteria are not met, the work area(s) shall be re-cleaned by the contractor and the clearance inspection repeated at no cost to the project.

END OF SECTION

SECTION 03 54 16 - HYDRAULIC CEMENT UNDERLAYMENT

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Polymer-modified, self-leveling, hydraulic cement underlayment for application below interior floor coverings. Provide only as required.
2. The quantities for floor leveling is anticipated not to exceed one-thousand four hundred (1,400) square feet.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.

1.3 QUALITY ASSURANCE

- A. Installer Qualifications: Installer who is approved by manufacturer for application of underlayment products required for this Project.

1.4 FIELD CONDITIONS

- A. Environmental Limitations: Comply with manufacturer's written instructions for substrate temperature, ventilation, ambient temperature and humidity, and other conditions affecting underlayment performance.
1. Place hydraulic cement underlayments only when ambient temperature and temperature of substrates are between 50 and 80 deg F (10 and 27 deg C).

PART 2 - PRODUCTS

2.1 HYDRAULIC CEMENT UNDERLAYMENTS

- A. Hydraulic Cement Underlayment: Polymer-modified, self-leveling, hydraulic cement product that can be applied in minimum uniform thickness of 1/4 inch (6 mm) and that can be feathered at edges to match adjacent floor elevations.
1. Cement Binder: ASTM C150/C150M, portland cement, or hydraulic or blended hydraulic cement as defined by ASTM C219.

2. Compressive Strength: Not less than 4000 psi (27.6 MPa) at 28 days when tested according to ASTM C109/C109M.
 3. Underlayment Additive: Resilient-emulsion product of underlayment manufacturer, formulated for use with underlayment when applied to substrate and conditions indicated.
- B. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch (3 to 6 mm); or coarse sand as recommended by underlayment manufacturer.
1. Provide aggregate when recommended in writing by underlayment manufacturer for underlayment thickness required.
- C. Water: Potable and at a temperature of not more than 70 deg F (21 deg C).
- D. Reinforcement: For underlayment applied to wood substrates, provide galvanized metal lath or other corrosion-resistant reinforcement recommended in writing by underlayment manufacturer.
- E. Primer: Product of underlayment manufacturer recommended in writing for substrate, conditions, and application indicated.
- F. Surface Sealer: Designed to reduce porosity as recommended by manufacturer for type of floor covering to be applied to underlayment.

PART 3 - EXECUTION

3.1 PREPARATION

- A. General: Prepare and clean substrate according to manufacturer's written instructions.
1. Treat nonmoving substrate cracks according to manufacturer's written instructions to prevent cracks from telegraphing (reflecting) through underlayment.
 2. Fill substrate voids to prevent underlayment from leaking.
- B. Concrete Substrates: Mechanically remove, according to manufacturer's written instructions, laitance, glaze, efflorescence, curing compounds, form-release agents, dust, dirt, grease, oil, and other contaminants that might impair underlayment bond.
- C. Adhesion Tests: After substrate preparation, test substrate for adhesion with underlayment according to manufacturer's written instructions.

3.2 APPLICATION

- A. General: Mix and apply underlayment components according to manufacturer's written instructions.

1. Close areas to traffic during underlayment application and for time period after application recommended in writing by manufacturer.
 2. Coordinate application of components to provide optimum adhesion to substrate and between coats.
 3. At substrate expansion, isolation, and other moving joints, allow joint of same width to continue through underlayment.
- B. Apply primer over prepared substrate at manufacturer's recommended spreading rate.
- C. Apply underlayment to produce uniform, level surface.
1. Apply a final layer without aggregate to product surface.
 2. Feather edges to match adjacent floor elevations.
- D. Cure underlayment according to manufacturer's written instructions. Prevent contamination during application and curing processes.
- E. Do not install floor coverings over underlayment until after time period recommended in writing by underlayment manufacturer.
- F. Apply surface sealer at rate recommended by manufacturer.
- G. Remove and replace underlayment areas that evidence lack of bond with substrate, including areas that emit a "hollow" sound when tapped.

END OF SECTION 03 54 16

SECTION 05 50 00 - METAL FABRICATIONS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
1. Miscellaneous steel framing and supports.
 2. Steel tubes and plates.

1.2 ACTION SUBMITTALS

- A. Product Data: For the following:
1. Fasteners.
 2. Shop primers.
- B. Shop Drawings: Show fabrication and installation details. Show anchorage and accessory items.

PART 2 - PRODUCTS

2.1 METALS

- A. Metal Surfaces, General: Provide materials with smooth, flat surfaces unless otherwise indicated. For metal fabrications exposed to view in the completed Work, provide materials without seam marks, roller marks, rolled trade names, or blemishes.
- B. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.
- C. Steel Plates, Shapes, and Bars: ASTM A36/A36M.
- D. Stainless Steel Bars and Shapes: ASTM A276/A276M, Type 304.
- E. Steel Tubing: ASTM A500/A500M, cold-formed steel tubing.
- F. Steel Pipe: ASTM A53/A53M, Standard Weight (Schedule 40) unless otherwise indicated.
- G. Zinc-Coated Steel Wire Rope: ASTM A741.
1. Wire Rope Fittings: Hot-dip galvanized-steel connectors with capability to sustain, without failure, a load equal to minimum breaking strength of wire rope with which they are used.

- H. Stainless Steel Wire Rope: Wire rope manufactured from stainless steel wire complying with ASTM A492, Type 316.
 - 1. Wire Rope Fittings: Stainless steel connectors, Type 316, with capability to sustain, without failure, a load equal to minimum breaking strength of wire rope with which they are used.
- I. Steel Prestressing Strand: ASTM A416/A416M, Grade 270 (Grade 1860), low-relaxation, seven-wire, with 0.9-lb/sq. ft. (4.39-kg/sq. m) zinc coating.
 - 1. Steel Prestressing Strand Fittings: Hot-dip galvanized-steel anchors and connectors with capability to sustain, without failure, a load equal to minimum breaking strength of steel prestressing strand with which they are used.
- J. Slotted Channel Framing: Cold-formed metal box channels (struts) complying with MFMA-4.
 - 1. Size of Channels: 1-5/8 by 1-5/8 inches (41 by 41 mm).
 - 2. Material: Cold-rolled steel, ASTM A1008/A1008M, commercial steel, Type B 0.0966-inch (2.5-mm) minimum thickness baked-on, acrylic enamel.
- K. Cast Iron: Either gray iron, ASTM A48/A48M, or malleable iron, ASTM A47/A47M, unless otherwise indicated.
- L. Aluminum Extrusions: ASTM B221 (ASTM B221M), Alloy 6063-T6.
- M. Aluminum-Alloy Rolled Tread Plate: ASTM B632/B632M, Alloy 6061-T6.
- N. Aluminum Castings: ASTM B26/B26M, Alloy 443.0-F.
- O. Bronze Extrusions: ASTM B455, Alloy UNS No. C38500 (extruded architectural bronze).
- P. Bronze Castings: ASTM B584, Alloy UNS No. C83600 (leaded red brass) or UNS No. C84400 (leaded semired brass).
- Q. Nickel Silver Castings: ASTM B584, Alloy UNS No. C97600 (20 percent leaded nickel bronze).

2.2 FASTENERS

- A. General: Unless otherwise indicated, provide Type 304 stainless steel fasteners for exterior use and zinc-plated fasteners with coating complying with ASTM B633 or ASTM F1941/F1941M, Class Fe/Zn 5, at exterior walls. Select fasteners for type, grade, and class required.
 - 1. Provide stainless steel fasteners for fastening aluminum, stainless steel, or nickel silver.
 - 2. Provide bronze fasteners for fastening bronze.

- B. Cast-in-Place Anchors in Concrete: Either threaded or wedge type unless otherwise indicated; galvanized ferrous castings, either ASTM A47/A47M malleable iron or ASTM A27/A27M cast steel. Provide bolts, washers, and shims as needed, all hot-dip galvanized per ASTM F2329/F2329M.

2.3 MISCELLANEOUS MATERIALS

- A. Water-Based Primer: Emulsion type, anticorrosive primer for mildly corrosive environments that is resistant to flash rusting when applied to cleaned steel, complying with MPI#107 and compatible with topcoat.
- B. Epoxy Zinc-Rich Primer: Complying with MPI#20 and compatible with topcoat.
- C. Shop Primer for Galvanized Steel: Primer formulated for exterior use over zinc-coated metal and compatible with finish paint systems indicated.
- D. Galvanizing Repair Paint: High-zinc-dust-content paint complying with SSPC-Paint 20 and compatible with paints specified to be used over it.
- E. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D1187/D1187M.
- F. Shrinkage-Resistant Grout: Factory-packaged, nonmetallic, nonstaining, noncorrosive, nongaseous grout complying with ASTM C1107/C1107M. Provide grout specifically recommended by manufacturer for interior and exterior applications.

2.4 FABRICATION, GENERAL

- A. Shop Assembly: Preassemble items in the shop to greatest extent possible. Disassemble units only as necessary for shipping and handling limitations. Use connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation.
- B. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch (1 mm) unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.
- C. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.
- D. Form exposed work with accurate angles and surfaces and straight edges.
- E. Weld corners and seams continuously to comply with the following:
 - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 - 2. Obtain fusion without undercut or overlap.
 - 3. Remove welding flux immediately.
 - 4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing.

- F. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners or welds where possible. Where exposed fasteners are required, use Phillips flat-head (countersunk) fasteners unless otherwise indicated. Locate joints where least conspicuous.
- G. Fabricate seams and other connections that are exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.
- H. Where units are indicated to be cast into concrete or built into masonry, equip with integrally welded steel strap anchors, not less than 8 inches (200 mm) from ends and corners of units and 24 inches (600 mm) o.c.

2.5 MISCELLANEOUS FRAMING AND SUPPORTS

- A. Fabricate units from steel shapes, plates, and bars of welded construction unless otherwise indicated. Fabricate to sizes, shapes, and profiles indicated and as necessary to receive adjacent construction.

2.6 MISCELLANEOUS STEEL TRIM

- A. Unless otherwise indicated, fabricate units from steel shapes, plates, and bars of profiles shown with continuously welded joints and smooth exposed edges. Miter corners and use concealed field splices where possible.
- B. Provide cutouts, fittings, and anchorages as needed to coordinate assembly and installation with other work.

2.7 GENERAL FINISH REQUIREMENTS

- A. Finish metal fabrications after assembly.

2.8 STEEL AND IRON FINISHES

- A. Galvanizing: Hot-dip galvanize items as indicated to comply with ASTM A153/A153M for steel and iron hardware and with ASTM A123/A123M for other steel and iron products.
- B. Shop prime iron and steel items unless they are to be embedded in concrete, sprayed-on fireproofing, or masonry, or unless otherwise indicated.
- C. Preparation for Shop Priming: Prepare surfaces to comply with SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning.
- D. Shop Priming: Apply shop primer to comply with SSPC-PA 1, "Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel," for shop painting.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing metal fabrications. Set metal fabrications accurately in location, alignment, and elevation; with edges and surfaces level, plumb, true, and free of rack; and measured from established lines and levels.
- B. Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations. Do not weld, cut, or abrade surfaces of exterior units that have been hot-dip galvanized after fabrication and are for bolted or screwed field connections.
- C. Field Welding: Comply with the following requirements:
 - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 - 2. Obtain fusion without undercut or overlap.
 - 3. Remove welding flux immediately.
 - 4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.
- D. Fastening to In-Place Construction: Provide anchorage devices and fasteners where metal fabrications are required to be fastened to in-place construction. Provide threaded fasteners for use with concrete and masonry inserts, toggle bolts, through bolts, lag screws, wood screws, and other connectors.
- E. Provide temporary bracing or anchors in formwork for items that are to be built into concrete, masonry, or similar construction.

3.2 INSTALLATION OF MISCELLANEOUS FRAMING AND SUPPORTS

- A. Install framing and supports to comply with requirements of items being supported, including manufacturers' written instructions and requirements indicated on Shop Drawings.

3.3 REPAIRS

- A. Touchup Painting:
 - 1. Immediately after erection, clean field welds, bolted connections, and abraded areas. Paint uncoated and abraded areas with same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.
- B. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A780/A780M.

**CADILLAC PLACE 15TH FLOOR – (3) JUDICIAL SUITES
DETROIT, MICHIGAN**

**File No. 950/22357.MNB
C.O. No. Y23038**

END OF SECTION 05 50 00

SECTION 06 10 53 - MISCELLANEOUS ROUGH CARPENTRY

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. Submittals: ICC-ES evaluation reports for treated wood.

- 1.2 In addition to the labor and material specified herein, the contractor shall provide all fasteners, nails, bolts, ramsets, blocking, edge blocking, straps and other miscellaneous items not specifically detailed on the plans as required for a complete job in accordance with the applicable building codes.

- 1.3 Protect materials; keep under cover in transit and on the job site.

PART 2 - PRODUCTS

2.1 WOOD PRODUCTS, GENERAL

- A. Lumber: Provide dressed lumber, S4S, marked with grade stamp of inspection agency.
- B. Fire-Retardant-Treated Materials: Comply with performance requirements in AWPA C20.
 - 1. Use Exterior type for exterior locations and where indicated.
 - 2. Use Interior Type A, High Temperature (HT) where indicated.
 - 3. Use Interior Type A unless otherwise indicated.
 - 4. Identify with appropriate classification marking of a testing and inspecting agency acceptable to authorities having jurisdiction.
- C. Provide fire-retardant treated materials for all miscellaneous rough carpentry.

2.2 LUMBER

- A. Miscellaneous Lumber: Standard, Stud, or No. 3 grade with 19 percent maximum moisture content of any species. Provide for nailers, blocking, and similar members.

2.3 PLYWOOD BACKING PANELS

- A. Telephone and Electrical Equipment Backing Panels: Plywood, Exterior, AC, fire-retardant treated, not less than 3/4-inch (19-mm) nominal thickness.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Set miscellaneous rough carpentry to required levels and lines, with members plumb, true to line, cut, and fitted. Locate nailers, blocking, and similar supports to comply with requirements for attaching other construction.
- B. Securely attach miscellaneous rough carpentry to substrates, complying with the following:
 - 1. CABO NER-272 for power-driven fasteners.
 - 2. Table 2304.9.1, "Fastening Schedule," in the IBC.

END OF SECTION 06 10 53

SECTION 06 40 23 - INTERIOR ARCHITECTURAL WOODWORK

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Interior standing and running trim.
2. Interior door and sidelite frames.
3. Interior paneling.
4. Interior bookshelves.
5. Shop priming of interior architectural woodwork.
6. Shop finishing of interior architectural woodwork.

1.2 QUALIFICATIONS

- A. A member in good standing with the Architectural Woodwork Institute (AWI) or a contractor with at least 10 years of experience in the fabrication and installation of woodwork and cabinetry.

1.3 ACTION SUBMITTALS

A. Qualifications

1. Provide evidence of AWI membership or 10 years of experience. If the latter is selected, provide project descriptions, associated millwork costs per project, project contacts for no fewer than 5 projects.

B. Shop Drawings:

1. Include the following:
 - a. Dimensioned details.
 - b. Attachment details.
2. Show full-size details.
3. Show locations and sizes of furring, blocking, and hanging strips, including blocking and reinforcement concealed by construction and specified in other Sections.

- C. Samples: For each exposed product and for each shop-applied color and finish specified. 12 inches in length each.

- D. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for materials and execution.

1. Build mockups of feature wall in judges offices.
2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Owner specifically approves such deviations by Change Order.

PART 2 - PRODUCTS

2.1 ARCHITECTURAL WOODWORK, GENERAL

- A. Quality Standard: Unless otherwise indicated, comply with the Architectural Woodwork Institute Standards for grades of interior architectural woodwork indicated for construction, finishes, installation, and other requirements.
 - 1. <https://awinet.org/standards/>
- B. Hardboard: AHA A135.4.
- C. Medium-Density Fiberboard: ANSI A208.2, 2009 made with binder containing no urea formaldehyde.
- D. Hardwood Plywood and Face Veneers: HPVA HP-1, Grade AA, made with adhesive containing no urea formaldehyde. Resin impregnated paper backs are NOT permitted. Backs shall be of compatible hardwood species and cut. Contact adhesive is NOT permitted.
- E. Material thicknesses shall comply with AWI/AWMAC/WI (AWS) Architectural Woodwork Standards, 2014, 2nd Edition, Custom Grade unless noted otherwise.
- F. Wood Species and Cut for Transparent Finish:
 - 1. WD – 1 Quarter-sawn Figured Makore – a mix of Fiddleback and Block Mottle. No Sap Permitted. It is the design intent that the Work in this Section match in color and grain to the Work of the existing wall panels.
- G. Veneer Matching Requirements:
 - 1. Matching within individual panel faces: Balance and center match.
 - 2. Method of Matching Panels: Book match.
- H. Wood Species for Opaque Finish: Any closed-grain hardwood.

2.2 INTERIOR WOODWORK

- A. Architectural Woodwork Standards Grade: Custom.
- B. Application: Feature wall in Judges Offices (1501, 1502, 1514), Existing Doors and Frames as necessary, Existing bookcases as necessary.
- C. Complete fabrication to maximum extent possible before shipment to Project site. Disassemble components only as necessary for shipment and installation. Where necessary for fitting at site, provide ample allowance for scribing, trimming, and fitting.
- D. Backout or groove backs of flat trim members and kerf backs of other wide, flat members, except for members with ends exposed in finished work. Miter corners

pressure glued and joined by lemon spline, biscuit or dowels. Inside corners shall be miter coped.

- E. Paneling for Transparent Finish: AWS Custom grade.
 - 1. Wood Species: As Specified herein above.
 - 2. Face Grade: AWS AA
 - 3. Matching of Adjacent Veneer Leaves: Book match and architectural end match.
 - 4. Veneer Matching within Panel Face: Center Balance match.
 - 5. Panel Matching: Blueprint match panels and components.
 - 6. Stile and Rail Joinery: Solid lumber stile and rail with panel products and solid rims. Mortise and tenon or doweled construction. Fender washer panel retention acceptable.
 - 7. Raised Panels: Rim raised. Mitered, splined or doweled, to panel body and glued under pressure. Pre-finish prior to assembly. Panels set with “space balls” to accommodate movement. Plant prepared joints.

- F. Hardwood Lumber:
 - 1. Species: Makore
 - 2. Cut: Plain sliced/plain sawn.
 - 3. Wood Moisture Content: 5 to 10 percent.
 - 4. For rails thicker than available lumber, use veneered construction. Do not glue for thickness.

- G. Wood Door and Sidelite Frames shall be shop assembled, dadoed, doweled, mitered with biscuit, or rabbeted joints. Stops shall be ploughed-in.

2.3 INTERIOR STANDING AND RUNNING TRIM FOR OPAQUE FINISH

- A. Architectural Woodwork Standards Grade: **Custom.**

- B. Application: Base Infill where base is missing
 - 1. Wood Species: Poplar.
 - 2. Wood Moisture Content: 5 to 10 percent.

2.4 MISCELLANEOUS MATERIALS

- A. Provide self-drilling screws for metal-framing supports, as recommended by metal-framing manufacturer.

- B. Anchors: Select material, type, size, and finish required for each substrate for secure anchorage.
 - 1. Provide metal expansion sleeves or expansion bolts for post-installed anchors.
 - 2. Use nonferrous-metal or hot-dip galvanized anchors and inserts at inside face of exterior walls and at floors.

- C. Installation Adhesive: Product recommended by fabricator for each substrate for secure anchorage.

2.5 FABRICATION

- A. Sand fire-retardant-treated wood lightly to remove raised grain on exposed surfaces before fabrication.
- B. Fabricate interior architectural woodwork to dimensions, profiles, and details indicated.
 - 1. Ease edges to radius indicated for the following:
 - a. Edges of Solid-Wood (Lumber) Members: 1/16 inch (1.5 mm) unless otherwise indicated.
 - b. Edges of Rails and Similar Members More Than 3/4 Inch (19 mm) Thick: 1/8 inch (3 mm).
- C. Complete fabrication, including assembly, to maximum extent possible before shipment to Project site.
 - 1. Disassemble components only as necessary for shipment and installation.
 - 2. Where necessary for fitting at site, provide allowance for scribing, trimming, and fitting.
 - 3. Trial fit assemblies at fabrication shop that cannot be shipped completely assembled.
 - a. Install dowels, screws, bolted connectors, and other fastening devices that can be removed after trial fitting.
 - b. Verify that parts fit as intended, and check measurements of assemblies against field measurements indicated on approved Shop Drawings before disassembling for shipment.

2.6 SHOP PRIMING

- A. Preparations for Finishing: Comply with the Architectural Woodwork Standards for sanding, filling countersunk fasteners, sealing concealed surfaces, and similar preparations for finishing interior architectural woodwork, as applicable to each unit of work.
- B. Interior Architectural Woodwork for Opaque Finish: Shop prime with one coat of wood primer as specified in Section 09 91 23 "Interior Painting."
 - 1. Backpriming: Apply one coat of primer, compatible with finish coats, to concealed surfaces of woodwork.
- C. Interior Architectural Woodwork for Transparent Finish: Shop-seal concealed surfaces with required pretreatments and first coat of finish.
 - 1. Backpriming: Apply one coat of sealer, compatible with finish coats, to concealed surfaces of woodwork.

2.7 SHOP FINISHING

- A. Finishes: Comply with AWS Section 5, Custom Grade.

- B. Finish architectural woodwork at the fabrication shop; defer only final touch up until after installation.
 - 1. Apply one coat of sealer or primer to concealed surfaces of woodwork.
 - 2. It is the design intent that the Work in this Section match in color and grain to the existing woodwork.

- C. Transparent Finish:
 - 1. AWS System #5 “Water White” Conversion Varnish.
 - 2. Stain and Optional Steps: Wash Coat and Stain to match Existing Door finish.
 - 3. Sheen: Satin 35-degree, medium rubbed effect.
 - 4. Effect: Partially Filled Pore.

2.8 RESTORATION AND CLEANING MATERIALS

- A. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to the following:

- B. Cleaning and Stripping Products:
 - 1. Mohawk Wash Wax #M712-1907. Or Savogran “Dirtex Cleaner” or equal.
 - 2. Mohawk Finish Remover #2 #710-2727. Or Dumond Chemicals “Smart Strip Advanced Paint Remover” or equal.

- C. Sherwin-Williams/Minwax Company
 - 1. Custom stain compatible with Minwax Water Based Oil-Modified Polyurethane. Or equal. (Option #1: The intent is to stain the walls darker than they are now.)
 - 2. Minwax Water Based Oil-Modified Polyurethane #143. Or equal.

- D. Unlisted manufacturers must be submitted to Architect for approval prior to use.

- E. Material compatibility: Provide filler, sanding sealer, stain, toners and finish/top coat materials that are compatible with one another and the substrates indicated under conditions of service and application.

- F. Color, Sheen and Effect: Match the Project Mockup Control Samples.

2.9 REPAIR MATERIALS AND WORKMANSHIP

- A. Comply with AWS Custom Grade.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Before installation, condition interior architectural woodwork to humidity conditions in installation areas for not less than 72 hours prior to beginning of installation.

- B. Before installing interior architectural woodwork, examine shop-fabricated work for completion and complete work as required, including removal of packing and backpriming of concealed surfaces.

3.2 INSTALLATION

- A. Grade: Install interior architectural woodwork to comply with same grade as item to be installed.
- B. Before installation, condition woodwork to average prevailing humidity conditions in installation areas.
- C. Install woodwork to comply with AWS Custom Grade.
- D. Furring, blocking, shims and hanging strips: Fire retardant treated softwood lumber, kiln dried after treatment to less than 10 percent moisture content.
- E. Install woodwork level, plumb, true, and straight. Shim as required with concealed shims. Install level and plumb (including tops) to a tolerance of 1/8 inch in 96 inches (3 mm in 2400 mm).
- F. Coordinate wood doors and wood frames for correct fit.
- G. Assemble interior architectural woodwork and complete fabrication at Project site to the extent that it was not completed during shop fabrication.
- H. Install interior architectural woodwork level, plumb, true in line, and without distortion.
 - 1. Shim as required with concealed shims.
 - 2. Install level and plumb to a tolerance of **1/8 inch in 96 inches (3 mm in 2400 mm)**.
- I. Scribe and cut interior architectural woodwork to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts.
- J. Anchor interior architectural woodwork to anchors or blocking built in or directly attached to substrates.
 - 1. Secure with countersunk, concealed fasteners and blind nailing.
 - 2. Use fine finishing nails or finishing screws for exposed fastening, countersunk and filled flush with interior architectural woodwork.
 - 3. For shop-finished items, use filler matching finish of items being installed.
- K. Standing and Running Trim:
 - 1. Install with minimum number of joints possible, using full-length pieces (from maximum length of lumber available) to greatest extent possible.
 - 2. Do not use pieces less than **60 inches (1500 mm)** long, except where shorter single-length pieces are necessary.
 - 3. Scarf running joints and stagger in adjacent and related members.

4. Fill gaps, if any, between top of base and wall with latex sealant, painted to match wall.
 5. Install standing and running trim with no more variation from a straight line than **1/8 inch in 96 inches (3 mm in 2400 mm)**.
- L. Anchor woodwork to anchors or blocking built in or directly attached to substrates. Fasten with countersunk concealed fasteners and blind nailing. Use fine finishing nails for exposed nailing, countersunk and filled flush with woodwork.
- M. Standing and Running Trim: Install with minimum number of joints possible, using full-length pieces (from maximum length of lumber available) to greatest extent possible. Do not use pieces less than 36 inches (900 mm) long, except where shorter single-length pieces are necessary. Scarf running joints and stagger in adjacent and related members.
- N. Anchor paneling to supports with concealed panel-hanger clips and by blind nailing on back-up strips, splined-connection strips, and similar associated trim and framing. Provide "Panelclip" anchor system by Brooklyn Hardware, www.panelclip.com, or equal. Comply with Brooklyn Hardware manufacturers installation instructions.
1. Extruded aluminum continuous wall tracks for horizontal installation and multipolymer plastic shims as required for shimming wall tracks. Mount continuous wall tracks at 16" on centers vertically into hollow metal studs. Anchoring into drywall only is not permitted.
 2. Extruded aluminum 2" panel "Z-clips" attached to wood panel backs for friction fit to continuous wall tracks. Mount 2" panel clips on panel backs at 16" on centers horizontally.
 3. All other components and hardware for complete installation.
- O. I.Cabinets: Install so doors and drawers are accurately aligned. Adjust hardware to center doors and drawers in openings and to provide unencumbered operation.

3.2 EXAMINATION

- A. Examine surfaces indicated to be cleaned and restored for compliance with requirements, and other conditions affecting performance.
1. For the record, prepare a written report of the work, listing conditions detrimental to performance.
 2. Proceed with work only after unsatisfactory conditions have been corrected.

3.2.1 PREPARATION.

- A. Remove hardware and hardware accessories, plates, machined surfaces, and similar items already installed that are not to be finished and that have not been removed by

others. If removal is impractical or impossible because of the size or weight of the item, provide surface applied protection before surface preparation and finishing. After completing finishing operations in each space or area, reinstall items removed using workers skilled in the trades involved, unless otherwise indicated.

- B. De-wax and Cleaning: Before stripping and or applying finish or other surface treatment, clean substrates of substances that could impair the bond of coatings. First de-wax with Mohawk Wax Wash Liquid Preparatory Cleaner #M712-1907. Remove oil and grease before cleaning. Schedule cleaning and finishing so dust and other contaminants from the cleaning process will not fall on wet, newly finished surfaces.
- C. Surface Preparation: De-wax, clean and prepare surfaces to be finished according to manufacturer's written instructions for each particular substrate condition.
 - 1. Bare wood: Bare wood that has been stripped of its finish for refinishing must be cleaned immediately following the removal of the existing finish by wiping the surface thoroughly with an odorless mineral spirits wash using a rag or stripping pad attached to a sponge. Once the surface has dried, the bare wood must be wiped clean of dust and airborne dirt.
 - 2. Finished wood: Wood with an existing finish that is to be recoated must first be de-waxed and then cleaned.
- D. Materials Preparation: Mix and prepare finish materials according to manufacturer's written instructions.
 - 1. Stir materials before application to produce a mixture of uniform density. Stir as required during application. Do not stir surface film into material. If necessary, remove surface film and strain materials before using.
 - 2. Use only thinners approved by finish manufacturer and only within recommended limits.

3.3 APPLICATION

- A. Apply finish according to manufacturer's written instructions. Use applicators and techniques best suited for substrate, type of material being applied, and room conditions.
 - 1. Do not finish over dirt, rust, scale, grease, moisture, scuffed surfaces, or conditions detrimental to the formation of a durable finish film.
 - 2. Provide finish coats that are compatible with sanding sealers used.

3. The completed finish must be uniform in appearance throughout and match the approved samples. No thin, flat, sagging or inconsistent finished surfaces will be accepted.
 4. Comply with AWS Section 5 Custom Grade.
- B. Finish Type A: Areas that require complete to bare wood Strip and Re-do.
1. De-wax, where shellac is present strip wood with denatured alcohol. Apply with soft cloth. Scrape up residue as quickly as possible. Repeat application of alcohol as necessary until all previous finish is removed. In other areas without shellac, Chemical Strip and Wash with odorless mineral spirits to Bare Wood. Overnight dry.
 2. Through Sand with 120-Grit aluminum oxide sandpaper as necessary.
 3. Stain and Toner as necessary to match Architects Sample.
 4. Cross coat Seal and Sand 240 aluminum oxide sandpaper.
 5. Topcoats with AWS System 12, Polyurethane, Water-Based.
 6. Sand with 320 or 400 grit aluminum oxide sandpaper.
 7. Hand rub with four (4) 0000 steel wool as necessary

3.4 WOODWORK REPAIR AND PATCHING

- A. General: Where existing woodwork or casework has damage, has been altered or is scheduled to be altered under this Contract, repairs and alterations shall be made in the shop or in the field, as applicable. Restoration shall include, but is not limited to, the following items:
1. Remove abandoned fasteners and hardware.
 2. Fill holes, dents, scratches and abrasion scars
 3. Replace missing pieces with new pieces in matching wood species and cut, with profile and finish to match Control Sample.
 4. Repair veneer or replace veneer as require to match original.
 5. Secure loose pieces, scratches, and abrasion scars.
 6. Secure loose joinery, such as mitered corners that have separated, making joints tight again.
- B. All repairs shall be made using like materials to match original.
1. For repairs 1/8" diameter or less, use wood wax filler, tinted to match natural color of adjacent woodwork.
 2. For repairs greater than 1/8", but less than 2" in diameter, use a wood Dutchman or plug to fill hole.
 3. For repairs greater than 2" in diameter, fill hole with a boat shaped patch, matching the species grain and color of the wood.

3.3 CLEANING

- A. Cleanup: At the end of each workday, remove empty cans, rags, rubbish, and other discarded paint materials from Project site.

3.4 PROTECTION

- A. Provide final protection and maintain conditions in a manner that ensure woodwork is without damage or deterioration at time of Substantial Completion.
- B. Provide “Wet Paint” signs to protect newly finished surfaces. After completing finishing operations, remove temporary protective wrappings provided by others to protect their work.
- C. After work of other trades is complete, touch-up and restore damaged or defaced surfaces.

END OF SECTION 06 40 23

SECTION 06 41 16 - PLASTIC-LAMINATE-CLAD ARCHITECTURAL CABINETS AND PARTITIONS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Plastic-laminate-clad architectural cabinets and partitions.
2. Wood furring, blocking, shims, and hanging strips for installing plastic-laminate-clad architectural cabinets that are not concealed within other construction.
3. Cable management.

1.2 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.

1. Include data for fire-retardant treatment from chemical-treatment manufacturer and certification by treating plant that treated materials comply with requirements.

- B. Shop Drawings:

1. Include plans, elevations, sections, and attachment details.
2. Apply AWI Quality Certification Program label to Shop Drawings.

- C. Samples: For each exposed product and for each color and texture specified.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For manufacturer and Installer.

- B. Research reports.

- C. Field quality control reports.

1.5 QUALITY ASSURANCE

- A. Manufacturer's Qualifications: Employs skilled workers who custom fabricate products similar to those required for this Project and whose products have a record of successful in-service performance.

- B. Installer Qualifications: Manufacturer of products.

PART 2 - PRODUCTS

2.1 ARCHITECTURAL CABINET MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
1. Trend Millwork LLC
 2. Wittrock Woodworking

2.2 PLASTIC-LAMINATE-CLAD ARCHITECTURAL CABINETS AND PARTITIONS

- A. Quality Standard: Unless otherwise indicated, comply with the Architectural Woodwork Standards for grades of cabinets indicated for construction, finishes, installation, and other requirements.
1. Provide labels from AWI certification program indicating that woodwork complies with requirements of grades specified.
- B. Architectural Woodwork Standards Grade: **Custom.**
- C. Regional Materials: Wood products shall be manufactured within 100 miles (160 km) of Project site from materials that have been extracted, harvested, or recovered, as well as manufactured, within 100 miles (160 km) of Project site.
- D. Certified Wood: Wood products shall be certified as "FSC Pure" or "FSC Mixed Credit" according to FSC STD-01-001 and FSC STD-40-004.
- E. Type of Construction: Frameless.
- F. Door and Drawer-Front Style: Flush overlay.
- G. High-Pressure Decorative Laminate: NEMA LD 3, grades as indicated or if not indicated, as required by quality standard.
1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - a. Pionite; a Panolam Industries International, Inc. brand.
 - b. Wilsonart LLC.
 - c. Formica
- H. Laminate Cladding for Exposed Surfaces:
1. Horizontal Surfaces: Grade HGS.
 2. Postformed Surfaces: Grade HGP.
 3. Vertical Surfaces: Grade HGS.
 4. Edges: Grade HGS.

5. Pattern Direction: To be selected during shop drawings.

- I. Concealed Backs of Panels with Exposed Plastic-Laminate Surfaces: High-pressure decorative laminate, NEMA LD 3, Grade BKL.
- J. Drawer Construction: Fabricate with exposed fronts fastened to subfront with mounting screws from interior of body.
 - 1. Join subfronts, backs, and sides with glued dovetail joints.
- K. Colors, Patterns, and Finishes: Provide materials and products that result in colors and textures of exposed laminate surfaces complying with the following requirements:
 - a. As indicated on Drawings.

2.3 WOOD MATERIALS

- A. Wood Products: Provide materials that comply with requirements of referenced quality standard for each type of architectural cabinet and quality grade specified unless otherwise indicated.
 - 1. Wood Moisture Content: 5 to 10 percent.
- B. Composite Wood and Agrifiber Products: Provide materials that comply with requirements of referenced quality standard for each type of architectural cabinet and quality grade specified unless otherwise indicated.
 - 1. Recycled Content of MDF and Particleboard: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 17 percent.
- C. Composite Wood Products: Products shall be made using ultra-low-emitting formaldehyde resins as defined in the California Air Resources Board's "Airborne Toxic Control Measure to Reduce Formaldehyde Emissions from Composite Wood Products" or shall be made with no added formaldehyde.
 - 1. Medium-Density Fiberboard (MDF): ANSI A208.2, Grade 130.
 - 2. Particleboard: ANSI A208.1, Grade M-2.
 - 3. Straw-Based Particleboard: ANSI A208.1, Grade M-2, except for density.
 - a. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - 1) Chesapeake Plywood LLC.
 - 4. Softwood Plywood: DOC PS 1.
 - 5. Thermoset Decorative Panels: Particleboard or MDF finished with thermally fused, melamine-impregnated decorative paper and complying with requirements of NEMA LD 3, Grade VGL, for Test Methods 3.3, 3.4, 3.6, 3.8, and 3.10.

2.4 FIRE-RETARDANT-TREATED MATERIALS

- A. Fire-Retardant-Treated Materials, General: Where fire-retardant-treated materials are indicated, use materials that are acceptable to authorities having jurisdiction as determined by testing performed on identical products by a qualified testing agency.
1. Use treated materials that comply with requirements of referenced quality standard. Do not use materials that are warped, discolored, or otherwise defective.
 2. Use fire-retardant-treatment formulations that do not bleed through or otherwise adversely affect finishes. Do not use colorants to distinguish treated materials from untreated materials.
 3. Identify fire-retardant-treated materials with appropriate classification marking of qualified testing agency in the form of removable paper label or imprint on surfaces that will be concealed from view after installation.

2.5 CABINET HARDWARE AND ACCESSORIES

- A. General: Provide cabinet hardware and accessory materials associated with architectural cabinets .
- B. Frameless Concealed Hinges (European Type): ANSI/BHMA A156.9, B01602, 135 degrees of opening, self-closing.
- C. Back-Mounted Pulls: ANSI/BHMA A156.9, B02011.
- D. Cabinet and Drawer pulls: similar to Mockett DP57B 4-5/32" wire drawer pull in brushed stainless steel.
- E. Touch latch: similar to Stanley CD47 Magnetic Cabinet Touch Latch.
- F. Adjustable Shelf Standards and Supports: ANSI/BHMA A156.9, B04071; with shelf rests, B04081.
- G. Shelf Rests: ANSI/BHMA A156.9, B04013; metal.
- H. Drawer Slides: ANSI/BHMA A156.9.
1. Grade 1 and Grade 2: Side mounted and extending under bottom edge of drawer.
 - a. Type: Full extension.
 - b. Material: Zinc-plated steel with polymer rollers.
 2. Grade 1HD-100 and Grade 1HD-200: Side mounted; full-extension type; zinc-plated-steel ball-bearing slides.
 3. For drawers not more than 3 inches (75 mm) high and not more than 24 inches (600 mm) wide, provide Grade 1.
 4. For drawers more than 3 inches (75 mm) high, but not more than 6 inches (150 mm) high and not more than 24 inches (600 mm) wide, provide Grade 1HD-100.

5. For drawers more than 6 inches (150 mm) high or more than 24 inches (600 mm) wide, provide Grade 1HD-200.

I. Door Locks: ANSI/BHMA A156.11, E07121.

J. Drawer Locks: ANSI/BHMA A156.11, E07041.

K. Door and Drawer Silencers: ANSI/BHMA A156.16, L03011.

L. Grommets for Cable Passage: 2-inch (51-mm) OD, molded-plastic grommets and matching plastic caps with slot for wire passage.

1. Color: Black.

M. Exposed Hardware Finishes: For exposed hardware, provide finish that complies with ANSI/BHMA A156.18 for ANSI/BHMA finish number indicated.

1. Satin Chromium Plated: ANSI/BHMA 626 for brass or bronze base; ANSI/BHMA 652 for steel base.

N. For concealed hardware, provide manufacturer's standard finish that complies with product class requirements in ANSI/BHMA A156.9.

2.6 MISCELLANEOUS MATERIALS

A. Furring, Blocking, Shims, and Hanging Strips: Fire-retardant-treated softwood lumber, kiln-dried to less than 15 percent moisture content.

B. Anchors: Select material, type, size, and finish required for each substrate for secure anchorage. Provide metal expansion sleeves or expansion bolts for post-installed anchors. Use nonferrous-metal or hot-dip galvanized anchors and inserts at inside face of exterior walls and at floors.

C. Adhesives: Use adhesives that meet the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

D. Adhesive for Bonding Plastic Laminate and edges: Do not use adhesives that contain urea formaldehyde.

2.7 FABRICATION

A. Complete fabrication, including assembly and hardware application, to maximum extent possible before shipment to Project site. Disassemble components only as necessary for shipment and installation. Where necessary for fitting at site, provide ample allowance for scribing, trimming, and fitting.

B. Shop-cut openings to maximum extent possible to receive hardware, appliances, electrical work, and similar items. Locate openings accurately and use templates or

roughing-in diagrams to produce accurately sized and shaped openings. Sand edges of cutouts to remove splinters and burrs.

2.8 CABLE MANAGEMENT

- A. Mount under all new built-in Desktops. Interrupt at Desktop support brackets. Leave not sharp edges.
- B. Equal to Kable Kontrol Electro Zinc resistant finish wire basket – 4” W x 2” H. Provide all accessory mounting brackets as required.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Before installation, condition cabinets to humidity conditions in installation areas for not less than 72 hours.
- B. Architectural Woodwork Standards Grade: Install cabinets to comply with quality standard grade of item to be installed.
- C. Anchor cabinets to anchors or blocking built in or directly attached to substrates. Secure with wafer-head cabinet installation screws.
- D. Install cabinets level, plumb, and true in line to a tolerance of 1/8 inch in 96 inches (3 mm in 2400 mm) using concealed shims.
 - 1. Scribe and cut cabinets to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts.
 - 2. Install cabinets without distortion so doors and drawers fit openings and are accurately aligned. Adjust hardware to center doors and drawers in openings and to provide unencumbered operation. Complete installation of hardware and accessory items as indicated.
 - 3. Fasten wall cabinets through back, near top and bottom, and at ends not more than 16 inches (400 mm) o.c. with No. 10 wafer-head screws sized for not less than 1-1/2-inch (38-mm) penetration into wood framing, blocking, or hanging strips or No. 10 wafer-head sheet metal screws through metal backing or metal framing behind wall finish.

END OF SECTION 06 41 16

SECTION 06 61 16 – SOLID SURFACING FABRICATIONS

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- I. Submittals: Product Data for solid-surfacing materials, Shop Drawings and Samples.
- II. Quality Standard: Architectural Woodwork Institute's "Architectural Woodwork Quality Standards."
- III. Scope: Provide new solid surface counters with bowls. Coordinate counter opening with faucet specified under Mechanical.

PART 2 - PRODUCTS

2.1 Bradley OmniDeck – LD 3010 Series or approved equal.

- I. Judges Toilet 1503
 1. One bowl standard configuration
 2. (SL-TR1) Rectangular integral undermount bowl
 3. 60" Standard length
 4. 22" Standard depth
 5. Bowl Placement Center Line: 22" from left side.
 6. No opening for waste within the counter.
 7. 4" backsplash
 8. 4" left side splash
 9. Front apron
 10. Apron Height: standard 3".
 11. Faucet drilling – Coordinate with Mechanical Specifications.
 12. Standard Color: To Be Determined
 13. Edging: round over 3/8" radius
 14. Mounting: Heavy-Duty Stainless-Steel Brackets
 15. Stainless Steel trap cover
- II. Judges Toilet 1504.
 1. One bowl standard configuration
 2. (SL-TR1) Rectangular integral undermount bowl
 3. 60" Standard length
 4. 22" Standard depth
 5. Bowl Placement Center Line: 22" from right side.
 6. No opening for waste within the counter.
 7. 4" backsplash

8. 4" left side splash
 9. Front apron
 10. Apron Height: standard 3".
 11. Faucet drilling – Coordinate with Mechanical Specifications.
 12. Standard Color: To Be Determined
 13. Edging: round over 3/8" radius
 14. Mounting: Heavy-Duty Stainless-Steel Brackets
 15. Stainless Steel trap cover
- III. Judges Toilet 1515
1. One bowl standard configuration
 2. (SL-TR1) Rectangular integral undermount bowl
 3. 60" Standard length
 4. 22" Standard depth
 5. Bowl Placement Center Line: 22" from left side.
 6. No opening for waste within the counter.
 7. 4" backsplash
 8. 4" left side splash
 9. Front apron
 10. Apron Height: standard 3".
 11. Faucet drilling – Coordinate with Mechanical Specifications.
 12. Standard Color: To Be Determined
 13. Edging: round over 3/8" radius
 14. Mounting: Heavy-Duty Stainless-Steel Brackets
 15. Stainless Steel trap cover

PART 3 - EXECUTION

3.1 INSTALLATION

- I. Before installation, condition solid surfacing to average prevailing humidity conditions in installation areas.
- II. Install solid surfacing to comply with referenced quality standard for grade specified.
- III. Install solid surfacing level, plumb, true, and straight. Shim as required with concealed shims. Install level and plumb (including tops) to a tolerance of 1/8 inch in 96 inches (3 mm in 2400 mm).
- IV. Scribe and cut solid surfacing to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts.
- V. Anchor solid surfacing to anchors or blocking built in or directly attached to substrates. Fasten with countersunk concealed fasteners and blind nailing.

END OF SECTION 06 61 16

SECTION 07 21 00 – THERMAL AND ACOUSTIC INSULATION

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Sound attenuation insulation in walls.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Sustainable Design Submittals:
 - 1. Product Data: For adhesives, indicating VOC content.
 - 2. Laboratory Test Reports: For adhesives, indicating compliance with requirements for low-emitting materials.
 - 3. Laboratory Test Reports: For insulation, indicating compliance with requirements for low-emitting materials.
 - 4. Recycled Content.
 - 5. Acoustic performance.

1.3 INFORMATIONAL SUBMITTALS

- A. Product test reports.
- B. Research reports.

PART 2 - PRODUCTS

2.1 APPROVED MANUFACTURERS

- a. Dow Chemical Company (The).
- b. Owens Corning.
- c. Other manufacturers meeting the criteria of this Section.

2.2 ACOUSTIC INSULATION IN STC-RATED WALLS

- A. Acoustic insulation in walls specified to have an STC rating shall be equal to Rockwool "Safe-N-Sound" mineral wool, 3" thick, 16" or 24" wide batts based on required wall layout. Flame Spread Index = 0 and Smoke Developed Rating = 0 or less when tested per ASTM E84 or UL723.

2.3 ACOUSTIC INSULATION ABOVE CEILING

- A. Acoustic insulation placed on top of ceiling tiles where shown on the Drawings shall be equal to Rockwool "Safe-N-Sound" mineral wool, 6" thick, 24" wide batts based on required wall layout. Flame Spread Index = 0 and Smoke Developed Rating = 0 or less when tested per ASTM E84 or UL723.

2.4 ACCESSORIES

- A. Adhesive for Bonding Insulation: Product compatible with insulation and air and water barrier materials, and with demonstrated capability to bond insulation securely to substrates without damaging insulation and substrates.
 - 1. Adhesives shall have a VOC content of 70 g/L or less.
 - 2. Adhesive shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."
- B. Flashing tape and sealant as recommended by manufacturer of insulation.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Comply with insulation manufacturer's written instructions applicable to products and applications.
- B. Install insulation that is undamaged, dry, and unsoiled and that has not been left exposed to ice, rain, or snow at any time.
- C. Extend insulation to envelop entire area to be insulated. Fit tightly around obstructions and fill voids with insulation. Remove projections that interfere with placement.
- D. Provide sizes to fit applications and selected from manufacturer's standard thicknesses, widths, and lengths. Apply single layer of insulation units unless multiple layers are otherwise shown or required to make up total thickness or to achieve R-value.

3.2 INSTALLATION OF CAVITY-WALL INSULATION

- A. Foam-Plastic Board Insulation: Install pads of adhesive spaced approximately 24 inches (610 mm) O.C. both ways on inside face and as recommended by manufacturer.
 - 1. Fit courses of insulation between obstructions, with edges butted tightly in both directions, and with faces flush.
 - 2. Press units firmly against inside substrates.

3.3 INSTALLATION OF INSULATION IN FRAMED CONSTRUCTION

- A. Blanket Insulation: Install in cavities formed by framing members according to the following requirements:
1. Use insulation widths and lengths that fill the cavities formed by framing members. If more than one length is required to fill the cavities, provide lengths that will produce a snug fit between ends.
 2. Place insulation in cavities formed by framing members to produce a friction fit between edges of insulation and adjoining framing members.
 3. Maintain 3-inch (76-mm) clearance of insulation around recessed lighting fixtures not rated for or protected from contact with insulation.
 4. For metal-framed wall cavities where cavity heights exceed 96 inches (2438 mm), support unfaced blankets mechanically and support faced blankets by taping flanges of insulation to flanges of metal studs.

END OF SECTION 07 21 00

**SECTION 07 52 16 – STYRENE-BUTADIENE-STYRENE (SBS) MODIFIED BITUMINOUS
MEMBRANE ROOFING**

PART 1 – GENERAL

1.1 SCOPE OF WORK

- A. This Section uses GAF Four-Ply SBS Hot Mop-Applied Modified Bitumen Roofing System as the Basis of Design for the repair of the existing roof where the new roof penetrations occur.
- B. Preferred Contractor:
LaDuke Roofing & Sheet Metal
10311 Capital St
Oak Park, MI 48237
(248) 414-6600
<https://www.ladukeroofing.com/>

1.2 WORK CONDITIONS

- A. Work shall only begin when the contractor has decided, to his satisfaction, that all specifications are workable as specified, and that the contractor can meet project and code requirements.
- B. The contractor shall only begin roofing work when the substrates have been prepared as necessary, and are ready and acceptable to have materials installed as specified.
- C. Do not begin work when inclement weather is forecast to occur prior to the anticipated time of completion of the work item.
- D. Do not install materials during inclement weather, except for temporary work necessary to protect materials that are already installed. Remove all temporary work before installing permanent materials.
- E. Do not install materials when moisture, in any form, is present on the roof deck, or substrate to which the materials are to be applied, or when foaming of hot asphalt occurs.
- F. Protect the building, contents, surrounding area, building occupants and contractor personnel during work. Coordinate all work operations with the building owner and building occupants so that adequate interior protection, as necessary, is provided and disruption to normal building operations is minimized. Provide adequate exterior protection to prevent damage to the building owner's property.

- G. Roof system installation should not begin until all roof openings, curbs, pipes, sleeves, ducts, vents or other penetrations through the roof are solidly set, and all tapered edges and cant strips, reglets, and wood nailers are secure and tight to the building as per this specification manual.
- H. Where wheeled or other traffic over the partially completed roofing is unavoidable, provide and use adequate plank or plywood, set over a minimum thickness of rigid board insulation to protect the newly installed roof.
- I. Provide temporary water cut-offs and tie-ins at the end of each workday. Remove all temporary work at the beginning of the next workday.
- J. When tearing off an existing membrane, limit removal to the area that will be completely reroofed that day with the new roofing system.
- K. If conditions are uncovered or created which would be detrimental to the proper conduct of specified work, immediately notify the building owner and architect of these conditions for consultation on acceptable treatments.
- L. Observe fire and safety precautions as recommended by Asphalt Roofing Manufacturers Association, the National Roofing Contractors Association, OSHA and the GAF Manual.
- M. All work shall be performed in compliance with International Building Code requirements.

1.3 DELIVERY, STORAGE AND HANDLING

- A. Roofing materials shall leave the factory dry and must be stored to prevent the materials from getting wet.
- B. Unload and handle all roofing and construction materials with care.
- C. Examine all materials as they are received. Do not use any materials that are damaged, unlabeled or otherwise appear to be unfit for use. Materials must display legible labels, which identify the materials and applicable reference standards. Immediately notify carrier and manufacturer of damaged, wet, or defective materials.
- D. Do not expose materials to moisture in any form before, during, or after delivery to the site. Reject delivery of materials that show evidence of contact with moisture.
- E. At the job site, no more material should be stored than will be used within two weeks. For periods longer than two weeks, the materials should be properly warehoused, i.e., dry, ventilated, on pallets, etc. No more material should be

stored on the roof than can be used within five days. When prolonged inclement weather threatens, i.e., rainy seasons, no more roofing materials should be supplied to the rooftop than can be used within two days.

- F. Store roll goods on end on pallets in a clean, dry, well ventilated protected area. Take care to prevent damage to roll ends or edges. Do not double stack modified bitumen products.
- G. Remove manufacturer supplied plastic covers from materials provided with such covers. Use “breathable” type covers such as canvas tarpaulins to allow venting and protection from weather and moisture. Cover and protect materials at the end of each day work. Do not remove any protective tarpaulins until immediately before material will be installed.
- H. Lightweight insulation products should be properly stored and weighted to avoid weather and wind damage.
- I. Store roofing asphalt to prevent leakage and carton deterioration.
- J. Store all coatings and sealants/caulks to protect from freezing. Frozen material must be discarded and replaced. Properly seal all liquid material containers after use.
- K. Materials should be stored above 55°F (12.8°C), a minimum of 24 hours prior to application.
- L. Follow the requirements per manufacturer when applying membranes at temperatures below 45°F (7.2°C).

1.4 QUALITY CONTROL OF APPLICATION

- A. There are recommendations and requirements, which must be considered in the roof system construction process. The following include, but are not limited to:
 - 1. Visual inspection should be of the following: deck surface; specified materials being installed; use of proper bitumen type; conditions of the materials being installed; use of the proper and specified number of fasteners (if required); and that the correct number of plies are being used and that the application procedure is correct; and surfacing.
 - 2. Checks of the asphalt temperatures at all phases of application.
 - 3. Roofing products and other associated roof system materials shall be installed according to the minimum guidelines set forth in the GAF Manual and to individual project requirements.

- B. Prepare substrate surfaces thoroughly prior to application of new roofing materials. This is particularly important for recover and reroofing applications. Providing a smooth, even, clean and dry substrate minimizes the likelihood that underlying deficiencies will cause premature deterioration or even failure of the new roofing system.
- C. The surface of the roof deck must be dry, firm, smooth, and free of dirt and loose material. Electrical conduits, bolts, and other similar small items must be removed from the surface of the roof deck; such surface irregularities cannot be properly insulated and roofed. It is the responsibility of the roofing contractor to determine the suitability of the roof deck surface to receive the roof assembly. The deck must meet manufacturer requirements, as described in the Roof Design section of this manual.
- D. Perimeter and penetration wood nailers and curbs must be in place as specified.
- E. The roof deck must provide positive drainage or tapered insulation must be used to provide slope. Outlets must be placed and installed to remove water promptly and completely from the roof.
- F. Expansion joints, roof vents, roof drains, etc., must be installed using acceptable industry standards and manufacturer specifications.
- G. All old roofing must be removed down to the deck. Preparation includes but is not limited to removal of existing flashings, replacement of wet/damaged existing roofing materials, removal of loose aggregate, removal of abandoned equipment, supports and penetrations, replacement of damaged decking, etc. The substrate must present a suitable surface to receive and hold the new roofing materials.
- H. Blisters, splits, other membrane defects and deck deficiencies, must be replaced, and wet insulation replaced, in accordance with good roofing practices to attain a surface which is smooth, dry, clean and free of sharp projections and depressions.
- I. All existing composition and metal flashing must be removed and replaced.
- J. All metal counter-flashing, metal coping and other metal work above the roof system must be inspected, and replaced or repaired as necessary to provide a watertight assembly.
- K. All metal flashing must be primed where it will come in contact with the roofing membranes.

1.5 SUBMITTALS

- A. Submit proposed roofing system, complete with materials and parts list, installation instructions and installation details to Architect for review and approval.

1.6 WARRANTY

- A. Provide a manufacturer's standard warranty for the modified bitumen roofing systems for not less than 10 years from acceptance of the work for all new roof systems. Warranty shall state that the manufacturer shall repair or replace defective material at their cost for material, labor and related expenses. The warranty may not be prorated. Wind resistance shall be Class D – 90 mph – or as required by local building codes.

PART 2 – PRODUCTS

2.1 ASPHALTS

- A. ASTM D-312, Type III or Type IV Asphalt. Type IV asphalt must be used when installing SBS hot mopped base flashing membrane and roofing systems on all slopes 1/2" per foot (4.2 cm per meter) or greater.

2.2 BASE SHEET

- A. Over Roof Deck Insulation: GAF STRATAVENT Perforated Base Sheet

2.3 INTERPLY

- A. GAF GAFGLAS FLEXPPLY 6 Interply Sheets – Type VI Felt

2.4 MEMBRANE

- A. GAF RUBEROID MOP Plus Granule FR Cap Sheet

2.5 MISCELLANEOUS

- A. Pipe Flashing : GAF M-Weld Adjustable M-Vent two-piece pre-flashed aluminum base and flexible boot.
- B. Flashing: GAF Ruberoid Mop Flashing, Smooth

PART 3 - EXECUTION

- 3.1 Install roofing per manufacturer's recommendations over clean, dry deck specified elsewhere. Perform no work when temperature is below 40 deg F, or in the presence of rain or snow.

- 3.2 Protect all existing improvements including lawns, shrubbery and paved areas. Do not allow bitumen to soil adjacent finished surfaces. Chute all debris from the roof to dumpster or other trash receptacle.
- 3.3 Cover any roof sumps or drains before starting work. Uncover same at the completion of the day's work.
- 3.4 Fiber cant strips at vertical surfaces, set in manufacturer's recommended adhesives.
- 3.5 Install base sheet, 2 interply sheets and cap sheet (total 4-ply roof) per manufacturer's recommendations with felt fully embedded in hot asphalt.
- 3.6 Mop roofing up under all parapet wall flashings, counterflashing and sills and reinforce with flashing and mastic material. 8" minimum above roof surface.
- 3.7 Flashings are to be secured at the top edge with fasteners spaced a maximum of 8" O.C.
- 3.8 Lap roofing up and over all curbs of all roof openings. Reinforce with flashing and mastic materials.
- 3.9 Complete roofing in one day operation or provide water cut offs each day.

END OF SECTION 07 52 16

SECTION 07 62 00 - SHEET METAL FLASHING AND TRIM

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. Submittals: Product Data, Shop Drawings, and Samples.
- B. Comply with SMACNA's "Architectural Sheet Metal Manual." Conform to dimensions and profiles shown unless more stringent requirements are indicated.
- C. Coordinate installation of sheet metal flashing and trim with interfacing and adjoining construction to provide a leakproof, secure, and noncorrosive installation when installing new exterior mechanical components.

PART 2 - PRODUCTS

2.1 SHEET METAL

- A. Metallic-Coated Steel Sheet: Galvanized structural-steel sheet, ASTM A 653/A 653M, G90 (Z275), or aluminum-zinc alloy-coated structural-steel sheet, ASTM A 792/A 792M, Class AZ50 coating designation, Grade 40 (Class AZM150 coating designation, Grade 275); 0.022-inch (0.56-mm) nominal thickness.
 - 1. Finish: Manufacturer's standard three-coat fluoropolymer system with color coat and clear coat containing not less than 70 percent PVDF resin by weight.
 - 2. Concealed Finish: Manufacturer's standard white or light-colored acrylic or polyester backer finish.

2.2 ACCESSORIES

- A. Felt Underlayment: ASTM D 226, Type I (No. 15), asphalt-saturated organic felts.
- B. Self-Adhering Sheet Underlayment, High Temperature: Butyl or SBS-modified asphalt; slip-resisting-polyethylene surfaced; with release paper backing; cold applied. Stable after testing at 240 deg F (116 deg C) and passes after testing at minus 20 deg F (29 deg C); ASTM D 1970.
- C. Slip Sheet: Building paper, 3-lb/100 sq. ft. (0.16-kg/sq. m) minimum, rosin sized.
- D. Fasteners: Wood screws, annular-threaded nails, self-tapping screws, self-locking rivets and bolts, and other suitable fasteners.

1. Exposed Fasteners: Heads matching color of sheet metal roofing using plastic caps or factory-applied coating.
 2. Spikes and Ferrules: Same material as gutter; with spike with ferrule matching internal gutter width.
 3. Fasteners for Metallic-Coated Steel Sheet: Hot-dip galvanized steel or Series 300 stainless steel.
- E. Butyl Sealant: ASTM C 1311, solvent-release butyl rubber sealant.
- F. Bituminous Coating: Cold-applied asphalt emulsion complying with ASTM D 1187.

2.3 FABRICATION

- A. Fabricate sheet metal flashing and trim to comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to the design, dimensions, metal, and other characteristics of the item indicated.
- B. Expansion Provisions: Where lapped expansion provisions cannot be used, form expansion joints of intermeshing hooked flanges, not less than 1 inch (25 mm) deep, filled with butyl sealant concealed within joints.
- C. Fabrication Tolerances: Fabricate sheet metal flashing and trim that is capable of installation to tolerances specified in MCA's "Guide Specification for Residential Metal Roofing."

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Comply with SMACNA's "Architectural Sheet Metal Manual." Allow for thermal expansion; set true to line and level. Install Work with laps, joints, and seams permanently watertight and weatherproof; conceal fasteners where possible.
- B. Sealed Joints: Form nonexpansion, but movable, joints in metal to accommodate elastomeric sealant to comply with SMACNA standards.
- C. Fabricate nonmoving seams in sheet metal with flat-lock seams. Rivet joints for additional strength.
- D. Separate dissimilar metals with a bituminous coating or polymer-modified, bituminous sheet underlayment.

END OF SECTION 07 62 00

SECTION 07 84 13 - PENETRATION FIRESTOPPING

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. Submittals: Product Data and Installer certificates signed by Installer certifying that products have been installed in compliance with requirements.

1.2 SUMMARY

- A. Firestopping is defined as the process of furnishing and installing a material, or combination of materials, in various constructions, to maintain an effective barrier against the spread of flame, smoke and gases and to maintain the integrity of fire-rated construction.
 - 1. Firestopping includes but is not limited to thru-floor and thru-roof plumbing, conduit and duct penetrations.

1.3 DEFINITIONS

- A. COTR: Contracting Officer Technical Representative
- B. FM: FM Global (Factory Mutual)
- C. FPE: Fire Protection Engineer
- D. Furnish: To supply the stated equipment or materials
- E. Install: To set in position and connect or adjust for use
- F. NFPA: National Fire Protection Association
- G. NICET: National Institute for Certification in Engineering Technologies
- H. OSHM: Office of Safety Health and Environmental Management
- I. Provide: To furnish and install the stated equipment or materials
- J. UL: Underwriters Laboratories

1.4 SYSTEM DESCRIPTION

- A. Firestopping shall be provided in the following locations:

1. Duct, cable, conduit, piping and their supports that penetrate through floor slabs, fire-rated partitions, fire walls, and exterior walls where rated. Firestopping shall be provided for all new penetrations; penetrations left open by demolition/removal of duct, cable, conduit, and pipe; damaged fire stopping, and existing abandoned penetrations in the contract area. Unless otherwise specified or shown on the drawings, the Contractor shall assume that all floor slabs are two-hour, fire-rated. Locations of fire walls or partitions are indicated on the drawings.
 2. Penetrations of vertical shafts. Assume 2-Hr barrier unless noted otherwise.
 3. Around openings and penetrations through fire-rated ceiling assemblies.
 4. Joint systems for floor-to-floor, wall-to-wall, floor-to-wall, and head of wall applications.
- B. Other locations shown specifically on the drawings or where called for in other sections of the specifications.

1.5 PERFORMANCE REQUIREMENTS

- A. Materials or combinations of materials used for fire stopping shall be noncombustible and comply with the following as a minimum:
1. Flame Spread: 25 or less, as measured by ASTM E-84
 2. Smoke Developed: 100 or less, as measured by ASTM E-84
- B. Fire stopping shall be asbestos free and shall be non-toxic to humans during installation and fire conditions
- C. Examination Of Work By The Contractor
1. It shall be the responsibility of the prime contractor to provide firestopping for the entire project. The Contractor shall examine area to receive fire stopping prior to beginning work or to submitting the data required under 1.08, Submittals.
 2. Data to be submitted shall be based on the findings of the Contractor's examination.

1.6 SUBMITTALS:

- A. Submit the following for approval by the COTR and the OSHM Fire Protection Engineer. Submit applicable data for each condition specified.
1. Certificates of conformance or compliance, accompanied by classification by a nationally recognized testing lab or by other supporting evidence satisfactory to the COTR and the OSHM Fire Protection Engineer, that the material or combination of materials used, meet the requirements specified for flame spread, smoke developed, and fire resistance.

2. Manufacturer's catalog data for all materials and prefabricated devices, including descriptions sufficient to identify them on the job, and instructions for installation.
3. Completed construction details (shop drawings) showing proposed material, reinforcement, anchorage, fastenings and method of installation. Clearly show which product will be used for each application. Fire stopping materials of different manufacturers shall not be intermixed. Do not submit multiple products for the same application. Details for fire stopping of penetrations and joint systems shall show compliance with the appropriate UL Design Number. Drawings shall accurately reflect job conditions pursuant to paragraph 1.07 C, Examination of the Work by Contractor.
4. Provide as-built drawings showing all penetration locations on floor plans. Identification key shall provide the rating and construction of the assembly penetrated, and the fire stopping assembly used at each location.

1.7 QUALITY ASSURANCE

- A. Manufacturers Qualifications: The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.
 1. American Society for Testing and Materials (ASTM) Publications:
 2. E-84 Standard Test Method for Surface Burning Characteristics of Building Materials
 3. E119 Standard Test Method For Fire Tests of Building Construction and Materials
 4. E814 Test Method of Fire Tests of Through-Penetration Fire stops
 5. E1966 Fire Resistive Joint Systems
 6. EB99 Cyclic Movement And Measuring The Min & Max Joint Widths of Arch Joint Systems
 7. Underwriters Laboratories (UL) Publications:
 8. UL-1479 Fire Tests of Through-Penetration Fire Stops
 9. UL-2079 Tests for Fire Resistance of Building Joint Systems
 10. FRD Fire Resistance Directory
- B. Installer's Qualifications. Provide data to shown that the firm has at least two years experience in the installation or application of systems similar in complexity to those required for this project. In addition, provide data to show that the firm is licensed by the manufacturer and has successfully completed at least 5 comparable scale projects using the manufacturer's systems.
- C. Pre-Installation Conference
 1. Conduct a pre-installation conference with all sub-contractor representatives to verify project requirements, substrate conditions, manufacturer's installation instructions, and manufacturer's warranty requirements.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to project site in original, unopened packages with intact and legible manufacturers' labels identifying product and manufacturer, date of manufacture, and shelf life if applicable.
- B. Store materials inside, under cover, above ground, and kept dry and protected from physical damage until ready for use. Remove from site and discard wet or damaged materials.

1.9 COORDINATION

- A. Coordinate installation of all penetration firestopping systems with mechanical, electrical, fire protection, and other trades so that installation is complete and to minimize rework due to the addition of penetrants or other modifications.

1.10 WARRANTY

- A. Provide a written warranty by the manufacturer against defects in manufacturing and materials and by the installer against defects in workmanship.

PART 2 - PRODUCTS

2.1 PENETRATION FIRESTOPPING

- A. Provide penetration firestopping materials that are compatible with one another, substrates, and penetrating items if any.
- B. Penetrations in Fire-Resistance-Rated Walls and Horizontal Assemblies: Provide penetration firestopping with ratings determined per ASTM E 814 or UL 1479, based on testing at a positive pressure differential of 0.01-inch wg (2.49 Pa).
 - 1. F-Rating at Fire-Resistance-Rated Walls: Not less than that of construction penetrated.
 - 2. F-Rating at Horizontal Assemblies: At least 1 hour, but not less than that of construction penetrated.
 - 3. T-Rating at Horizontal Assemblies: At least 1 hour, but not less than the fire-resistance rating of construction penetrated except for penetrations within the cavity of a wall.
- C. Penetrations in Smoke Barriers: Provide penetration firestopping with ratings determined per UL 1479.
 - 1. L-Rating: Not exceeding 5.0 cfm/sq. ft. (0.025 cu. m/s per sq. m) of penetration opening at 0.30-inch wg (74.7 Pa) at both ambient and elevated temperatures.

- D. Exposed Penetration Firestopping: Provide products with flame-spread and smoke-developed indexes of less than 25 and 450, respectively, as determined per ASTM E 84.
- E. Accessories: Provide components for each penetration firestopping system that are needed to install fill materials and to maintain ratings required. Use only those components specified by penetration firestopping manufacturer and approved by qualified testing and inspecting agency.

2.2 MANUFACTURERS

- A. All firestopping used throughout the project shall be the products of a single manufacturer.
- B. Hilti
- C. 3M
- D. Specified Technologies, Inc
- E. Nelson
- F. Any approved manufacturer

PART 3 - EXECUTION

3.1 INSTALLATION

- A. General: Install penetration firestopping to comply with manufacturer's written installation instructions and published drawings for products and applications indicated.
- B. Identify penetration firestopping with preprinted metal or plastic labels. Attach labels permanently to surfaces adjacent to and within 6 inches (150 mm) of firestopping edge so labels will be visible to anyone seeking to remove penetrating items or firestopping. Include the following information on labels:
 - 1. The words "Warning - Penetration Firestopping - Do Not Disturb. Notify Building Management of Any Damage."
 - 2. Designation of applicable testing and inspecting agency.
 - 3. Manufacturer's name.
 - 4. Installer's name.
- C. Owner will engage a qualified testing agency to perform tests and inspections.

3.2 PENETRATION FIRESTOPPING SCHEDULE

- A. Where UL-classified systems are indicated, they refer to alpha-alpha-numeric designations listed in UL's "Fire Resistance Directory" under product Category XHEZ.
- B. Firestopping with No Penetrating Items
 - 1. Available UL-Classified Systems: C-AJ-0012, C-BJ-0011, F-A-0003, W-J-0001, W-L-0002.
 - 2. Type of Fill Materials: One or more of the following:
 - a. Latex sealant.
 - b. Silicone sealant.
 - c. Intumescent putty.
 - d. Mortar.
 - e. Intumescent pillows.
 - f. Mineral wool packing.
 - g. Foam.
- C. Firestopping for Metallic Pipes, Conduit, or Tubing
 - 1. Available UL-Classified Systems: C-BJ-1039, F-A-1004, W-J-1066, W-L-1001, W-L-1007.
 - 2. Type of Fill Materials: One or more of the following:
 - a. Latex sealant.
 - b. Silicone sealant.
 - c. Intumescent putty.
 - d. Mortar.
 - e. Mineral wool packing.
- D. Firestopping for Nonmetallic Pipe, Conduit, or Tubing
 - 1. Available UL-Classified Systems: C-AJ-2003, F-A-2040, F-A-2084, W-J-2006, W-L-2038.
 - 2. Type of Fill Materials: One or more of the following:
 - a. Latex sealant.
 - b. Silicone sealant.
 - c. Intumescent putty.
 - d. Intumescent wrap strips.
 - e. Firestop device.
- E. Firestopping for Electrical Cables
 - 1. Available UL-Classified Systems: C-AJ-3006, C-BJ-3005, W-J-1119, W-L-3026, W-L-3018, W-L-3023.
 - 2. Type of Fill Materials: One or more of the following:
 - a. Latex sealant.
 - b. Silicone sealant.
 - c. Intumescent putty.
 - d. Silicone foam.
 - e. Pillows/bags.
- F. Firestopping for Cable Trays
 - 1. Available UL-Classified Systems: C-AJ-4001, C-BJ-4008, W-J-4023, W-L-4003.
 - 2. Type of Fill Materials: One or more of the following:

- a. Latex sealant.
 - b. Silicone foam.
 - c. Intumescent putty.
 - d. Mortar.
 - e. Pillows/bags.
- G. Firestopping for Insulated Pipes
1. Available UL-Classified Systems: C-AJ-5010, C-BJ-5003, F-A-5018, W-J-5009, W-L-5010.
 2. Type of Fill Materials: One or more of the following:
 - a. Latex sealant.
 - b. Silicone foam.
 - c. Intumescent putty.
 - d. Intumescent wrap strips.
- H. Firestopping for Miscellaneous Electrical Penetrants
1. Available UL-Classified Systems: W-L-6006.
 2. Type of Fill Materials: One or more of the following:
 - a. Latex sealant.
 - b. Intumescent putty.
 - c. Mortar.
- I. Firestopping for Miscellaneous Mechanical Penetrants
1. Available UL-Classified Systems: C-AJ-7004, W-J-7001, W-L-7013.
 2. Type of Fill Materials: One or more of the following:
 - a. Latex sealant.
 - b. Mortar.
- J. Firestopping for Groupings of Penetrants
1. Available UL-Classified Systems: C-AJ-8093, W-J-8004, W-L-8004.
 2. Type of Fill Materials: One or more of the following:
 - a. Latex sealant.
 - b. Mortar.
 - c. Intumescent wrap strips.
 - d. Firestop device.
 - e. Intumescent composite sheet.

END OF SECTION 07 84 13

SECTION 07 92 00 - JOINT SEALANTS

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. Submittals: Product Data and color Samples.
- B. Environmental Limitations: Do not proceed with installation of joint sealants when ambient and substrate temperature conditions are outside limits permitted by joint-sealant manufacturer or are below 40 deg F (4.4 deg C).

PART 2 - PRODUCTS

2.1 JOINT SEALANTS

- A. Compatibility: Provide joint sealants, joint fillers, and other related materials that are compatible with one another and with joint substrates under service and application conditions.
- B. Sealant for Use in Interior Joints in Ceramic Tile and Other Hard Surfaces in Kitchens and Toilet Rooms and Around Plumbing Fixtures:
 - 1. Single-component, mildew-resistant silicone sealant, ASTM C 920, Type S; Grade NS; Class 25; for Use NT; formulated with fungicide.
- C. Sealant for Interior Use at Perimeters of Door and Window Frames:
 - 1. Acrylic latex or siliconized acrylic latex, ASTM C 834, Type OP, Grade NF.
- D. Sealant for Exterior Use:
 - 1. Urethane, S, NS, 25, NT: Single-component, nonsag, nontraffic-use, plus 25 percent and minus 25 percent movement capability, urethane joint sealant; ASTM C920, Type S, Grade NS, Class 25, Use NT.
- E. Acoustical Sealant:
 - 1. Nonsag, paintable, nonstaining latex sealant complying with ASTM C 834 that effectively reduces airborne sound transmission as demonstrated by testing according to ASTM E 90.

2.2 MISCELLANEOUS MATERIALS

- A. Provide sealant backings of material that are nonstaining; are compatible with joint substrates, sealants, primers, and other joint fillers; and are approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.
- B. Cylindrical Sealant Backings: ASTM C 1330, of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance.
- C. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint-filler materials or joint surfaces at back of joint. Provide self-adhesive tape where applicable.
- D. Primer: Material recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Comply with ASTM C 1193.
- B. Do not install Exterior urethane sealant during times of large temperature swings as movement during curing may cause ripples in the sealant
- C. Install sealant backings to support sealants during application and to produce cross-sectional shapes and depths of installed sealants that allow optimum sealant movement capability.
- D. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and backs of joints.
- E. Acoustical Sealant Installation: At sound-rated assemblies and elsewhere as indicated, seal perimeters, control joints, openings, and penetrations with a continuous bead of acoustical sealant. Install acoustical sealant at both faces of partitions. Comply with ASTM C 919.

3.2 WARRANTY

- A. Manufacturer's standard.

END OF SECTION 07 92 00

SECTION 07 92 19 - ACOUSTICAL JOINT SEALANTS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes acoustical joint sealants.

1.2 ACTION SUBMITTALS

- A. Product Data: For each acoustical joint sealant.
- B. Sustainable Design Submittals:
 - 1. Product Data: For sealants, indicating VOC content.
 - 2. Laboratory Test Reports: For sealants, indicating compliance with requirements for low-emitting materials.
- C. Samples: For each kind and color of acoustical joint sealant required.
- D. Acoustical-Joint-Sealant Schedule: Include the following information:
 - 1. Joint-sealant application, joint location, and designation.
 - 2. Joint-sealant manufacturer and product name.
 - 3. Joint-sealant formulation.
 - 4. Joint-sealant color.

1.3 INFORMATIONAL SUBMITTALS

- A. Product test reports.
- B. Sample warranties.

1.4 WARRANTY

- A. Special Installer's Warranty: Installer agrees to repair or replace acoustical joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.
 - 1. Warranty Period: Two years from date of Substantial Completion.
- B. Special Manufacturer's Warranty: Manufacturer agrees to furnish acoustical joint sealants to repair or replace those joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.
 - 1. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Provide acoustical joint-sealant products that effectively reduce airborne sound transmission through perimeter joints and openings in building construction, as demonstrated by testing representative assemblies according to ASTM E90.
1. Sealant shall have a VOC content of 250 g/L or less.
 2. Sealant shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

2.2 ACOUSTICAL JOINT SEALANTS

- A. Acoustical Sealant: Manufacturer's standard nonsag, paintable, nonstaining latex acoustical sealant complying with ASTM C834.
1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - a. Everkem Diversified Products, Inc.
 - b. Specified Technologies, Inc.
 - c. Tremco Incorporated.
 - d. USG Corporation.
 2. Colors of Exposed Acoustical Joint Sealants: As selected by Architect from manufacturer's full range of colors.
- B. Primer: Material recommended by acoustical-joint-sealant manufacturer where required for adhesion of sealant to joint substrates.
- C. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials.
- D. Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Surface Cleaning of Joints: Clean out joints immediately before installing acoustical joint sealants to comply with joint-sealant manufacturer's written instructions.
- B. Joint Priming: Prime joint substrates where recommended by acoustical-joint-sealant manufacturer.

- C. Masking Tape: Use masking tape where required to prevent contact of sealant or primer with adjoining surfaces.

3.2 INSTALLATION OF ACOUSTICAL JOINT SEALANTS

- A. Comply with acoustical joint-sealant manufacturer's written installation instructions unless more stringent requirements apply.
- B. STC-Rated Assemblies: Seal construction at perimeters, behind control joints, and at openings and penetrations with a continuous bead of acoustical joint sealant. Install acoustical joint sealants at both faces of partitions, at perimeters, and through penetrations. Comply with ASTM C919, ASTM C1193, and manufacturer's written recommendations for closing off sound-flanking paths around or through assemblies, including sealing partitions to underside of floor slabs above acoustical ceilings.
- C. Acoustical Ceiling Areas: Apply acoustical joint sealant at perimeter edge moldings of acoustical ceiling areas in a continuous ribbon concealed on back of vertical legs of moldings before they are installed.

END OF SECTION 07 92 19

SECTION 08 06 71 – DOOR HARDWARE SCHEDULE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section references specification sections relating to commercial door hardware for the following:
 - 1. Swinging doors.
 - 2. Other doors to the extent indicated.
- B. Commercial door hardware includes, but is not necessarily limited to, the following:
 - 1. Mechanical door hardware.
 - 2. Cylinders specified for doors in other sections.
- C. Related Sections:
 - 1. Division 08 Section "Door Hardware".
- D. Codes and References: Comply with the version year adopted by the Authority Having Jurisdiction.
 - 1. ANSI A117.1 - Accessible and Usable Buildings and Facilities.
 - 2. ICC/IBC - International Building Code.
 - 3. NFPA 70 - National Electrical Code.
 - 4. NFPA 80 - Fire Doors and Windows.
 - 5. NFPA 101 - Life Safety Code.
 - 6. NFPA 105 - Installation of Smoke Door Assemblies.
 - 7. State Building Codes, Local Amendments.
- E. Standards: Reference Related Sections for requirements regarding compliance with applicable industry standards.

1.3 SUBMITTALS

- A. Product Data: Manufacturer's product data sheets including installation details, material descriptions, dimensions of individual components and profiles, operational descriptions and finishes.

- B. Door Hardware Schedule: Prepared by or under the supervision of supplier, detailing fabrication and assembly of door hardware, as well as procedures and diagrams. Coordinate the final Door Hardware Schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of door hardware.
1. Format: Comply with scheduling sequence and vertical format in DHI's "Sequence and Format for the Hardware Schedule."
 2. Organization: Organize the Door Hardware Schedule into door hardware sets indicating complete designations of every item required for each door or opening. Organize door hardware sets in same order as in the Door Hardware Sets at the end of Part 3. Submittals that do not follow the same format and order as the Door Hardware Sets will be rejected and subject to resubmission.
 3. Content: Include the following information:
 - a. Type, style, function, size, label, hand, and finish of each door hardware item.
 - b. Manufacturer of each item.
 - c. Fastenings and other pertinent information.
 - d. Location of door hardware set, cross-referenced to Drawings, both on floor plans and in door and frame schedule.
 - e. Explanation of abbreviations, symbols, and codes contained in schedule.
 - f. Mounting locations for door hardware.
 - g. Door and frame sizes and materials.
 4. Submittal Sequence: Submit the final Door Hardware Schedule at earliest possible date, particularly where approval of the Door Hardware Schedule must precede fabrication of other work that is critical in the Project construction schedule. Include Product Data, Samples, Shop Drawings of other work affected by door hardware, and other information essential to the coordinated review of the Door Hardware Schedule.
- C. Keying Schedule: Prepared under the supervision of the Owner, separate schedule detailing final keying instructions for locksets and cylinders in writing. Include keying system explanation, door numbers, key set symbols, hardware set numbers and special instructions. Owner to approve submitted keying schedule prior to the ordering of permanent cylinders.
- D. Product Test Reports: Indicating compliance with cycle testing requirements, based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified independent testing agency.
- E. Operating and Maintenance Manuals: Provide manufacturers operating and maintenance manuals for each item comprising the complete door hardware installation in quantity as required in Division 01, Closeout Submittals. The manual to include the name, address, and contact information of the manufacturers providing the hardware and their nearest service representatives. The final copies delivered after completion of the installation test to include "as built" modifications made during installation, checkout, and acceptance.

- F. Warranties and Maintenance: Special warranties and maintenance agreements specified in the Related Sections.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Inventory door hardware on receipt and provide secure lock-up and shelving for door hardware delivered to Project site. Do not store electronic access control hardware, software or accessories at Project site without prior authorization.
- B. Tag each item or package separately with identification related to the final Door Hardware Schedule and include basic installation instructions with each item or package.
- C. Deliver, as applicable, permanent keys, cylinders, cores, access control credentials, software and related accessories directly to Owner via registered mail or overnight package service. Instructions for delivery to the Owner shall be established at the "Keying Conference".

1.5 WARRANTY

- A. General Warranty: Reference Division 01, General Requirements. Special warranties specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.

1.6 MAINTENANCE SERVICE

- A. Maintenance Tools and Instructions: Furnish a complete set of specialized tools and maintenance instructions as needed for Owner's continued adjustment, maintenance, and removal and replacement of door hardware.

PART 2 - PRODUCTS

2.1 SCHEDULED DOOR HARDWARE

- A. Refer to "PART 3 – EXECUTION" for required specification sections.

PART 3 - EXECUTION

3.1 DOOR HARDWARE SETS

- A. The door hardware sets represent the design intent and direction of the owner and architect. They are a guideline only and should not be considered a detailed hardware schedule. Discrepancies, conflicting hardware and missing items should be brought to the attention of the architect with corrections made prior to the bidding process.

Omitted items not included in a hardware set should be scheduled with the appropriate additional hardware required for proper application and functionality.

1. Quantities listed are for each pair of doors, or for each single door.
 2. The supplier is responsible for handing and sizing all products.
 3. Where multiple options for a piece of hardware are given in a single line item, the supplier shall provide the appropriate application for the opening.
 4. At existing openings with new hardware the supplier shall field inspect existing conditions prior to the submittal stage to verify the specified hardware will work as required. Provide alternate solutions and proposals as needed.
- B. Products listed in the hardware sets shall be supplied by and in accordance with the requirements described in the specification section as noted for each item.
1. Section 08 71 00 – Door Hardware.
- C. Manufacturer's Abbreviations:
1. MK - McKinney
 2. PE - Pemko
 3. RO - Rockwood
 4. MC - Medeco
 5. RU - Corbin Russwin
 6. SG - Sargent & Greenleaf Inc
 7. BE - dormakaba Best
 8. RF - Rixson
 9. NO - Norton
 10. OT - Other
 11. SU - Securitron

Hardware Sets

Set: 1.0

Doors: 1501, 1502, 1513, 1515, 1516

4 Hinge, Full Mortise	TA2714	US4 (MATCH EXISTING COLOR)	MK
1 Core	- BEST SFIC to match Owner's existing key system	606 (MATCH EXISTING COLOR)	BE
1 Office Lock	CLX3351 AZD CT6SD	606 (MATCH EXISTING COLOR)	RU
1 Wall Stop	406 / 409	US4 (MATCH EXISTING COLOR)	RO

Set: 2.0

Doors: 1505, 1506, 1514, 1517

4 Hinge, Full Mortise	TA2714	US4 (MATCH EXISTING COLOR)	MK
1 Classroom Lock	CLX3351 AZD CT6SD	606 (MATCH EXISTING COLOR)	RU
1 Core	- BEST SFIC to match Owner's existing key system	606 (MATCH EXISTING COLOR)	BE
1 Wall Stop	406 / 409	US4 (MATCH EXISTING COLOR)	RO

Notes:

**CADILLAC PLACE 15TH FLOOR – (3) JUDICIAL SUITES
DETROIT, MICHIGAN**

**File No. 950/22357.MNB
C.O. No. Y23038**

Door to be normally closed and locked
Free egress at all times.

END OF SECTION 08 06 71

SECTION 08 14 16 - FLUSH WOOD DOORS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
1. Five-ply flush wood veneer-faced doors for transparent finish.
 2. Factory finishing flush wood doors.
 3. Factory machining for hardware.
 4. Refer to Section 06 40 23 "Interior Architectural Woodwork" for the construction of associated wood door frames.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product, including the following:
1. Door core materials and construction.
 2. Door edge construction
 3. Door face type and characteristics.
 4. Door louvers.
 5. Door trim for openings.
 6. Door frame construction.
 7. Factory-machining criteria.
 8. Factory finishing specifications.
- B. Shop Drawings: Indicate location, size, and hand of each door; elevation of each type of door; construction details not covered in Product Data; and the following:
1. Door schedule indicating door location, type, size, fire protection rating, and swing.
 2. Door elevations, dimension and locations of hardware, lite and louver cutouts, and glazing thicknesses.
 3. Details of electrical raceway and preparation for electrified hardware, access control systems, and security systems.
 4. Dimensions and locations of blocking for hardware attachment.
 5. Clearances and undercuts.
 6. Requirements for veneer matching.
- C. Samples: For factory-finished doors.

1.3 QUALITY ASSURANCE

- A. Certified Wood: Provide an invoice including vendor's chain-of-custody number, product cost, and entity being invoiced.
- B. Vendor Qualifications: A vendor that is certified for chain of custody by an FSC-accredited certification body.

PART 2 - PRODUCTS

2.1 FLUSH WOOD DOORS GENERAL

- A. Regional Materials: Wood doors shall be manufactured within 100 miles (160 km) of Project site from materials that have been extracted, harvested, or recovered, as well as manufactured, within 100 miles (160 km) of Project site.
- B. Certified Wood: Wood doors shall be certified as "FSC Pure" or "FSC Mixed Credit" according to FSC STD-01-001 and FSC STD-40-004.
- C. Adhesives: Use adhesives that meet the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."
- D. Composite Wood Products: Products shall be made using ultra-low-emitting formaldehyde resins as defined in the California Air Resources Board's "Airborne Toxic Control Measure to Reduce Formaldehyde Emissions from Composite Wood Products" or shall be made with no added formaldehyde.

2.2 SOLID-CORE, FIVE-PLY FLUSH WOOD VENEER-FACED DOORS FOR TRANSPARENT FINISH

- A. Interior Doors -Refer to Door Schedule on Drawings:
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Eggers Industries.
 - b. Oshkosh Door Company.
 - 2. Performance Grade: ANSI/WDMA I.S. 1A Heavy Duty.
 - 3. Architectural Woodwork Standards Grade: Premium.
 - 4. Faces: Single-ply wood veneer not less than 1/50 inch (0.508 mm) thick.
 - a. Species: **Quartered Figured Makore (Block Mottle)**, no sap permitted.
 - b. Cut: Quarter sliced.
 - c. Match between Veneer Leaves: Book match.
 - d. Assembly of Veneer Leaves on Door Faces: Center-balance match.
 - e. Pair and Set Match: Provide for doors hung in same opening.
 - 5. Exposed Vertical Edges: Same species as faces or a compatible species - Architectural Woodwork Standards edge Type A.
 - 6. Core for Non-Fire-Rated Doors:
 - a. ANSI A208.1, Grade LD-2 particleboard.
 - 1) Provide doors with WDMA I.S. 10 structural-composite-lumber cores instead of particleboard cores for doors scheduled to receive exit devices in Section 08 71 00 "Door Hardware."
 - b. WDMA I.S. 10 structural composite lumber.

- 1) Screw Withdrawal, Face: 550 lbf (2440 N).
- 2) Screw Withdrawal, Edge: 550 lbf (2440 N).
7. Construction: Five plies, hot-pressed bonded (vertical and horizontal edging is bonded to core), with entire unit abrasive planed before veneering.

2.3 LIGHT FRAMES AND LOUVERS

- A. Wood Beads for Light Openings in Wood Doors: Provide manufacturer's standard wood beads unless otherwise indicated.
 1. Wood Species: Same species as door faces.
 2. Profile: Manufacturer's standard shape.

2.4 FABRICATION

- A. Factory fit doors to suit frame-opening sizes indicated.
 1. Comply with clearance requirements of referenced quality standard for fitting unless otherwise indicated.
- B. Factory machine doors for hardware that is not surface applied.
 1. Locate hardware to comply with DHI-WDHS-3.
 2. Comply with final hardware schedules, door frame Shop Drawings, ANSI/BHMA-156.115-W, and hardware templates.
 3. Coordinate with hardware mortises in metal frames, to verify dimensions and alignment before factory machining.
 4. For doors scheduled to receive electrified locksets, provide factory-installed raceway and wiring to accommodate specified hardware.
- C. Openings: Factory cut and trim openings through doors.
 1. Light Openings: Trim openings with moldings of material and profile indicated.
 2. Glazing: Factory install glazing in doors indicated to be factory finished. Comply with applicable requirements in Section 08 80 00 "Glazing."

2.5 FACTORY FINISHING

- A. Comply with referenced quality standard for factory finishing.
 1. Complete fabrication, including fitting doors for openings and machining for hardware that is not surface applied, before finishing.
 2. Finish faces, all four edges, edges of cutouts, and mortises.
- B. Factory finish doors.
- C. Transparent Finish:
 1. Architectural Woodwork Standards Grade: Premium
 2. Finish: Architectural Woodwork Standards System-5, Varnish, Conversion.
 3. Sheen: Satin.
 4. Color to match existing Public Corridor doors. At least 3 variations of the stain mix must be provided to determine the best match.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Hardware: For installation, see Section 08 71 00 "Door Hardware."
- B. Install doors to comply with manufacturer's written instructions and referenced quality standard, and as indicated.
- C. Factory-Fitted Doors: Align in frames for uniform clearance at each edge.
- D. Factory-Finished Doors: Restore finish before installation if fitting or machining is required at Project site.

3.2 FIELD QUALITY CONTROL

- A. Repair or remove and replace installations where inspections by Government or A/E indicate that they do not comply with specified requirements.
- B. Reinspect repaired or replaced installations to determine if replaced or repaired door assembly installations comply with specified requirements.

3.3 ADJUSTING

- A. Operation: Rehang or replace doors that do not swing or operate freely.
- B. Finished Doors: Replace doors that are damaged or that do not comply with requirements. Doors may be repaired or refinished if Work complies with requirements and shows no evidence of repair or refinishing.

END OF SECTION 08 14 16

SECTION 08 71 00 - DOOR HARDWARE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes commercial door hardware for the following:
 - 1. Swinging doors.
 - 2. Sliding doors.
 - 3. Other doors to the extent indicated.
- B. Door hardware includes, but is not necessarily limited to, the following:
 - 1. Mechanical door hardware.
 - 2. Cylinders specified for doors in other sections.
- C. Related Sections:
 - 1. Division 06 Section "Interior Arch Woodwork".
- D. Codes and References: Comply with the version year adopted by the Authority Having Jurisdiction.
 - 1. ANSI A117.1 - Accessible and Usable Buildings and Facilities.
 - 2. ICC/IBC - International Building Code.
 - 3. NFPA 70 - National Electrical Code.
 - 4. NFPA 80 - Fire Doors and Windows.
 - 5. NFPA 101 - Life Safety Code.
 - 6. NFPA 105 - Installation of Smoke Door Assemblies.
 - 7. State Building Codes, Local Amendments.
- E. Standards: All hardware specified herein shall comply with the following industry standards as applicable. Any undated reference to a standard shall be interpreted as referring to the latest edition of that standard:
 - 1. ANSI/BHMA Certified Product Standards - A156 Series.
 - 2. UL10C - Positive Pressure Fire Tests of Door Assemblies.
 - 3. ANSI/UL 294 - Access Control System Units.
 - 4. UL 305 - Panic Hardware.

5. ANSI/UL 437- Key Locks.

1.3 SUBMITTALS

- A. Product Data: Manufacturer's product data sheets including installation details, material descriptions, dimensions of individual components and profiles, operational descriptions and finishes.
- B. Door Hardware Schedule: Prepared by or under the supervision of supplier, detailing fabrication and assembly of door hardware, as well as procedures and diagrams. Coordinate the final Door Hardware Schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of door hardware.
 1. Format: Comply with scheduling sequence and vertical format in DHI's "Sequence and Format for the Hardware Schedule."
 2. Organization: Organize the Door Hardware Schedule into door hardware sets indicating complete designations of every item required for each door or opening. Organize door hardware sets in same order as in the Door Hardware Sets at the end of Part 3. Submittals that do not follow the same format and order as the Door Hardware Sets will be rejected and subject to resubmission.
 3. Content: Include the following information:
 - a. Type, style, function, size, label, hand, and finish of each door hardware item.
 - b. Manufacturer of each item.
 - c. Fastenings and other pertinent information.
 - d. Location of door hardware set, cross-referenced to Drawings, both on floor plans and in door and frame schedule.
 - e. Explanation of abbreviations, symbols, and codes contained in schedule.
 - f. Mounting locations for door hardware.
 - g. Door and frame sizes and materials.
 - h. Warranty information for each product.
 4. Submittal Sequence: Submit the final Door Hardware Schedule at earliest possible date, particularly where approval of the Door Hardware Schedule must precede fabrication of other work that is critical in the Project construction schedule. Include Product Data, Samples, Shop Drawings of other work affected by door hardware, and other information essential to the coordinated review of the Door Hardware Schedule.
- C. Shop Drawings: Details of electrified access control hardware indicating the following:
 1. Wiring Diagrams: Upon receipt of approved schedules, submit detailed system wiring diagrams for power, signaling, monitoring, communication, and control of the access control system electrified hardware. Differentiate between manufacturer-installed and field-installed wiring. Include the following:

- a. Elevation diagram of each unique access controlled opening showing location and interconnection of major system components with respect to their placement in the respective door openings.
 - b. Complete (risers, point-to-point) access control system block wiring diagrams.
 - c. Wiring instructions for each electronic component scheduled herein.
2. Electrical Coordination: Coordinate with related sections the voltages and wiring details required at electrically controlled and operated hardware openings.
- D. Keying Schedule: After a keying meeting with the owner has taken place prepare a separate keying schedule detailing final instructions. Submit the keying schedule in electronic format. Include keying system explanation, door numbers, key set symbols, hardware set numbers and special instructions. Owner must approve submitted keying schedule prior to the ordering of permanent cylinders/cores.
- E. Informational Submittals:
1. Product Test Reports: Indicating compliance with cycle testing requirements, based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified independent testing agency.
- F. Operating and Maintenance Manuals: Provide manufacturers operating and maintenance manuals for each item comprising the complete door hardware installation in quantity as required in Division 01, Closeout Procedures.
- 1.4 QUALITY ASSURANCE
- A. Manufacturers Qualifications: Engage qualified manufacturers with a minimum 5 years of documented experience in producing hardware and equipment similar to that indicated for this Project and that have a proven record of successful in-service performance.
- B. Certified Products: Where specified, products must maintain a current listing in the Builders Hardware Manufacturers Association (BHMA) Certified Products Directory (CPD).
- C. Installer Qualifications: A minimum 3 years documented experience installing both standard and electrified door hardware similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.
- D. Door Hardware Supplier Qualifications: Experienced commercial door hardware distributors with a minimum 5 years documented experience supplying both mechanical and electromechanical hardware installations comparable in material, design, and extent to that indicated for this Project. Supplier recognized as a factory direct distributor by the manufacturers of the primary materials with a warehousing facility in Project's vicinity. Supplier to have on staff a certified Architectural Hardware Consultant (AHC) available during the course of the Work to consult with Contractor,

Architect, and Owner concerning both standard and electromechanical door hardware and keying.

- E. Source Limitations: Obtain each type and variety of door hardware specified in this section from a single source unless otherwise indicated.
 - 1. Electrified modifications or enhancements made to a source manufacturer's product line by a secondary or third party source will not be accepted.
 - 2. Provide electromechanical door hardware from the same manufacturer as mechanical door hardware, unless otherwise indicated.
- F. Each unit to bear third party permanent label demonstrating compliance with the referenced standards.
- G. Keying Conference: Conduct conference to comply with requirements in Division 01 Section "Project Meetings." Keying conference to incorporate the following criteria into the final keying schedule document:
 - 1. Function of building, purpose of each area and degree of security required.
 - 2. Plans for existing and future key system expansion.
 - 3. Requirements for key control storage and software.
 - 4. Installation of permanent keys, cylinder cores and software.
 - 5. Address and requirements for delivery of keys.
- H. Pre-Submittal Conference: Conduct coordination conference in compliance with requirements in Division 01 Section "Project Meetings" with attendance by representatives of Supplier(s), Installer(s), and Contractor(s) to review proper methods and the procedures for receiving, handling, and installing door hardware.
 - 1. Prior to installation of door hardware, conduct a project specific training meeting to instruct the installing contractors' personnel on the proper installation and adjustment of their respective products. Product training to be attended by installers of door hardware (including electromechanical hardware) for aluminum, hollow metal and wood doors. Training will include the use of installation manuals, hardware schedules, templates and physical product samples as required.
 - 2. Inspect and discuss electrical roughing-in, power supply connections, and other preparatory work performed by other trades.
 - 3. Review sequence of operation narratives for each unique access controlled opening.
 - 4. Review and finalize construction schedule and verify availability of materials.
 - 5. Review the required inspecting, testing, commissioning, and demonstration procedures
- I. At completion of installation, provide written documentation that components were applied to manufacturer's instructions and recommendations and according to approved schedule.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Inventory door hardware on receipt and provide secure lock-up and shelving for door hardware delivered to Project site. Do not store electronic access control hardware, software or accessories at Project site without prior authorization.
- B. Tag each item or package separately with identification related to the final Door Hardware Schedule, and include basic installation instructions with each item or package.
- C. Deliver, as applicable, permanent keys, cylinders, cores, access control credentials, software and related accessories directly to Owner via registered mail or overnight package service. Instructions for delivery to the Owner shall be established at the "Keying Conference".

1.6 COORDINATION

- A. Templates: Obtain and distribute to the parties involved templates for doors, frames, and other work specified to be factory prepared for installing standard and electrified hardware. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing hardware to comply with indicated requirements.
- B. Door and Frame Preparation: Doors and corresponding frames are to be prepared, reinforced and pre-wired (if applicable) to receive the installation of the specified electrified, monitoring, signaling and access control system hardware without additional in-field modifications.

1.7 WARRANTY

- A. General Warranty: Reference Division 01, General Requirements. Special warranties specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.
- B. Warranty Period: Written warranty, executed by manufacturer(s), agreeing to repair or replace components of standard and electrified door hardware that fails in materials or workmanship within specified warranty period after final acceptance by the Owner. Failures include, but are not limited to, the following:
 - 1. Structural failures including excessive deflection, cracking, or breakage.
 - 2. Faulty operation of the hardware.
 - 3. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
 - 4. Electrical component defects and failures within the systems operation.
- C. Standard Warranty Period: One year from date of Substantial Completion, unless otherwise indicated.

D. Special Warranty Periods:

1. Ten years for mortise locks and latches.
2. Five years for exit hardware.
3. Twenty five years for manual overhead door closer bodies.
4. Two years for electromechanical door hardware, unless noted otherwise.

1.8 MAINTENANCE SERVICE

- A. Maintenance Tools and Instructions: Furnish a complete set of specialized tools and maintenance instructions as needed for Owner's continued adjustment, maintenance, and removal and replacement of door hardware.

PART 2 - PRODUCTS

2.1 SCHEDULED DOOR HARDWARE

- A. General: Provide door hardware for each door to comply with requirements in Door Hardware Sets and each referenced section that products are to be supplied under.
- B. Designations: Requirements for quantity, item, size, finish or color, grade, function, and other distinctive qualities of each type of door hardware are indicated in the Door Hardware Sets at the end of Part 3. Products are identified by using door hardware designations, as follows:
1. Named Manufacturer's Products: Product designation and manufacturer are listed for each door hardware type required for the purpose of establishing requirements. Manufacturers' names are abbreviated in the Door Hardware Schedule.
- C. Substitutions: Requests for substitution and product approval for inclusive mechanical and electromechanical door hardware in compliance with the specifications must be submitted in writing and in accordance with the procedures and time frames outlined in Division 01, Substitution Procedures. Approval of requests is at the discretion of the architect, owner, and their designated consultants.

2.2 HANGING DEVICES

- A. Hinges: ANSI/BHMA A156.1 certified butt hinges with number of hinge knuckles and other options as specified in the Door Hardware Sets.
1. Quantity: Provide the following hinge quantity:
 - a. Two Hinges: For doors with heights up to 60 inches.
 - b. Three Hinges: For doors with heights 61 to 90 inches.
 - c. Four Hinges: For doors with heights 91 to 120 inches.

- d. For doors with heights more than 120 inches, provide 4 hinges, plus 1 hinge for every 30 inches of door height greater than 120 inches.
2. Hinge Size: Provide the following, unless otherwise indicated, with hinge widths sized for door thickness and clearances required:
 - a. Widths up to 3'0": 4-1/2" standard or heavy weight as specified.
 - b. Sizes from 3'1" to 4'0": 5" standard or heavy weight as specified.
3. Hinge Weight and Base Material: Unless otherwise indicated, provide the following:
 - a. Interior Doors: Standard weight, steel, ball bearing or oil impregnated bearing hinges unless Hardware Sets indicate heavy weight.
4. Hinge Options: Comply with the following:
 - a. Non-removable Pins: With the exception of electric through wire hinges, provide set screw in hinge barrel that, when tightened into a groove in hinge pin, prevents removal of pin while door is closed; for the all out-swinging lockable doors.
5. Manufacturers:
 - a. Hager Companies (HA).
 - b. McKinney Products; ASSA ABLOY Architectural Door Accessories (MK).
 - c. Stanley Hardware (ST).

2.3 CYLINDERS AND KEYING

- A. General: Cylinder manufacturer to have minimum (10) years experience designing secured master key systems and have on record a published security keying system policy.
- B. Source Limitations: Obtain each type of keyed cylinder and keys from the same source manufacturer as locksets and exit devices, unless otherwise indicated.
 1. Manufacturers:
 - a. dormakaba Best (BE).
 - b. Match Existing, Field Verify.
 - c. No Substitution.
- C. Cylinder Types: Original manufacturer cylinders able to supply the following cylinder formats and types:
 1. Threaded mortise cylinders with rings and cams to suit hardware application.
 2. Rim cylinders with back plate, flat-type vertical or horizontal tailpiece, and raised trim ring.

3. Bored or cylindrical lock cylinders with tailpieces as required to suit locks.
 4. Tubular deadlocks and other auxiliary locks.
 5. Mortise and rim cylinder collars to be solid and recessed to allow the cylinder face to be flush and be free spinning with matching finishes.
 6. Keyway: Manufacturer's Standard.
- D. Interchangeable Cores: Provide small format interchangeable cores as specified, core insert, removable by use of a special key; usable with other manufacturers' cylinders.
- E. Removable Cores: Provide removable cores as specified, core insert, removable by use of a special key, and for use with only the core manufacturer's cylinder and door hardware.
- F. Keying System: Each type of lock and cylinders to be factory keyed.
1. Supplier shall conduct a "Keying Conference" to define and document keying system instructions and requirements.
 2. Furnish factory cut, nickel-silver large bow permanently inscribed with a visual key control number as directed by Owner.
 3. Existing System: Field verify and key cylinders to match Owner's existing system.
- G. Key Quantity: Provide the following minimum number of keys:
1. Change Keys per Cylinder: Two (2)
 2. Master Keys (per Master Key Level/Group): Five (5).
 3. Construction Keys (where required): Ten (10).
 4. Construction Control Keys (where required): Two (2).
 5. Permanent Control Keys (where required): Two (2).
- H. Construction Keying: Provide temporary keyed construction cores.
- I. Key Registration List (Bitting List):
1. Provide keying transcript list to Owner's representative in the proper format for importing into key control software.
 2. Provide transcript list in writing or electronic file as directed by the Owner.
- 2.4 MECHANICAL LOCKS AND LATCHING DEVICES
- A. Cylindrical Locksets, Grade 1 (Heavy Duty): ANSI/BHMA A156.2, Series 4000, Operational Grade 1 Certified Products Directory (CPD) listed.
1. Vertical Impact: Exceed 100 vertical impacts (20 times ANSI/BHMA A156.2 requirements).
 2. Furnish with solid cast levers, standard 2 3/4" backset, and 1/2" (3/4" at rated paired openings) throw brass latchbolt.
 3. Locks are to be non-handed and fully field reversible.

4. Manufacturers:
 - a. Corbin Russwin Hardware (RU) - CLX3300 Series.
 - b. dormakaba Best (BE) - 9K Series.
 - c. Sargent Manufacturing (SA) - 10X Line.

2.5 LOCK AND LATCH STRIKES

- A. Strikes: Provide manufacturer's standard strike with strike box for each latch or lock bolt, with curved lip extended to protect frame, finished to match door hardware set, unless otherwise indicated, and as follows:
 1. Flat-Lip Strikes: For locks with three-piece antifriction latchbolts, as recommended by manufacturer.
 2. Extra-Long-Lip Strikes: For locks used on frames with applied wood casing trim.
 3. Aluminum-Frame Strike Box: Provide manufacturer's special strike box fabricated for aluminum framing.
 4. Double-lipped strikes: For locks at double acting doors. Furnish with retractable stop for rescue hardware applications.
- B. Standards: Comply with the following:
 1. Strikes for Mortise Locks and Latches: BHMA A156.13.
 2. Strikes for Bored Locks and Latches: BHMA A156.2.
 3. Strikes for Auxiliary Deadlocks: BHMA A156.36.
 4. Dustproof Strikes: BHMA A156.16.

2.6 DOOR STOPS AND HOLDERS

- A. General: Door stops and holders to be of type and design as specified below or in the Hardware Sets.
- B. Door Stops and Bumpers: ANSI/BHMA A156.16, Grade 1 certified door stops and wall bumpers. Provide wall bumpers, either convex or concave types with anchorage as indicated, unless floor or other types of door stops are specified in Hardware Sets. Do not mount floor stops where they will impede traffic. Where floor or wall bumpers are not appropriate, provide overhead type stops and holders.
 1. Manufacturers:
 - a. Hiawatha, Inc. (HI).
 - b. Rockwood (RO).
 - c. Trimco (TC).
- C. Overhead Door Stops and Holders: ANSI/BHMA A156.8, Grade 1 Certified Products Directory (CPD) listed overhead stops and holders to be surface or concealed types as indicated in Hardware Sets. Track, slide, arm and jamb bracket to be constructed of

extruded bronze and shock absorber spring of heavy tempered steel. Provide non-handed design with mounting brackets as required for proper operation and function.

1. Manufacturers:
 - a. Norton Rixson (RF).
 - b. Rockwood (RO).
 - c. Sargent Manufacturing (SA).

2.7 ARCHITECTURAL SEALS

- A. General: Thresholds, weatherstripping, and gasket seals to be of type and design as specified below or in the Hardware Sets. Provide continuous weatherstrip gasketing on exterior doors and provide smoke, light, or sound gasketing on interior doors where indicated. At exterior applications provide non-corrosive fasteners and elsewhere where indicated.
- B. Smoke Labeled Gasketing: Assemblies complying with NFPA 105 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for smoke control ratings indicated, based on testing according to UL 1784.
 1. Provide smoke labeled perimeter gasketing at all smoke labeled openings.
- C. Fire Labeled Gasketing: Assemblies complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing according to UL-10C.
 1. Provide intumescent seals as indicated to meet UL10C Standard for Positive Pressure Fire Tests of Door Assemblies, and NPFA 252, Standard Methods of Fire Tests of Door Assemblies.
- D. Sound-Rated Gasketing: Assemblies that are listed and labeled by a testing and inspecting agency, for sound ratings indicated.
- E. Replaceable Seal Strips: Provide only those units where resilient or flexible seal strips are easily replaceable and readily available from stocks maintained by manufacturer.
- F. Manufacturers:
 1. National Guard Products (NG).
 2. Pemko (PE).
 3. Reese Enterprises, Inc. (RE).

2.8 FABRICATION

- A. Fasteners: Provide door hardware manufactured to comply with published templates generally prepared for machine, wood, and sheet metal screws. Provide screws according to manufacturers recognized installation standards for application intended.

2.9 FINISHES

- A. Standard: Designations used in the Hardware Sets and elsewhere indicate hardware finishes complying with ANSI/BHMA A156.18, including coordination with traditional U.S. finishes indicated by certain manufacturers for their products.
- B. Provide quality of finish, including thickness of plating or coating (if any), composition, hardness, and other qualities complying with manufacturer's standards, but in no case less than specified by referenced standards for the applicable units of hardware
- C. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine scheduled openings, with Installer present, for compliance with requirements for installation tolerances, labeled fire door assembly construction, wall and floor construction, and other conditions affecting performance.
- B. Notify architect of any discrepancies or conflicts between the door schedule, door types, drawings and scheduled hardware. Proceed only after such discrepancies or conflicts have been resolved in writing.

3.2 PREPARATION

- A. Wood Doors: Comply with ANSI/DHI A115-W series.

3.3 INSTALLATION

- A. Install each item of mechanical and electromechanical hardware and access control equipment to comply with manufacturer's written instructions and according to specifications.
 - 1. Installers are to be trained and certified by the manufacturer on the proper installation and adjustment of fire, life safety, and security products including: hanging devices; locking devices; closing devices; and seals.
- B. Mounting Heights: Mount door hardware units at heights indicated in following applicable publications, unless specifically indicated or required to comply with governing regulations:
 - 1. Standard Steel Doors and Frames: DHI's "Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames."
 - 2. DHI TDH-007-20: Installation Guide for Doors and Hardware.

3. Where indicated to comply with accessibility requirements, comply with ANSI A117.1 "Accessibility Guidelines for Buildings and Facilities."
 4. Provide blocking in drywall partitions where wall stops or other wall mounted hardware is located.
- C. Retrofitting: Install door hardware to comply with manufacturer's published templates and written instructions. Where cutting and fitting are required to install door hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation of surface protective trim units with finishing work specified in Division 9 Sections. Do not install surface-mounted items until finishes have been completed on substrates involved.
- D. Thresholds: Set thresholds for exterior and acoustical doors in full bed of sealant complying with requirements specified in Division 7 Section "Joint Sealants."
- E. Storage: Provide a secure lock up for hardware delivered to the project but not yet installed. Control the handling and installation of hardware items so that the completion of the work will not be delayed by hardware losses before and after installation.

3.4 FIELD QUALITY CONTROL

- A. Field Inspection (Punch Report): Reference Division 01 Sections "Closeout Procedures". Produce project punch report for each installed door opening indicating compliance with approved submittals and verification hardware is properly installed, operating and adjusted. Include list of items to be completed and corrected, indicating the reasons or deficiencies causing the Work to be incomplete or rejected.
1. Organization of List: Include separate Door Opening and Deficiencies and Corrective Action Lists organized by Mark, Opening Remarks and Comments, and related Opening Images and Video Recordings.

3.5 ADJUSTING

- A. Initial Adjustment: Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate as intended. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.

3.6 CLEANING AND PROTECTION

- A. Protect all hardware stored on construction site in a covered and dry place. Protect exposed hardware installed on doors during the construction phase. Install any and all hardware at the latest possible time frame.
- B. Clean adjacent surfaces soiled by door hardware installation.

- C. Clean operating items as necessary to restore proper finish. Provide final protection and maintain conditions that ensure door hardware is without damage or deterioration at time of owner occupancy.

3.7 DEMONSTRATION

- A. Instruct Owner's maintenance personnel to adjust, operate, and maintain mechanical and electromechanical door hardware.

3.8 DOOR HARDWARE SETS

- A. The hardware sets represent the design intent and direction of the owner and architect. They are a guideline only and should not be considered a detailed hardware schedule. Discrepancies, conflicting hardware and missing items should be brought to the attention of the architect with corrections made prior to the bidding process. Omitted items not included in a hardware set should be scheduled with the appropriate additional hardware required for proper application and functionality.

1. Quantities listed are for each pair of doors, or for each single door.
2. The supplier is responsible for handing and sizing all products.
3. Where multiple options for a piece of hardware are given in a single line item, the supplier shall provide the appropriate application for the opening.
4. At existing openings with new hardware the supplier shall field inspect existing conditions prior to the submittal stage to verify the specified hardware will work as required. Provide alternate solutions and proposals as needed.

- B. Refer to Drawings for hardware sets.

END OF SECTION 08 71 00

SECTION 08 80 00 - GLAZING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes:
 - 1. Glass for doors and interior borrowed lites.
 - 2. Glazing sealants and accessories.

1.2 COORDINATION

- A. Coordinate glazing channel dimensions to provide necessary bite on glass, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Sustainable Design Submittals:
 - 1. Product Data: For sealants, indicating VOC content.
 - 2. Laboratory Test Reports: For sealants, indicating compliance with requirements for low-emitting materials.
- C. Glass Samples: For each type of glass product other than clear monolithic vision glass; 12 inches (300 mm) square.
- D. Glazing Schedule: List glass types and thicknesses for each size opening and location. Use same designations indicated on Drawings.
- E. Delegated-Design Submittal: For glass indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.4 INFORMATIONAL SUBMITTALS

- A. Preconstruction adhesion and compatibility test report.

1.5 QUALITY ASSURANCE

- A. Sealant Testing Agency Qualifications: An independent testing agency qualified according to ASTM C1021 to conduct the testing indicated.

1.6 WARRANTY

- A. Manufacturer's Special Warranty for Coated-Glass Products: Manufacturer agrees to replace coated-glass units that deteriorate within specified warranty period. Deterioration of coated glass is defined as defects developed from normal use that are not attributed to glass breakage or to maintaining and cleaning coated glass contrary to manufacturer's written instructions. Defects include peeling, cracking, and other indications of deterioration in coating.

1. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Safety Glazing: Where safety glazing is indicated, provide glazing that complies with 16 CFR 1201, Category II.

2.2 GLASS PRODUCTS, GENERAL

- A. Safety Glazing Labeling: Where safety glazing is indicated, permanently mark glazing with certification label of the manufacturer. Label shall indicate manufacturer's name, type of glass, thickness, and safety glazing standard with which glass complies.
- B. Insulating-Glass Certification Program: Permanently marked either on spacers or on at least one component lite of units with appropriate certification label of the IGCC.

2.3 GLASS PRODUCTS

- A. Fully Tempered Float Glass: ASTM C1048, Kind FT (fully tempered), Condition A (uncoated) unless otherwise indicated, Type I, Class 1 (clear), Quality-Q3.

2.4 INSULATING GLASS

- A. Insulating-Glass Units: Factory-assembled units consisting of sealed lites of glass separated by a dehydrated interspace, qualified in accordance with ASTM E2190.
1. Sealing System: Dual seal, with manufacturer's standard primary and secondary sealants.
2. Perimeter Spacer: Manufacturer's standard spacer material and construction.
3. Desiccant: Molecular sieve or silica gel, or a blend of both.

2.5 GLAZING SEALANTS

- A. General:
1. Compatibility: Compatible with one another and with other materials they contact, including glass products, seals of insulating-glass units, and glazing channel

substrates, under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.

2. Suitability: Comply with sealant and glass manufacturers' written instructions for selecting glazing sealants suitable for applications indicated and for conditions existing at time of installation.
 3. Sealant shall have a VOC content of 250 g/L or less.
 4. Sealant shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."
 5. Colors of Exposed Glazing Sealants: As selected by Architect from manufacturer's full range.
- B. Glazing Sealant: Neutral-curing silicone glazing sealant complying with ASTM C920, Type S, Grade NS, Class 25, Use NT.
1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - a. Sika Corporation.
 - b. The Dow Chemical Company.
 - c. Tremco Incorporated.

2.6 MISCELLANEOUS GLAZING MATERIALS

- A. Cleaners, Primers, and Sealers: Types recommended by sealant or gasket manufacturer.
- B. Setting Blocks:
1. Type recommended by sealant or glass manufacturer.
- C. Spacers:
1. Type recommended by sealant or glass manufacturer.
- D. Edge Blocks:
1. Type recommended by sealant or glass manufacturer.

PART 3 - EXECUTION

3.1 GLAZING, GENERAL

- A. Comply with combined written instructions of manufacturers of glass, sealants, gaskets, and other glazing materials, unless more stringent requirements are indicated, including those in referenced glazing publications.
- B. Protect glass edges from damage during handling and installation. Remove damaged glass from Project site and legally dispose of off Project site. Damaged glass includes glass with edge damage or other imperfections that, when installed, could weaken glass, impair performance, or impair appearance.
- C. Apply primers to joint surfaces where required for adhesion of sealants, as determined by preconstruction testing.
- D. Install setting blocks in sill rabbets, sized and located to comply with referenced glazing publications, unless otherwise required by glass manufacturer. Set blocks in thin course of compatible sealant suitable for heel bead.
- E. Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.
- F. Provide spacers for glass lites where length plus width is larger than 50 inches (1270 mm).
- G. Provide edge blocking where indicated or needed to prevent glass lites from moving sideways in glazing channel, as recommended in writing by glass manufacturer and according to requirements in referenced glazing publications.
- H. Where post-mounted at Workstations, provide holes in glazing to allow for pinning to posts.

3.2 TAPE GLAZING

- A. Position tapes on fixed stops so that, when compressed by glass, their exposed edges are flush with or protrude slightly above sightline of stops.
- B. Install tapes continuously, but not necessarily in one continuous length. Do not stretch tapes to make them fit opening.
- C. Cover vertical framing joints by applying tapes to heads and sills first, then to jambs. Cover horizontal framing joints by applying tapes to jambs, then to heads and sills.
- D. Place joints in tapes at corners of opening with adjoining lengths butted together, not lapped. Seal joints in tapes with compatible sealant approved by tape manufacturer.
- E. Apply heel bead of elastomeric sealant.

- F. Center glass lites in openings on setting blocks, and press firmly against tape by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings.

3.3 GASKET GLAZING (DRY)

- A. Cut compression gaskets to lengths recommended by gasket manufacturer to fit openings exactly, with allowance for stretch during installation.
- B. Insert soft compression gasket between glass and frame or fixed stop so it is securely in place with joints miter cut and bonded together at corners.
- C. Installation with Drive-in Wedge Gaskets: Center glass lites in openings on setting blocks and press firmly against soft compression gasket by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.
- D. Installation with Pressure-Glazing Stops: Center glass lites in openings on setting blocks and press firmly against soft compression gasket. Install dense compression gaskets and pressure-glazing stops, applying pressure uniformly to compression gaskets. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.
- E. Install gaskets so they protrude past face of glazing stops.

3.4 CLEANING AND PROTECTION

- A. Immediately after installation remove nonpermanent labels and clean surfaces.
- B. Protect glass from contact with contaminating substances resulting from construction operations. Examine glass surfaces adjacent to or below exterior concrete and other masonry surfaces at frequent intervals during construction, but not less than once a month, for buildup of dirt, scum, alkaline deposits, or stains.
 - 1. If, despite such protection, contaminating substances do come into contact with glass, remove substances immediately as recommended in writing by glass manufacturer. Remove and replace glass that cannot be cleaned without damage to coatings.
- C. Remove and replace glass that is damaged during construction period.

END OF SECTION 08 80 00

SECTION 09 22 16 - NON-STRUCTURAL METAL FRAMING

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. Submittals: Product Data.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Resistance-Rated Assemblies: Provide materials and construction identical to those tested in assemblies per ASTM E 119 by an independent testing and inspecting agency acceptable to authorities having jurisdiction.
- B. STC-Rated Assemblies: Provide materials and construction identical to those tested in assemblies per ASTM E 90 and classified per ASTM E 413 by a qualified independent testing and inspecting agency.

2.2 METAL FRAMING AND SUPPORTS

- A. Steel Framing Members, General: ASTM C 754.
 - 1. Steel Sheet Components: ASTM C 645. Thickness specified is minimum uncoated base-metal thickness.
 - 2. Protective Coating: Manufacturer's standard corrosion-resistant zinc coating.
- B. Suspended Ceiling and Soffit Framing:
 - 1. Tie Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.0625 inch diameter, or double strand of 0.0475 inch diameter wire.
 - 2. Wire Hangers: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, and 0.162-inch diameter.
 - 3. Carrying Channels: Cold-rolled steel, 0.0538 inch thick, 1-1/2 inches deep.
 - 4. Furring Channels: Steel, rigid hat-shaped channels; 7/8 inch deep, 0.0179 inch thick.
 - 5. Grid Suspension System for Interior Ceilings: Interlocking, direct-hung system.
- C. Partition and Soffit Framing:
 - 1. Studs and Runners: 20 Gauge, in depth indicated. 16 Gauge where hangers are installed for plumbing fixtures.
 - 2. Flat Strap and Backing: 0.0179 inch thick.

3. Rigid Hat-Shaped Furring Channels: In depth indicated and 0.0179 inch thick.
4. Resilient Furring Channels: 1/2 inch deep, with single- or double-leg configuration.
5. Cold-Rolled Furring Channels: 0.0538 inch thick, 3/4 inch deep.
6. Z-Furring: In depth required by insulation, 1-1/4-inch face flange, 7/8-inch wall-attachment flange, and 0.0179 inch thick.

2.3 ACCESSORIES

- A. General: Comply with referenced installation standards.
 1. Fasteners for Metal Framing: Of type, material, size, corrosion resistance, holding power, and other properties required to fasten steel members to substrates.
- B. Acoustical Sealant for Concealed Joints: Nonsag, latex sealant complying with ASTM C 834.

2.4 INSTALLATION

- A. Install steel framing to comply with ASTM C 754 and with ASTM C 840 requirements that apply to framing installation and with United States Gypsum's "Gypsum Construction Handbook."
 1. Gypsum Plaster Assemblies: Also comply with ASTM C 841.
 2. Portland Cement Plaster Assemblies: Also comply with ASTM C 1063.
 3. Gypsum Veneer Plaster Assemblies: Also comply with ASTM C 844.
- B. Install supplementary framing, and blocking to support fixtures, equipment services, heavy trim, grab bars, toilet accessories, furnishings, or similar construction.
- C. Isolate steel framing from building structure, except at floor, to prevent transfer of loading imposed by structural movement.
 1. Where studs are installed directly against exterior walls, install foam-gasket isolation strip between studs and wall.
- D. Fire-Resistance-Rated Assemblies: Comply with requirements of listed assemblies.

END OF SECTION 09 22 16

SECTION 09 24 00 – PORTLAND CEMENT PLASTERING

PART 1 - GENERAL

1.1 SCOPE OF WORK

- A. Provide repairs where noted on the Drawings and where required as the result of demolition and new construction.
- B. Submittals: Product Data and finish Samples.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. STC-Rated Assemblies: Where indicated, provide gypsum plaster assemblies tested for STC ratings per ASTM E 90 and classified according to ASTM E 413 by a qualified testing agency.
- B. Fire-Resistance-Rated Assemblies: Where indicated, provide gypsum plaster assemblies tested for fire resistance per ASTM E 119 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

2.2 LATH

- A. Expanded-Metal Lath: ASTM C 847, galvanized, flat or self-furring, 2.5-lb/sq. yd. (1.4-kg/sq. m) weight.

2.3 ACCESSORIES

- A. Comply with ASTM C 1063 and coordinate depth of accessories with thicknesses and number of plaster coats required:
 - 1. Zinc and Zinc-Coated (Galvanized) Accessories:
 - a. Foundation Weep Screed: Fabricated from hot-dip galvanized-steel sheet, ASTM A 653/A 653M, G60 (Z180) zinc coating.
 - b. Cornerite: Fabricated from metal lath with ASTM A 653/A 653M, G60 (Z180), hot-dip galvanized zinc coating.
 - c. External-Corner Reinforcement: Fabricated from metal lath with ASTM A 653/A 653M, G60 (Z180), hot-dip galvanized zinc coating.

- d. Cornerbeads: Small-nose or Bullnose style, fabricated from zinc.
 - e. Casing Beads: Square-edge or Bullnose style, fabricated from zinc; with expanded flanges.
 - f. Control Joints: Fabricated from zinc; one-piece-type, M-shaped configuration; with perforated flanges.
- B. Fiber for Base Coat: Alkaline-resistant glass or polypropylene fibers, 1/2 inch (13 mm) long, free of contaminants, manufactured for use in portland cement plaster.
 - C. Bonding Compound: ASTM C 932.
 - D. Fasteners for Attaching Metal Lath to Substrates: Complying with ASTM C 1063.

2.4 PORTLAND CEMENT PLASTER

- A. Portland Cement: ASTM C 150, Type I or Type II depending upon application.
 - 1. Color for Finish Coats: White.
- B. Lime: ASTM C 206, Type S; ASTM C 207, Type S.
- C. Sand Aggregate: ASTM C 897.
 - 1. Color for Job-Mixed Finish Coats: White.
- D. Ready-Mixed, Finish-Coat Plaster: Mill-mixed portland cement, aggregates, coloring agents, and proprietary ingredients.

2.5 PLASTER MIXES

- A. Base-Coat Mix: Portland cement and lime; comply with ASTM C 926.
- B. Job-Mixed Finish Coat: Portland cement and lime; comply with ASTM C 926.
- C. Factory-Prepared Finish-Coat Mixes: For ready-mixed finish-coat plasters; comply with manufacturer's written instructions.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Fire-Resistance-Rated Assemblies: Install components according to requirements for design designations from listing organization and publication indicated on Delivery Order.
- B. Install metal lath and accessories according to ASTM C 1063.

1. Partition Framing and Vertical Furring: Install flat diamond-mesh lath.
 2. Flat-Ceiling and Horizontal Framing: Install flat diamond-mesh lath.
 3. Curved-Ceiling Framing: Install flat diamond-mesh lath.
 4. On Solid Surfaces, Not Otherwise Furred: Install self-furring, diamond-mesh lath.
 5. Install lath-type, external-corner reinforcement at exterior locations.
 6. Install cornerbead at interior and exterior locations.
- C. Apply bonding compound on unit masonry and concrete plaster bases.
- D. Apply, and cure plaster materials and finishes to comply with ASTM C 926. Apply three coats. Apply float finish.

END OF SECTION 09 24 00

SECTION 09 29 00 - GYPSUM BOARD

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. Submittals: Product Data.

PART 2 - PRODUCTS

2.1 PANEL PRODUCTS

- A. Provide in maximum lengths available to minimize end-to-end butt joints.
- B. Interior Gypsum Board: ASTM C 1278 Abuse Resistant, Water Resistant, Mold Resistant equal to USG Fiberock Aqua-Tough in 5/8" thickness. To be used in Toilet room walls. Type X in non-Toilet Room walls. Gypsum board on ceiling to be mold and mildew resistant.
- C. Cement Board: ANSI A118.9. ASTM C1280, ASTM C 1325, ANSI A118.9
 - 1. Product: USG DUROCK brand Cement Board. 1/2" or 5/8" thickness

2.2 ACCESSORIES

- A. Trim Accessories: ASTM C 1047, formed from galvanized or aluminum-coated steel sheet, rolled zinc, plastic, or paper-faced galvanized-steel sheet. For exterior trim, use accessories formed from hot-dip galvanized-steel sheet, plastic, or rolled zinc.
 - 1. Provide cornerbead at outside corners unless otherwise indicated.
 - 2. Provide LC-bead (J-bead) at exposed panel edges.
 - 3. Provide control joints where indicated.
- B. Joint-Treatment Materials: ASTM C 475/C 475M.
 - 1. Joint Tape: Paper unless otherwise recommended by panel manufacturer.
 - 2. Joint Compounds: Setting-type taping compound and drying-type, ready-mixed, compounds for topping.
 - 3. Skim Coat: For final coat of Level 5 finish, use drying-type, all-purpose compound.
 - 4. Cementitious Backer Unit Joint-Treatment Materials: Products recommended by cementitious backer unit manufacturer.

- C. Acoustical Sealant for Exposed and Concealed Joints: Nonsag, paintable, nonstaining latex sealant complying with ASTM C 834.
- D. Sound-Attenuation Blankets: ASTM C 665, Type I (unfaced).

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install gypsum board to comply with ASTM C 840.
 - 1. Isolate gypsum board assemblies from abutting structural and masonry work. Provide edge trim and acoustical sealant.
 - 2. Single-Layer Fastening Methods: Fasten gypsum panels to supports with screws.
 - 3. Multilayer Fastening Methods: Fasten base layers and face layer separately to supports with screws.
- B. Install cementitious backer units to comply with ANSI A108.11.
- C. Fire-Resistance-Rated Assemblies: Comply with requirements of listed assemblies.
- D. Finishing Gypsum Board: ASTM C 840.
 - 1. At concealed areas, unless a higher level of finish is required for fire-resistance-rated assemblies, provide Level 1 finish: Embed tape at joints.
 - 2. At substrates for tile, provide Level 2 finish: Embed tape and apply separate first coat of joint compound to tape, fasteners, and trim flanges.
 - 3. Unless otherwise indicated, provide Level 4 finish: Embed tape and apply separate first, fill, and finish coats of joint compound to tape, fasteners, and trim flanges.
 - 4. Where indicated, provide Level 5 finish: Embed tape and apply separate first, fill, and finish coats of joint compound to tape, fasteners, and trim flanges. Apply skim coat to entire surface.
- E. Cementitious Backer Units: Finish according to manufacturer's written instructions.
- F. Texture Finish Application: Mix and apply finish using powered spray equipment, to produce a uniform texture free of starved spots or other evidence of thin application or of application patterns.

END OF SECTION 09 29 00

SECTION 09 30 13 – PORCELAIN TILING

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. Submittals: Product Data for each type of product indicated and Samples for tile and grout.
- B. Obtain tile of each type and color or finish from same production run for each contiguous area.
- C. Deliver and store packaged materials in original containers with seals unbroken and labels intact until time of use. Comply with requirements in ANSI A137.1 for labeling tile packages.
- D. Notify Architect of any substrate defects prior to commencement of tile work.
- E. All tile shall conform to the American Tile Institute specifications and recommendations.
- F. All flooring materials including thresholds shall have a minimum coefficient of friction of 0.06. Any specified product having a standard surface with less than this coefficient of friction shall be provided with an applied non-slip surface.
- G. Extra Materials: Furnish 10% of quantity installed (minimum one full box/unit) to the owner as extra materials. Provide a signed transmittal for closeout documentation.

PART 2 - PRODUCTS

2.1 PORCELAIN TILE

- A. Ceramic tile that complies with Standard grade requirements in ANSI A137.1, "Specifications for Ceramic Tile."
- B. All floor tile shall have a dynamic coefficient of friction >0.42
- C. Tile Type: Refer to Drawings for Finish Schedule.

2.2 THRESHOLDS

- A. Marble threshold where shown on drawings.

2.3 INSTALLATION MATERIALS

- A. Cementitious Backer Units: ANSI A118.9 or ASTM C 1325, 1/2 inch (12.7 mm) thick.
- B. Fiber-Cement Underlayment: ASTM C 1288, 1/2 inch (12.7 mm) thick.
- C. VOC Limit for Adhesives and Fluid-Applied Waterproofing Membranes: 65 g/L when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- D. Setting and Grouting Materials: Comply with material standards in ANSI's "Specifications for the Installation of Ceramic Tile" that apply to materials and methods indicated.
 - 1. In locations as indicated on Drawings: Thin-Set Mortar Type: Dry-set portland cement.
 - a. Products:
 - 1) Kerabond (or approved equal), dry set mortar to be used in combination with the Keralastic (or approved equal)-premium flexible latex admixture.
 - 2. In locations as indicated on Drawings: Replace existing mortar bed which is approximately 1- 1/2". Install new mortar bed as required to slope to the floor drains.
 - a. Install waterproofing to comply with ANSI A108.13. Allow for flood test of waterproofing prior to installing tile.
 - 3. Grout Type: Standard unsanded cement grout suitable for 1/8" grout and narrower. Use grout resistant to mold and mildew growth.
- E. Water: Clean and fit to drink.
- F. Bonded crack isolation membrane applied to the concrete substrate to prevent the transfer of cracks.
- G. Skim coat: equal to Mapei Ultra Skim Coat.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Comply with TCA's "Handbook for Ceramic Tile Installation" for TCA installation methods specified in tile installation schedules. Comply with parts of ANSI A108 Series "Specifications for Installation of Ceramic Tile" that are referenced in TCA installation methods, specified in tile installation schedules, and apply to types of setting and grouting materials used.

1. For installations indicated below, follow procedures in ANSI's "Specifications for the Installation of Ceramic Tile" for providing 95 percent mortar coverage.
 - a. Tile floors in wet areas.
 - b. Tile floors composed of tiles 8 by 8 inches (200 by 200 mm) or larger.
 - c. Tile floors composed of rib-backed tiles.
 - B. Perform cutting and drilling of tile without marring visible surfaces. Carefully grind cut edges of tile abutting trim, finish, or built-in items for straight aligned joints. Fit tile closely to electrical outlets, piping, fixtures, and other penetrations so plates, collars, or covers overlap tile.
 - C. Lay tile in grid pattern unless otherwise indicated. Align joints where adjoining tiles on floor, base, walls, and trim are the same size.
 - D. Install cementitious backer units and treat joints according to ANSI A108.11.
 - E. Install stone thresholds in same type of setting bed as adjacent floor unless otherwise indicated. At locations where mortar bed (thickset) would otherwise be exposed above adjacent floor finishes, set thresholds in latex-portland cement mortar (thin set).
 - F. Interior Floor Tile Installation Method:
 1. Over Concrete Subfloors: Latex Portland cement mortar bond with bonded crack isolation membrane. TNCA Method #F125A. Refer to detail on sheet A-502 for more information.
 - G. Interior Wall Tile Installation Method(s):
 1. Over Concrete and Masonry: TCA W223 (organic adhesive).
 2. Over Cement Backer Board and Metal Studs: TCA W244C-18.
- 3.2 PROTECTION
- A. Prohibit all foot and wheel traffic from using newly tiled floors for at least three (3) days, preferably seven (7) days.
 - B. Provide temporary wood walkways and wheel ways for seven (7) days where use of newly tiled floor with cement type grout is unavoidable.
- 3.3 Execution
- A. Clean all tile upon completion.
 - B. Replace any damaged or broken tile.
 - C. Seal grout as recommended by manufacturer.

END OF SECTION 09 30 13

SECTION 09 51 23 - ACOUSTICAL TILE CEILINGS

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Work includes metal ceiling suspension system for acoustical ceilings and acoustical units (pads) for metal ceiling suspension systems.
- B. Attic stock: Provide 5% extra materials to building management for attic stock. Label the containers and place where directed by building management.

1.2 SUBMITTALS

- A. Samples:
 - 1. Acoustical units, each type, with label indicating conformance to specification requirements, including units specified to match existing.
 - 2. Colored pins or markers for units providing access.
- B. Manufacturer's Literature and Data:
 - 1. Ceiling suspension system, each type, showing complete details of installation, including suspension system specified to match existing.
 - 2. Acoustical units, each type
- C. The acoustical tile pads and the metal suspension must be compatible as indicated in the manufacturer's written literature. Submittals of the ceiling system shall specifically indicate the required compatibility.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Resistance-Rated Assemblies: Provide materials and construction identical to those tested in assemblies per ASTM E 119 by an independent testing and inspecting agency acceptable to authorities having jurisdiction.
- B. Seismic Standard: Provide acoustical tile ceilings designed and installed to withstand the effects of earthquake motions according to the following:
 - 1. CISCA's Recommendations for Acoustical Ceilings: Comply with CISCA's "Recommendations for Direct-Hung Acoustical Tile and Lay-in Panel Ceilings - Seismic Zones 0-2."

2. CISCA's Guidelines for Systems Requiring Seismic Restraint: Comply with CISCA's "Guidelines for Seismic Restraint of Direct-Hung Suspended Ceiling Assemblies - Seismic Zones 3 & 4."
3. UBC Standard 25-2, "Metal Suspension Systems for Acoustical Tile and for Lay-in Panel Ceilings."

2.2 ACOUSTICAL TILE

A. Products:

1. USG Radar 2110, to match building standard tile.
 - a. Classification: As follows, per ASTM E 1264:
 - 1) Color: White.
 - 2) Light Reflectance (LR) Coefficient: Not less than 0.80.
 - 3) Noise Reduction Coefficient (NRC): Not less than 0.70.
 - 4) Ceiling Attenuation Class (CAC): Not less than 35.

B. Surface-Burning Characteristics: ASTM E 1264, Class A materials, tested per ASTM E 84.

C. Edge Detail: Square.

D. Thickness: 5/8 inch.

E. Modular Size: 24 by 24 inches.

2.3 SUSPENSION SYSTEM

A. Ceiling Suspension System: Direct hung; ASTM C 635, heavy-duty structural classification.

1. Products:

- a. 15/16" Don DX/DXL

B. Attachment Devices: Size for 5 times the design load indicated in ASTM C 635, Table 1, Direct Hung, unless otherwise indicated.

C. Wire Hangers, Braces, and Ties: Zinc-coated carbon-steel wire; ASTM A 641/A 641M, Class 1 zinc coating, soft temper.

1. Size: Provide yield strength at least 3 times the hanger design load (ASTM C 635, Table 1, Direct Hung), but not less than 0.106-inch- (2.69-mm-) diameter wire for wire hangers and 0.135-inch- (3.5-mm-) diameter wire for sway bracing wire.

D. Seismic Struts: Manufacturer's standard product designed to accommodate seismic forces.

- E. Access: Identify upward access tile with manufacturer's standard unobtrusive markers for each access unit.

PART 3 - EXECUTION

3.1 GENERAL INSTALLATION

- A. Install acoustical tiles in coordination with suspension system and exposed moldings and trim. Place splines or suspension system flanges into kerfed edges so tile-to-tile joints are closed by double lap of material.
 - 1. Fit adjoining tile to form flush, tight joints. Scribe and cut tile for accurate fit at borders and around penetrations through tile.
- C. Lay out acoustical units symmetrically about the center lines of each room, space as shown on reflected ceiling plans.
- D. Moldings:
 - 1. Install metal wall molding at perimeter of each room, column space or panel, and at adjacent vertical surfaces.
 - 2. Install special shaped molding at changes in ceiling heights and at other breaks in ceiling construction to support acoustical units and to conceal their edges.
- E. Perimeter Seal:
 - 1. Install perimeter seal between vertical leg of wall molding and finish wall, partition, and other adjacent vertical surfaces.
 - 2. Install perimeter seal to finish flush with exposed faces of horizontal legs of wall molding.

3.2 CEILING SUSPENSION SYSTEM INSTALLATION

- A. Ceiling Suspension System Installation: Comply with ASTM C 636 and CISCA's "Ceiling Systems Handbook."
 - 1. Fire-Rated Assembly: Install fire-rated ceiling systems according to tested fire-rated design.
 - 2. Use direct or indirect hung suspension system or combination thereof as defined in ASTM C635.
 - 3. Support a maximum area of 16 square feet of ceiling per hanger.
 - 4. Prevent deflection in excess of 1/360 of span of cross runner and main runner.

5. Provide extra hangers, minimum of one hanger at each corner of each item of mechanical, electrical and miscellaneous equipment supported by ceiling suspension system not having separate support or hangers.
 6. Provide not less than four inch clearance from the exposed face of the acoustical units to the underside of ducts, pipe, conduit, secondary suspension channels, concrete beams or joists; and steel beam or barjoist unless furred system is shown.
 7. Use main runners not less than 48 inches in length.
 8. Install hanger wires vertically. Angled wires are not acceptable except for seismic restraint bracing wires.
- B. Direct Hung Suspension System:
1. As illustrated in ASTM C635.
 2. Support main runners by hanger wires attached directly to the structure overhead.
 3. Maximum spacing of hangers, four feet on centers unless interference occurs by mechanical systems. Use indirect hung suspension system where not possible to maintain hanger spacing.
- C. Indirect Hung Suspension System:
1. As illustrated in ASTM C635.
 2. Space carrying channels for indirect hung suspension system not more than four feet on center. Space hangers for carrying channels not more than four feet on center or for carrying channels less than four feet on center so as to insure that specified requirements are not exceeded.
 3. Support main runners by specially designed clips attached to carrying channels.

3.3 ACOUSTICAL UNIT INSTALLATION

- A. Cut acoustic units for perimeter borders and penetrations to fit tight against penetration for joint not concealed by molding.
1. Cuts shall be machine made and painted to match finish of uncut tile.
- B. Install lay-in acoustic panels in exposed grid with not less than 1/4-inch bearing at edges on supports.
1. Install tile to lay level and in full contact with exposed grid.

2. Replace cracked, broken, stained, dirty, or tile not cut for minimum bearing.

3.4 CLEAN-UP AND COMPLETION

- A. Replace damaged, discolored, dirty, cracked and broken acoustical units.
- B. Leave finished work clean and free from smudges, marks or other defects.

END OF SECTION 09 51 23

SECTION 09 65 13 - RESILIENT BASE AND ACCESSORIES

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. Submittals: Product Data and Samples.
- B. Extra Materials: Deliver to Owner at least 20 linear feet of each type and color of resilient wall base installed.

PART 2 - PRODUCTS

2.1 RESILIENT BASE

- A. Products: Mannington Commercial, Johnsonite, Allstate or approved equal.
- B. Color and Pattern: Mannington Color: Refer to Finish Plan in Drawings.
- C. ASTM F 1861, Type TV (vinyl)
- D. Group (Manufacturing Method): I (solid).
- E. Style: Cove (base with toe).
- F. Minimum Thickness: 0.080 inch (2.0 mm).
- G. Height: 4 inches (102 mm).
- H. Lengths: coils in manufacturer's standard lengths. 4' length pieces are NOT acceptable.
- I. Outside Corners: Job formed.
- J. Inside Corners: Job formed.
- K. Finish: As selected.

2.2 RESILIENT MOLDING ACCESSORY

- A. Color: As selected from manufacturer's standard running line.
- B. Description: Joiner for tile and carpet.
- C. Material: Rubber.

- D. Profile and Dimensions: 1-1/2 inch integral top surface to finish flush with carpet and lip beveled.

2.3 INSTALLATION ACCESSORIES

- A. Trowelable Leveling and Patching Compounds: Latex-modified, portland cement- or blended hydraulic cement-based formulation provided or approved by flooring manufacturer for applications indicated.
- B. Adhesives: Water-resistant type recommended by manufacturer to suit products and substrate conditions.
- C. Stair-Tread-Nose Filler: Two-part epoxy compound recommended by resilient tread manufacturer to fill nosing substrates that do not conform to tread contours.
- D. Metal Edge Strips: Extruded aluminum with mill finish of width shown, of height required to protect exposed edges of tiles, and in maximum available lengths to minimize running joints.
- E. Floor Polish: Provide protective liquid floor polish products as recommended by resilient stair tread manufacturer.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Do not start work until work of other trades, including painting, has been substantially completed. Use only experienced workers.
- B. Adhesively install resilient wall base and accessories, as recommended by the manufacturer, and in a manner to produce smooth and even-finished surfaces with clean, tight joints at seams.
- C. Install wall base in maximum lengths possible. Apply to walls, columns, pilasters, casework, and other permanent fixtures in rooms or areas where base is required.
- D. Install reducer strips at edges of floor coverings that would otherwise be exposed.
- E. Install rubber edge strips over exposed carpet edges adjacent to uncarpeted finish flooring. Anchor strips to floor with suitable fasteners. Apply adhesive to edge strips, insert carpet into lip and press it down over carpet.

END OF SECTION 09 65 13

SECTION 09 68 16 - SHEET CARPETING

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. Submittals: Provide at least two (2) 24 inch x 24 inch samples for each type of carpet scheduled. Submit product data.
- B. Extra Materials: Deliver to Owner full-width carpet equal to 5 percent of each type and color carpet installed, packaged with protective covering and labeled with Room locations and dates for storage.

PART 2 - PRODUCTS

2.1 CARPET

- A. Products: As noted on Drawings.
- B. Width: As available from manufacturer. Approximately. 12 feet, 6 inches.
- C. Critical Radiant Flux Classification: Passes class 1 (ASTM E 648).

2.2 ADHESIVE

- 1. As recommended by the manufacturer and fully compatible with the substrate.

2.3 ACCESSORIES:

- 1. Carpet Edge Guard, Nonmetallic: Extruded or molded heavy-duty vinyl or rubber carpet edge guard of size and profile indicated and with minimum 2" wide anchorage flange; colors selected by government from among standard colors available within the industry (any manufacturer).

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Comply with CRI 104.
- B. Installation Method: Direct glue-down.

- C. Maintain uniformity of carpet direction and lay of pile. At doorways, center seams under door in closed position. Bind or seal cut edges as recommended by carpet manufacturer.
- D. Install pattern parallel to walls and borders.

END OF SECTION 09 68 16

SECTION 09 91 23 - PAINTING

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. Summary: Work includes surface preparation and application of paint systems on the below listed interior substrates: Note that existing lead-based paint is present in the facility. Refer to Appendix A Pre-Alteration Assessment and Specification Section 800 Appendix II Lead Abatement Project Procedures.
1. Concrete
 2. Concrete masonry units (CMUs).
 3. Steel
 4. Gypsum Board
 5. Tectum exposed at roof deck
 6. Metal deck
- B. Submittals:
1. Product Data. Include printout of Master Painters Institute (MPI's) "MPI Approved Products List" with product highlighted.
 2. Samples.
- C. Mockups: Full-coat finish Sample of each type of coating, color, and substrate, applied where directed.
- D. This Section does not apply to pre-finished materials such as aluminum flashing.
- E. Extra Materials: Deliver to Owner 1 gal. (3.8 L) of each color and type of finish coat paint used on Project, in containers, properly labeled and sealed.

PART 2 - PRODUCTS

2.1 PAINT

- A. Products:
1. First Grade only of the following manufacturers or approved equals: Pratt & Lambert, Glidden Co., Standard Detroit Paint Co., Benjamin Moore Paints or Rustoleum Corp., Sherwin Williams.
 2. Waterbased Dryfall: Sherwin Williams Dryfall #B42W1 or approved equal over manufacturer's recommended primer.

- a. Spray apply to concrete ceilings, tectum, ductwork and exposed metal deck where exposed structural ceiling is indicated to be painted on the drawings.
 - b. Clean and prepare existing surfaces per manufacturer's written recommendations. Prepare ductwork (new and existing) using a cleaner/degreaser prior to application of dryfall.
3. Epoxy Floor Covering: Duraflex Shop Floor MR or approved equal.
- a. System Application: Mechanically prepare floor, manufacturer's recommended primer and sealer, Waterproof Membrane, Shop Floor with broadcast of flintshot aggregate, Shop Floor Grout Coat, Armor Top Coat.
 - b. Color to be selected from Manufacturer's standard colors.
 - c. Control joints to be extended through the new system.
 - d. Provide 10-year warranty: Test concrete and follow manufacturer's written instruction to achieve 10-year warranty.
- B. MPI Standards: Provide materials that comply with MPI standards indicated and listed in its "MPI Approved Products List." See www.paintinfo.com for more information. When possible, product must meet MPI Green Product Standards GPS-1-08 and GPS-2-08.
- C. Material Compatibility: Provide materials that are compatible with one another and with substrates.
1. For each coat in a paint system, provide products recommended in writing by manufacturers of topcoat for use in paint system and on substrate indicated.
- D. Use paints and coatings that comply with the following limits for VOC content:
1. Anticorrosive and Antirust Paints Applied to Ferrous Metals: 250 g/L.
 2. Floor Coatings: 100 g/L.
 3. Flat Paints and Coatings: 50 g/L.
 4. Nonflat Paints, Coatings: 150 g/L.
 5. Primers, Sealers, and Undercoaters: 200 g/L.
- E. Colors: As scheduled.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Comply with recommendations in MPI's "MPI Architectural Painting Specification Manual" applicable to substrates indicated.

- B. Remove hardware, lighting fixtures, and similar items that are not to be painted. Mask items that cannot be removed. Reinstall items in each area after painting is complete.
- C. Clean and prepare surfaces in an area before beginning painting in that area. Schedule painting so cleaning operations will not damage newly painted surfaces.

3.2 APPLICATION

- A. Comply with recommendations in MPI's "MPI Architectural Painting Specification Manual" applicable to substrates indicated.
- B. Paint exposed surfaces, new and existing, unless otherwise indicated.
 - 1. Paint surfaces behind movable equipment and furniture same as similar exposed surfaces.
 - 2. Paint surfaces behind permanently fixed equipment or furniture with prime coat only.
 - 3. Paint the back side of access panels.
 - 4. Color-code mechanical piping in accessible ceiling spaces.
 - 5. Do not paint prefinished items, items with an integral finish, operating parts, and labels unless otherwise indicated.
- C. Apply paints according to manufacturer's written instructions.
 - 1. Use brushes only for exterior painting and where the use of other applicators is not practical.
 - 2. Use rollers for finish coat on interior walls and ceilings.
- D. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.
 - 1. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.
- E. Apply stains and transparent finishes to produce surface films without color irregularity, cloudiness, holidays, lap marks, brush marks, runs, ropiness, or other imperfections. Use multiple coats to produce a smooth surface film of even luster.

3.3 EXTERIOR PAINT APPLICATION SCHEDULE

- A. Steel:
 - 1. Semigloss, Quick-Dry Enamel: Two coats over rust-inhibitive primer: MPI EXT 5.1A.

3.4 INTERIOR PAINT APPLICATION SCHEDULE

A. Concrete:

1. Concrete Sealant and primer: One coat
2. Topcoat for walls: Alkyd, interior, semi-gloss (MPI Gloss Level 5)
3. Topcoat for ceiling: Alkyd, interior (MP Gloss Level 3)
4. Floor: Epoxy floor system

B. Steel:

1. Semigloss Latex: Two coats over alkyd anticorrosive primer: MPI INT 5.1Q.

C. Concrete Masonry Units:

1. Semigloss Latex: Two coats over latex block filler: MPI INT 4.2A.

D. Gypsum Board:

1. Eggshell Latex: Two coats over primer/sealer: MPI INT 9.2A.

E. Exposed Structural Ceiling / Tectum and Duct

1. Dryfall: Two coats

END OF SECTION 09 91 23

SECTION 10 14 00 - SIGNAGE

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. Provide and install room signage where indicated on Drawings. Refer to Drawings A-104 and A-601.
- B. Submittals: Product Data, Shop Drawings, and Samples.
- C. Regulatory Requirements: Comply with applicable provisions in ICC/ANSI A117.1.
- D. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- E. Supplier: SignGraphix, Inc.
8457 Andersonville Road
Suite H
Clarkston, MI 48346
(248) 848-1700
info@signgraphix.net

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Aluminum Castings: Alloy recommended by sign manufacturer for casting process used and for use and finish indicated.
- B. Aluminum Sheet: ASTM B 209 (ASTM B 209M), alloy and temper recommended by aluminum producer and finisher, with not less than the strength and durability of 5005-H15.
- C. Aluminum Extrusions: ASTM B 221 (ASTM B 221M), alloy and temper recommended by aluminum producer and finisher, with not less than the strength and durability properties of 6063-T5.
- D. Bronze Castings: ASTM B 584, Alloy UNS C83600 (No. 1 manganese bronze).
- E. Bronze Plate: ASTM B 36/B 36M, alloy UNS No. C28000 (muntz metal).
- F. Stainless Steel: ASTM A 240/A 240M or ASTM A 666, Type 304.

- G. Acrylic Sheet: ASTM D 4802, Category A-1 (cell-cast sheet), Type UVA (UV absorbing).
- H. Plastic Laminate: High-pressure laminate engraving stock with face and core in contrasting colors.
- I. Applied Vinyl: Die-cut characters from vinyl film of nominal thickness of 3 mils (0.076 mm) with pressure-sensitive adhesive backing, suitable for exterior applications.

2.2 SIGNS

- A. Interior Panel Signs: Matte-finished opaque acrylic with square edges and rounded corners. Letters 1" in height.
 - 1. Color of letters and background signage color to be selected from manufacturer's standard.
 - 2. Provide frame with slot to receive acrylic plaque.
 - 3. Match existing building standard.
- B. Interior Panel Directory: Matte-finished opaque acrylic with square edges and rounded corners. Letters 1" in height.
 - 1. Color of letters and background signage color to be selected from manufacturer's standard.
 - 2. Provide frame with slot to receive acrylic plaque.
 - 3. Match existing building standard.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Locate signs where indicated or directed by Architect. Install signs level, plumb, and at heights indicated, with sign surfaces free from distortion and other defects in appearance. Coordinate sign location with the Architect.
- B. Wall-Mounted Signs:
 - 1. Two-Face Tape: Mount signs to smooth, nonporous surfaces, other than vinyl.
 - 2. Mechanical Fasteners: Use nonremovable mechanical fasteners placed through predrilled holes.

END OF SECTION 10 14 00

SECTION 10 28 00 - TOILET ACCESSORIES

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. Submittals: Product Data.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Stainless Steel: ASTM A 666, Type 304, No. 4 finish (satin), 0.0312-inch minimum nominal thickness unless otherwise indicated.
- B. Brass: ASTM B 19, ASTM B 16 or ASTM B 30.
- C. Aluminum: ASTM B 221, Alloy 6063-T6 or 6463-T6.
- D. Sheet Steel: ASTM A 1008/A 1008M, 0.0359-inch minimum nominal thickness.
- E. Galvanized-Steel Sheet: ASTM A 653/A 653M, G60.
- F. Chromium Plating: ASTM B 456, Service Condition Number SC 2 (moderate service).
- G. Baked-Enamel Finish: Factory-applied, gloss-white, baked-acrylic-enamel coating.
- H. Tempered Glass: ASTM C 1048, Kind FT (fully tempered).
- I. Mirrors: ASTM C 1503, Mirror Glazing Quality, clear-glass mirrors, nominal 6.0 mm thick.
- J. Galvanized-Steel Mounting Devices: ASTM A 153/A 153M, hot-dip galvanized after fabrication.
- K. Fasteners: Screws, bolts, and other devices of same material as accessory unit, tamper and theft resistant when exposed, and of galvanized steel when concealed.
- L. Keys: Provide universal keys for internal access to accessories for servicing and resupplying. Provide minimum of six keys to Owner's representative.

2.2 TOILET AND BATH ACCESSORIES

- A. See Toilet Room and Break Room Elevations, Drawing A-201

B. Manufacturers:

1. Bobrick
2. Bradley
3. American Specialties, Inc.
4. Georgia Pacific

C. Toilet Tissue Dispenser:

1. Basis of Design Product: Bradley Model 5126 – BradEX
2. Type: Two-roll, hinged hood tissue dispenser.
3. Mounting: Surface-Mounted
4. Material: Stainless Steel
5. Size: 12 5/8" W x 6 3/8" H x 2" D.

D. Soap Dispenser:

1. Basis of Design Product (Building Standard): Bobrick B-8226
2. Mounting: Countertop mounted.
3. Materials: Bright polished stainless steel piston, spout and top cover. Polyethylene 34 fl.oz. soap container

E. Paper Towel Dispenser:

1. Basis of Design Product (Building Standard): Tork Matic 5510282
2. Type: One-at-a-time hand towel roll dispenser
3. Color: Black
4. Mounting: Surface
5. Material: Plastic
6. Operation: Manual
7. Size: 13.26" W x 14.65" H x 7.99" D.
8. Provide one roll of Tork Universal, Natural 290088 Roll Towel per dispenser

F. Mirrors:

1. Basis of Design Product: Bradley #786 – Stainless steel channel frame
2. 1/4" float glass, triple plated, electro-copper-plated backing or thermosetting infrared cured paint backing with Poly-Glaze protective finish..
3. Type 430 Stainless steel 3/4" x 3/4" x 7/16 " channel with 1/4" return at rear.
4. Concealed wall hanger.
5. Fifteen (15) year warranty against silver spoilage.
6. Provide size as shown on the Drawings.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install accessories using fasteners appropriate to substrate indicated and recommended by unit manufacturer. Install units level, plumb, and firmly anchored in locations and at heights indicated.
- B. Adjust accessories for unencumbered, smooth operation and verify that mechanisms function properly. Replace damaged or defective items. Remove temporary labels and protective coatings.

END OF SECTION 10 28 00

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PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes mechanical general administrative and procedural requirements. The following requirements are included in this Section to supplement the requirements specified in Division 01 Specification Sections.

1.3 INDUSTRY STANDARDS

- A. Applicability of Standards: Unless the Contract Documents include more stringent requirements, applicable construction industry standards have the same force and effect as if bound or copied directly into the Contract Documents to the extent referenced. Such standards are made a part of the Contract Documents by reference.

1. AABC - Associated Air Balance Council; www.aabc.com.
2. AASHTO - American Association of State Highway and Transportation Officials; www.transportation.org.
3. ABMA - American Bearing Manufacturers Association; www.americanbearings.org.
4. ABMA - American Boiler Manufacturers Association; www.abma.com.
5. AGA - American Gas Association; www.aga.org.
6. AHRI - Air-Conditioning, Heating, and Refrigeration Institute (The); www.ahrinet.org.
7. AMCA - Air Movement and Control Association International, Inc.; www.amca.org.
8. ANSI - American National Standards Institute; www.ansi.org.
9. ASHRAE - American Society of Heating, Refrigerating and Air-Conditioning Engineers; www.ashrae.org.
10. ASME - ASME International; (American Society of Mechanical Engineers); www.asme.org.
11. ASSE - American Society of Sanitary Engineering; www.asse-plumbing.org.
12. ASTM - ASTM International; www.astm.org.
13. AWS - American Welding Society; www.aws.org.
14. AWWA - American Water Works Association; www.awwa.org.
15. CDA - Copper Development Association; www.copper.org.
16. CGA - Compressed Gas Association; www.cganet.com.
17. CISPI - Cast Iron Soil Pipe Institute; www.cispi.org.
18. CSA - CSA International; (Formerly: IAS - International Approval Services); www.csa-international.org.
19. CSI - Construction Specifications Institute (The); www.csiresources.org.
20. CTI - Cooling Technology Institute; (Formerly: Cooling Tower Institute); www.cti.org.
21. FM Approvals - FM Approvals LLC; www.fmglobal.com.
22. HI - Hydraulic Institute; www.pumps.org.
23. ICC - International Code Council; www.iccsafe.org.
24. IEEE - Institute of Electrical and Electronics Engineers, Inc. (The); www.ieee.org.
25. IGSHPA - International Ground Source Heat Pump Association; www.igshpa.okstate.edu.
26. Intertek - Intertek Group; (Formerly: ETL SEMCO; Intertek Testing Service NA); www.intertek.com.
27. MSS - Manufacturers Standardization Society of The Valve and Fittings Industry Inc.; www.mss-hq.org.
28. NADCA - National Air Duct Cleaners Association; www.nadca.com.
29. NAIMA - North American Insulation Manufacturers Association; www.naima.org.
30. NEBB - National Environmental Balancing Bureau; www.nebb.org.
31. NECA - National Electrical Contractors Association; www.necanet.org.
32. NEMA - National Electrical Manufacturers Association; www.nema.org.
33. NETA - InterNational Electrical Testing Association; www.netaworld.org.
34. NFPA - National Fire Protection Association; www.nfpa.org.
35. NSF - NSF International; www.nsf.org.
36. NSPE - National Society of Professional Engineers; www.nspe.org.
37. SMACNA - Sheet Metal and Air Conditioning Contractors' National Association; www.smacna.org.
38. STI - Steel Tank Institute; www.steeltank.com.
39. TEMA - Tubular Exchanger Manufacturers Association, Inc.; www.tema.org.
40. UL - Underwriters Laboratories Inc.; www.ul.com.

41. USGBC - U.S. Green Building Council; www.usgbc.org.

- B. Publication Dates: Comply with standards in effect as of date of the Contract Documents unless otherwise indicated.
- C. Copies of Standards: Each entity engaged in construction on Project should be familiar with industry standards applicable to its construction activity. Copies of applicable standards are not bound with the Contract Documents.
 - 1. Where copies of standards are needed to perform a required construction activity, obtain copies directly from publication source.

1.4 PERFORMANCE REQUIREMENTS

- A. Systems Components Pressure and Temperature Ratings: Not less than indicated and as required for system pressures and temperatures.

1.5 QUALITY ASSURANCE

- A. Scope of Work: Furnish all labor, material, equipment, technical supervision, and incidental services required to complete, test and leave ready for operation the mechanical systems as specified and as indicated on Drawings.
 - 1. Contract Documents are complimentary, and what is required by one shall be as binding as if required by all. In the event of inconsistencies or disagreements within the Construction Documents bids shall be based on the most expensive combination of quality and quantity of the work indicated.
- B. Ordinances and Codes: Perform all Work in accordance with applicable Federal, State and local ordinances and regulations, the Rules and Regulations of ASHRAE, NFPA, SMACNA and UL, unless otherwise indicated.
 - 1. Notify the Architect/Engineer in writing before submitting a proposal should any changes in Drawings or Specifications be required to conform to the above codes, rules or regulations.
 - 2. If the Contractor performs any work knowing it to be contrary to such laws, ordinances, rules and regulations, and without notice to A/E, the Contractor shall bear all costs arising from corrective measures.
- C. Source Limitations: Obtain equipment and other components of the same or similar systems through one source from a single manufacturer.
- D. Tests and Inspections: Perform all tests required by state, city, county and/or other agencies having jurisdiction. Provide all materials, equipment, etc., and labor required for tests.
- E. Performance Requirements: Perform all work in a first class and workmanlike manner, in accordance with the latest accepted standards and practices for the trades involved.

- F. Sequence and Schedule: Perform work to avoid interference with the work of other trades. Remove and relocate work which in the opinion of the Owner's Representatives causes interference.
- G. Labeling Requirement for Packaged Equipment: Electrical panels on packaged mechanical equipment shall bear UL label or label of other Nationally Recognized Testing Laboratory (NRTL) (Intertek, CSA, etc.).

1.6 CODES, PERMITS AND FEES

- A. Unless otherwise indicated, all required permits, licenses, inspections, approvals and fees for Mechanical Work shall be secured and paid for by the Contractor. All Work shall conform to all applicable codes, rules and regulations.
- B. Rules of local utility companies shall be complied with. Check with each utility company supplying service to the installation and determine all devices including, but not limited to, all valves, meter boxes, and meters which will be required and include the cost of all such items in proposal.
- C. All work shall be executed in accordance with the rules and regulations set forth in local and state codes. Prepare any detailed drawings or diagrams which may be required by the governing authorities. Where the drawings and/or specifications indicate materials or construction in excess of code requirements, the drawings and/or specifications shall govern.
- D. Refer to Division 22 Section "Domestic Water Piping" for purchase and installation of potable water meters.

1.7 DRAWINGS

- A. The drawings show the location and general arrangement of equipment, piping and related items. They shall be followed as closely as elements of the construction will permit.
- B. Examine the drawings of other trades and verify the conditions governing the work on the job site. Arrange work accordingly. Provide fittings, valves, and accessories as required to meet actual conditions.
- C. Deviations from the drawings, with the exception of minor changes in routing and other such incidental changes that do not affect the functioning or serviceability of the systems, shall not be made without the written approval of the Architect/Engineer.
- D. The Architectural and Structural Drawings take precedence in all matters pertaining to the building structure, Mechanical Drawings in all matters pertaining to Mechanical Trades and Electrical Drawings in all matters pertaining to Electrical Trades. Where there are conflicts or differences between the drawings for the various trades, report such conflicts or differences to the Architect/Engineer for resolution.

- E. Drawings are not intended to be scaled for rough-in or to serve as shop drawings. Take all field measurements required to complete the Work.

1.8 MATERIAL AND EQUIPMENT MANUFACTURERS

- A. Equipment: All items of equipment shall be furnished complete with all accessories normally supplied with the catalog items listed and all other accessories necessary for a complete and satisfactory operating system. All equipment and materials shall be new and shall be standard products of manufacturers regularly engaged in the production of plumbing, heating, ventilating and air conditioning equipment and shall be the manufacturer's latest design.
- B. If an approved manufacturer is other than the manufacturer used as the basis for design, the equipment or product provided shall be equal in size, quality, durability, appearance, capacity, and efficiency through all ranges of operation, shall conform with arrangements and space limitations of the equipment shown on the plans and/or specified, shall be compatible with the other components of the system and shall comply with the requirements for Items Requiring Prior Approval specified in this section of the Specifications. All costs to make these items of equipment comply with these requirements including, but not limited to, piping, sheet metal, electrical work, and building alterations shall be included in the original Bid.
- C. All package unit equipment and skid mounted mechanical components that are factory assembled shall meet, in detail, the products named and specified within each section of the Mechanical and Electrical Specifications.
- D. Changes Involving Electrical Work: The design of the mechanical systems is based on the equipment scheduled on the Drawings. Equipment of higher electrical characteristics may be furnished provided such proposed equipment is approved in writing and connecting electrical services, circuit breakers, and conduit sizes are appropriately modified with no additional cost to project. If minimum energy ratings or efficiencies are specified, equipment shall comply with requirements.
 - 1. Where equipment changes are made that involve additional Electrical Work (larger size motor, additional wiring of equipment, etc.) the Mechanical Trades involved shall compensate the Electrical Trades for the cost of the additional Work required.

1.9 INSPECTION OF SITE

- A. Visit the site, examine and verify the conditions under which the Work must be conducted before submitting Proposal. The submitting of a Proposal implies that the Contractor has visited the site and understands the conditions under which the Work must be conducted. No additional charges will be allowed because of failure to make this examination or to include all materials and labor to complete the Work.
- B. No contract sum adjustments or contract time extensions will be made for Contractor claims arising from conditions which were or could have been observable, ascertainable or reasonably foreseeable from a site visit or inquiry into local conditions affecting the execution of the work.

1.10 ITEMS REQUIRING PRIOR APPROVAL

- A. Bids shall be based upon manufactured equipment specified. All items that the Contractor proposes to use in the Work that are not specifically named in the Contract Documents must be submitted for review prior to bids. Such items must be submitted in compliance with Division 01 specifications. Requests for prior approval must be accompanied by complete catalog information, including but not limited to, model, size, accessories, complete electrical information and performance data in the form given in the equipment schedule on the drawings at stated design conditions. Where items are referred to by symbolic designations on the drawings, all requests for prior approval shall bear the same designations.
 - 1. Equipment to be considered for prior approval shall be equal in quality, durability, appearance, capacity and efficiency through all ranges of operation, shall fulfill the requirements of equipment arrangement and space limitations of the equipment shown on the plans and/or specified and shall be compatible with the other components of the system.
 - 2. All costs incurred to make equipment comply with other requirements, including providing maintenance, clearance, piping, sheet metal, electrical, replacement of other components, and building alterations shall be included in the original bid.
- B. Voluntary alternates may be submitted for consideration, with listed addition or deduction to the bid, but will not affect the awarding of the contract.

1.11 ACTION SUBMITTALS

- A. Submit for review in compliance with Division 01.
- B. Equipment and material submittals required are indicated in the Mechanical; Fire Suppression; Plumbing; and Heating, Ventilating and Air Conditioning Sections. Refer to Division 01 for submittal quantities.
- C. Submittals shall be in groupings of similar or related items. Plumbing fixture submittals shall be in one package including all fixtures intended to be used for this project. Incomplete submittal groupings will be returned "Rejected". Submit product data with identification mark number or symbol numbers as specified or scheduled on the Mechanical Drawings.
- D. Submittals shall be project specific. Standard detail drawings and schedule not clearly indicating which data is associated with this Project will be returned "Rejected".
- E. If deviations (not substitutions) from Contract Documents are deemed necessary by the Contractor, details of such deviations, including changes in related portions of the project and the reasons therefore, shall be included with the submittal for approval.

1.12 INFORMATIONAL SUBMITTALS

- A. Shop Drawings:

1. Prepare shop drawings to scale for the Architect/Engineer for review.
2. Shop drawings shall be reviewed by the Mechanical Contractor for completeness and accuracy prior to submitting to the Architect/Engineer for review. The shop drawings shall be dated and signed by the Mechanical Contractor prior to submission.
3. No equipment shall be shipped from stock or fabricated until shop drawings for them have been reviewed by the Architect/Engineer. Review is only for general conformance with the design concept of the project and general compliance with the information given in the Contract Documents. Any action indicated is subject to the requirement of the plans and specifications.
 - a. By the review of shop drawings, the Architect/Engineer does not assume responsibility for actual dimensions or for the fit of completed work in position, nor does such review relieve Mechanical Trades of full responsibility for the proper and correct execution of the work required.
 - b. Contractor is responsible for:
 - 1) Dimensions, which shall be confirmed and correlated at the job site.
 - 2) Fabrication processes and techniques of construction.
 - 3) Quantities.
 - 4) Coordination of Contractor's work with all other trades.
 - 5) Satisfactory performance of Contractor's work.
 - 6) Temporary aspects of the construction process.
4. Submit detailed shop drawings of piping systems showing pipe routing and types and locations of all pipe hangers.

B. Coordination Drawings:

1. Submit project specified coordination drawings for review in compliance with Division 01 Specification Sections.

1.13 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Instructional Manuals:

1. Submit project specific Operation and Maintenance Instructional Manuals for review in compliance with Division 01 Specification Sections.
2. Provide complete operation and maintenance instructional manuals covering all mechanical equipment herein specified, together with parts lists. Maintenance and operating instructional manuals shall be job specific to this project. Generic manuals are not acceptable. One copy of all manuals shall be furnished for Owner. Maintenance and operating instructional manuals shall be provided when construction is approximately 75 percent complete.
3. Format: Submit operation and maintenance manuals in the following format:
 - a. PDF electronic file. Assemble each manual into a composite electronically indexed file. Submit on digital media acceptable to Architect.

- 1) Name each indexed document file in composite electronic index with applicable item name. Include a complete electronically linked operation and maintenance directory.
 - 2) Enable inserted reviewer comments on draft submittals.
4. The operating and maintenance instructions shall include a brief, general description for all mechanical systems including, but not limited to:
- a. Routine maintenance procedures.
 - b. Lubrication chart listing all types of lubricants to be used for each piece of equipment and the recommended frequency of lubrication.
 - c. Trouble-shooting procedures.
 - d. Contractor's telephone numbers for warranty repair service.
 - e. Submittals.
 - f. Recommended spare parts list.
 - g. Names and telephone numbers of major material suppliers and subcontractors.
 - h. System schematic drawings.

B. Record Drawings:

1. Submit record drawings in compliance with Division 01.
2. Contractor shall submit to the Architect/Engineer, record drawings on electronic media or vellum which have been neatly marked to represent as-built conditions for all new mechanical work.
3. The Contractor shall keep accurate note of all deviations from the construction documents and discrepancies in the underground concealed conditions and other items of construction on field drawings as they occur. The marked up field documents shall be available for review by the Architect, Engineer and Owner at their request.

C. Warranties:

1. Warranty: Comply with the requirements in Division 01 Specification Sections. Contractor shall warranty that the mechanical installation is free from defects and agrees to replace or repair, to the Owner's satisfaction, any part of this mechanical installation which becomes defective within a period of one year (unless specified otherwise in other Mechanical; Fire Suppression; Plumbing; or Heating, Ventilating and Air Conditioning Sections) from the date of substantial completion following final acceptance, provided that such failure is due to defects in the equipment, material, workmanship or failure to follow the contract documents.
2. File with the Owner any and all warranties from the equipment manufacturers including the operating conditions and performance capacities they are based on.

1.14 INSTRUCTION OF OWNER PERSONNEL

- A. Before final inspection, instruct Owner's designated personnel in operation, adjustment, and maintenance of mechanical equipment and systems at agreed upon times. A minimum of 24 hours of formal instruction to Owner's personnel shall be provided for each building. Additional hours are specified in individual specification sections.

- B. For equipment requiring seasonal operation, perform instructions for other seasons within six months.
- C. Use operation and maintenance manuals as basis for instruction. Review contents of manual with personnel in detail to explain all aspects of operation and maintenance.
- D. In addition to individual equipment training provide overview of each mechanical system. Utilize the as-built documents for this overview.
- E. Prepare and insert additional data in operation and maintenance manual when need for such data becomes apparent during instruction.

1.15 WARRANTY

- A. Warranty: Comply with the requirements in Division 01 Specification Sections. Contractor shall warranty that the mechanical installation is free from defects and agrees to replace or repair, to the Owner's satisfaction, any part of this mechanical installation which becomes defective within a period of one year (unless specified otherwise in other Mechanical; Fire Suppression; Plumbing; or Heating, Ventilating and Air Conditioning Sections) from the date of substantial completion following final acceptance, provided that such failure is due to defects in the equipment, material, workmanship or failure to follow the contract documents.
- B. File with the Owner any and all warranties from the equipment manufacturers including the operating conditions and performance capacities they are based on.

PART 2 - PRODUCTS (NOT APPLICABLE)

PART 3 - EXECUTION

3.1 MECHANICAL DEMOLITION WORK

- A. Demolition of existing mechanical equipment and materials shall be done by the Contractor unless otherwise indicated. Include items such as, but not limited to, existing piping, pumps, ductwork, supports, and equipment where such items are not required for the proper operation of the modified system.
- B. Include draining of piping systems where required for demolition, modification of, or connection to existing systems.
- C. In general, demolition work is indicated on the Drawings. However, the Contractor shall visit the job site to determine the full extent and character of this Work.
- D. Unless specifically noted to the contrary, removed materials shall not be reused in the work. Salvaged materials that are to be reused shall be stored safe against damage and turned over to the appropriate trade for reuse.

1. Salvaged materials of value that are not to be reused shall remain the property of the Owner unless such ownership is waived.
 2. Remove items from the systems and turn over to the Owner in their condition prior to removal. The Owner will move and store these materials.
 3. Items on which the Owner waives ownership shall become the property of the Contractor, who shall remove and legally dispose of same, away from the premises.
- E. Work that has been cut or partially removed shall be protected against damage until covered by permanent construction.
- F. Clean and flush the interior and exterior of existing relocated equipment and its related piping, valves, and accessories that are to be reused of mud, debris, pipe dope, oils, welding slag, loose mill scale, rust, and other extraneous material so that the existing equipment and accessories can be repainted and repaired as required for the proper operation and performance of the relocated equipment.
- G. Where existing equipment is to be removed, cap piping under floor, behind face of wall, above ceiling, or at mains.
- H. Cap ductwork and cap piping immediately adjacent to demolition as soon as demolition commences in order to allow existing systems to remain in operation.
1. Cap or plug piping with same or compatible piping material.
 2. Cap or plug ducts with same or compatible ductwork material.

3.2 WORK IN EXISTING BUILDINGS

- A. The Owner will provide access to existing buildings as required. Access requirements to occupied buildings shall be identified on the project schedule. The Contractor, once Work is started in the existing building, shall complete same without interruption so as to return work areas as soon as possible to Owner.
- B. Adequately protect and preserve all existing and newly installed Work. Promptly repair any damage to same at Contractor's expense.
- C. Consult with the Owner's Representative as to the methods of carrying on the Work so as not to interfere with the Owner's operation any more than absolutely necessary. Accordingly, all service lines shall be kept in operation as long as possible and the services shall only be interrupted at such time as will be designated by the Owner's Representative.
- D. Prior to starting work in any area, obtain approval for doing so from a qualified representative of the Owner who is designated and authorized by the Owner to perform testing and abatement, if necessary, of all hazardous materials including but not limited to, asbestos. The Contractor shall not perform any inspection, testing, containment, removal or other work that is related in any way whatsoever to hazardous materials under the Contract.

3.3 TEMPORARY SERVICES

- A. Provide temporary service as described in Division 01.
- B. The existing building will be occupied during construction. Maintain mechanical services and provide necessary temporary connections and their removal at no additional cost to the Owner.

3.4 WORK INVOLVING OTHER TRADES

- A. Certain items of equipment or materials specified in the Mechanical Division may have to be installed by other trades due to code requirements or union jurisdictional requirements. In such instances, the Contractor shall complete the work through an approved, qualified subcontractor and shall include the full cost for same in proposal.

3.5 ACCEPTANCE PROCEDURE

- A. Upon successful completion of start-up and recalibration, but prior to building acceptance, substantial completion and commencement of warranties, the Architect/Engineer shall be requested in writing to observe the satisfactory operation of all mechanical control systems.
- B. The Contractor shall demonstrate operation of equipment and control systems, including each individual component, to the Owner and Architect/Engineer.
- C. After correcting all items appearing on the punch list, make a second written request to the Owner and Architect/Engineer for observation and approval.
- D. After all items on the punch list are corrected and formal approval of the mechanical systems is provided by the Architect/Engineer, the Contractor shall indicate to the Owner in writing the commencement of the warranty period.
- E. Operation of the following systems shall be demonstrated:
 - 1. Air Handling Systems.
 - 2. Heating Systems.
 - 3. Domestic Hot Water Heaters.
 - 4. Temperature Controls.
 - 5. Building Automation System.
 - 6. Exhaust Systems.
- F. For systems requiring seasonal operation, demonstrate system performance within six months when weather conditions are suitable.

END OF SECTION 20 05 00

SECTION 20 05 10 - BASIC MECHANICAL MATERIALS AND METHODS

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PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- B. Related Sections include the following:
 - 1. Division 20 Section "Mechanical General Requirements."
 - 2. Division 22 Section "Domestic Water Piping" for flushing and cleaning of potable water piping.
 - 3. Division 23 Section "Piping Systems Flushing and Chemical Cleaning" for flushing and cleaning of HVAC piping.

1.2 SUMMARY

- A. This section includes mechanical materials and installation methods common to mechanical piping systems, sheet metal systems and equipment. This section supplements all other Division 20, 21, 22, and 23 Mechanical Sections, and Division 01 Specification Sections.

1.3 DEFINITIONS

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

2. NBR: Acrylonitrile-butadiene rubber.

1.4 ACTION SUBMITTALS

A. Product Data: For the following:

1. Transition fittings.
2. Dielectric fittings.
3. Mechanical sleeve seals.
4. Escutcheons.

1.5 INFORMATIONAL SUBMITTALS

A. Welding certificates.

B. Brazing Certificates: As required by ASME Boiler and Pressure Vessel Code, Section IX, or AWS B2.2.

1.6 QUALITY ASSURANCE

A. Regulatory Requirements: Comply with requirements in Public Law 111-380, "Reduction of Lead in Drinking Water Act," about lead content in materials that will be in contact with potable water for human consumption.

B. Comply with NSF 14, "Plastics Piping System Components and Related Materials," for plastic, potable domestic water piping and components. Include marking "NSF-pw" on piping.

C. Comply with NSF 61, "Drinking Water System Components - Health Effects; Sections 1 through 9," for potable domestic water piping and components.

D. Comply with NSF 372, "Drinking Water System Components – Lead Content" for potable domestic water piping and components.

E. Steel Pipe Welding: Qualify processes and operators according to ASME Boiler and Pressure Vessel Code: Section IX, "Welding and Brazing Qualifications."

1. Comply with provisions in ASME B31 Series, "Code for Pressure Piping."
2. Certify that each welder has passed AWS qualification tests for welding processes involved and that certification is current.

F. Duct Joint and Seam Welding: Qualify procedures and personnel according to the following:

1. AWS D9.1, "Sheet Metal Welding Code."

G. Structural Welding: Qualify procedures and personnel according to the following:

1. AWS D1.1, "Structural Welding Code--Steel."

2. AWS D1.2, "Structural Welding Code--Aluminum."
 3. AWS D1.3, "Structural Welding Code--Sheet Steel."
 4. AWS D1.4, "Structural Welding Code--Reinforcing Steel."
 5. AWS D9.1, "Sheet Metal Welding Code," for duct joint and seam welding.
- H. Brazing: Qualify processes and operators according to ASME Boiler and Pressure Vessel Code: Section IX, "Welding and Brazing Qualifications," or AWS B2.2, "Standard for Brazing Procedure and Performance Qualification."
- I. Soldering: Qualify processes and operators according to AWS B2.3/2.3M, "Specification for Soldering Procedure and Performance Qualification."
- J. Installer Qualifications:
1. Installers of Pressure-Sealed Joints: Installers shall be certified by the pressure-seal joint manufacturer as having been trained and qualified to join piping with pressure-seal pipe couplings and fittings.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Storage and Protection: Provide adequate weather protected storage space for all mechanical equipment and materials deliveries to the job site. Storage locations will be designated by the Owner's Representative. Equipment stored in unprotected areas must be provided with temporary protection.
1. Protect equipment and materials from theft, injury or damage.
 2. Protect equipment outlets, pipe and duct openings with temporary plugs or caps.
 3. Materials with enamel or glaze surface shall be protected from damage by covering and/or coating as recommended in bulletin "Handling and Care of Enameled Cast Iron Plumbing Fixtures", issued by the Plumbing Fixtures Manufacturer Association, and as approved.
 4. Electrical equipment furnished by Mechanical Trades and installed by the Electrical Trades: Turn over to Electrical Trades in good condition, receive written confirmation of same.
 5. Deliver pipes and tubes with factory-applied end caps. Maintain end caps through shipping, storage, and handling to prevent pipe end damage and to prevent entrance of dirt, debris, and moisture.
 6. Store plastic pipes protected from direct sunlight. Support to prevent sagging and bending.

1.8 COORDINATION

- A. Arrange for pipe spaces, chases, slots, and openings in building structure during progress of construction, to allow for mechanical installations. Coordinate with other trades to ensure accurate locations and sizes of mechanical spaces, chases, slots, shafts, recesses and openings.
- B. Coordinate installation of required supporting devices and set sleeves in poured-in-place concrete and other structural components as they are constructed.

- C. Install Work to avoid interference with work of other trades including, but not limited to, Architectural and Electrical Trades. Remove and relocate any work that causes an interference at Contractor's expense.
- D. Coordinate requirements for and provide access panels and doors for mechanical items requiring access that are concealed behind finished surfaces. Access panels and doors are specified in Division 08 Section "Access Doors and Frames."
- E. The mechanical trades shall be responsible for all damage to other work caused by their work or through the neglect of their workers.
 - 1. All patching and repair of any such damaged work shall be performed by the trades which installed the work. The cost shall be paid by the Mechanical Trades.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

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

2.2 PIPE, TUBE, AND FITTINGS

- A. Refer to individual Division 21, 22, and 23 piping Sections for pipe, tube, and fitting materials and joining methods.
- B. Pipe Threads: ASME B1.20.1 for factory-threaded pipe and pipe fittings.

2.3 JOINING MATERIALS

- A. Refer to individual Division 21, 22, and 23 piping Sections for special joining materials not listed below.
- B. Unions: Pipe Size 2 Inches and Smaller:
 - 1. Ferrous pipe: Malleable iron ground joint type unions.
 - 2. Unions in galvanized piping system shall be galvanized.
 - 3. Copper tube and pipe: Bronze unions with soldered joints.
- C. Solder Filler Metals: ASTM B 32, lead-free, antimony-free, silver-bearing alloys. Include water-flushable flux according to ASTM B 813.
- D. Brazing Filler Metals: Alloys meeting AWS A5.8.

1. Use Type BcuP Series, silver-bearing, copper-phosphorus alloys for joining copper or bronze socket fittings with copper pipe. Flux is prohibited unless used with bronze fittings.
 2. Use Type Bag Series, cadmium-free silver alloys for joining copper with steel, stainless steel, or other ferrous alloys.
- E. Welding Filler Metals: Comply with AWS D10.12/D10.12M for welding materials appropriate for wall thickness and chemical analysis of steel pipe being welded.
- F. Welding Materials: Comply with Section II, Part C, of ASME Boiler and Pressure Vessel Code for welding materials appropriate for wall thickness and for chemical analysis of pipe being welded.

2.4 PIPE THREAD COMPOUNDS

- A. General: Pipe thread compounds for the fluid service compatible with piping materials provided.
- B. Potable Water Service and Similar Applications: Compounds acceptable to U.S. Department of Agriculture (USDA) or Food and Drug Administration (FDA). Compounds containing lead are prohibited.
1. Lead-free pipe thread compounds suitable for service.
 - a. Manufacturers:
 - 1) HCC Holdings, Inc.; Hercules Pro Dope.
 - 2) Mill-Rose Company (The); Clean-Fit Products; Blue Monster Thread Sealant.
 - 3) Oatey; Great Blue Pipe Joint Compound.
 - 4) RectorSeal LLC: A CSW Industrials Company; No. 5, No.5 Special, and No. 5 Sub-Zero Pipe Thread Sealants.

2.5 TRANSITION FITTINGS

- A. AWWA Transition Couplings: Same size as, and with pressure rating at least equal to and with ends compatible with, piping to be joined.
1. Manufacturers:
 - a. Cascade Waterworks Mfg. Co.
 - b. Dresser Industries, Inc.; DMD Div.
 - c. Ford Meter Box Company, Incorporated (The); Pipe Products Div.
 - d. JCM Industries.
 - e. Smith-Blair, Inc.
 - f. Viking Johnson.
 2. Aboveground Pressure Piping: Pipe fitting.

2.6 DIELECTRIC FITTINGS

- A. Description: Combination fitting of copper alloy and ferrous materials with threaded, solder-joint, plain, or weld-neck end connections that match piping system materials.
- B. Insulating Material: Suitable for system fluid, pressure, and temperature.
- C. Brass Unions, Brass Nipples, Brass Couplings: For systems up to 286 deg F.
- D. Dielectric-Flange Kits: Include full-face- or ring-type neoprene or phenolic gasket, phenolic or polyethylene bolt sleeves, phenolic washers, and steel backing washers.
 - 1. Manufacturers:
 - a. Advance Products & Systems, Inc.
 - b. Calpico, Inc.
 - c. Capitol Manufacturing Co.
 - d. GF Piping Systems; George Fischer Central Plastics.
 - e. Epco Sales, Inc.
 - f. Pipeline Seal and Insulator, Inc.
 - g. Watts Water Technologies, Inc.; Watts Regulator Co.
 - h. Zurn Industries, Inc.; Wilkins Div.
 - 2. Separate companion flanges and steel bolts and nuts shall have 150- or 300-psig minimum working pressure where required to suit system pressures.
- E. Dielectric Nipple/Waterway Fittings: Electroplated steel nipple with inert and noncorrosive, thermoplastic lining; plain, male NPT threaded, or grooved ends; and 300-psig minimum working pressure at 230 deg F.
 - 1. Manufacturers:
 - a. ASC Engineered Solutions; Gruvlok Manufacturing; DI-LOK Nipples.
 - b. Elster Group; Perfection Corp.; ClearFlow.
 - c. Precision Plumbing Products, Inc.; ClearFlow.
 - d. Sioux Chief Manufacturing Co., Inc.
 - e. Tyco Fire & Building Products; Grinnell Mechanical Products; Figure 407 ClearFlow.
 - f. Victaulic Co. of America; Style 47 ClearFlow.

2.7 MODULAR MECHANICAL SEALS

- A. Description: Modular sealing element unit, designed for field assembly, to fill annular space between pipe and sleeve or pipe and core drilled hole.
 - 1. Manufacturers:
 - a. Advance Products & Systems, Inc.; Innerlynx.
 - b. Calpico, Inc.
 - c. Metraflex Co.

- d. Pipeline Seal and Insulator, Inc.; Thunderline Link Seal.
2. Sealing Elements: EPDM interlocking links shaped to fit surface of pipe. Include type and number required for pipe material and size of pipe.
3. Pressure Plates: Carbon steel. Include two for each sealing element.
4. Connecting Bolts and Nuts: Carbon steel with corrosion-resistant coating of length required to secure pressure plates to sealing elements. Include one for each sealing element.

2.8 SLEEVES

- A. Steel Pipe: ASTM A53, Type E, Grade B, Schedule 40, and 0.375 inch wall black.
- B. Steel Pipe: ASTM A53, Type E, Grade B, Schedule 40, and 0.375 inch wall galvanized, plain ends.
- C. Water Stop: Cast or ductile-iron; fabricated steel; PVC; or rotationally molded HDPE pipe; with plain ends and integral water stop, unless otherwise indicated.
 1. Manufacturers:
 - a. Advance Products & Systems, Inc.; Infinity and Gal-Vo-Plast Sleeves.
 - b. Calpico, Inc.
 - c. Metraflex Co.
 - d. Pipeline Seal and Insulator, Inc.
- D. Stack Sleeve Fittings: Manufactured, cast-iron sleeve with integral clamping flange. Include clamping ring and bolts and nuts for membrane flashing.
 1. Underdeck Clamp: Clamping ring with set screws.

2.9 ESCUTCHEONS

- A. Description: Manufactured wall and ceiling escutcheons, with an ID to closely fit around pipe, tube, and insulation of insulated piping and an OD that completely covers opening.
 1. New Piping:
 - a. Piping with Fitting or Sleeve Protruding from Wall: One-piece, deep-pattern type.
 - b. Chrome-Plated Piping or Piping in High Humidity Areas: One-piece, cast-brass type with polished chrome-plated finish.
 - c. Insulated Piping: One-piece, stamped-steel type with spring clips.
 - d. Bare Piping in Finished Spaces: One-piece, stamped-steel type.
 - e. Bare Piping in Unfinished Service Spaces or Equipment Rooms: Split-plate, stamped-steel type with concealed hinge and set screw.
 2. Existing Piping: Use the following:

- a. Chrome-Plated Piping or Piping in High Humidity Areas: Split-casting, cast-brass type with chrome-plated finish.
- b. Insulated Piping: Split-plate, stamped-steel type with concealed hinge and spring clips.
- c. Bare Piping: Split-plate, stamped-steel type with set screw or spring clips.

2.10 GROUT

- A. Description: ASTM C 1107, Grade B, nonshrink and nonmetallic, dry hydraulic-cement grout.
 1. Characteristics: Post-hardening, volume-adjusting, nonstaining, noncorrosive, nongaseous, and recommended for interior and exterior applications.
 2. Design Mix: 5000-psi, 28-day compressive strength.
 3. Packaging: Premixed and factory packaged.

2.11 EPOXY BONDING COMPOUND

- A. Two-component system suitable for bonding wet or dry concrete to each other and to other materials.
- B. Manufacturers:
 1. Euco 452 #450; Euclid Chemical Co.
 2. Epobond; L & M Construction Chemicals.
 3. Sikadur 87; Sika Corp.

2.12 LEAK DETECTOR SOLUTION

- A. Commercial leak detector solution for pipe system testing.
- B. Manufacturers:
 1. American Gas and Chemicals Inc.; Leak Tec.
 2. Cole-Parmer Inst. Co.; Leak Detector.
 3. Guy Speaker Co. Inc.; Squirt 'n Bubbles.

PART 3 - EXECUTION

3.1 PIPING SYSTEMS - COMMON REQUIREMENTS

- A. Refer to piping application schedules on the Drawings.
- B. Install piping according to the following requirements and Division 21, 22, and 23 Sections specifying piping systems, and in accordance with manufacturer's instructions.

- C. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. The Drawings shall be followed as closely as elements of construction will permit.
- D. During the progress of construction, protect open ends of pipe, fittings, and valves to prevent the admission of foreign matter. Place plugs or flanges in the ends of all installed work whenever work stops. Plugs shall be commercially manufactured products.
- E. Prior to and during laying of pipe, maintain excavations dry and clear of water and extraneous materials. Provide minimum 4 inches of clearance in all directions for pipe passing under or through building grade beams.
- F. Weld-o-lets and thread-o-lets can be used for annular flow measuring devices, temperature control components, and thermal wells in steel pipe. Pipe taps shall be drilled and deburred. Torch cutting is not acceptable.
- G. Brazolets can be used for annular flow measuring devices, temperature control components, and thermal wells in copper tube. Pipe taps shall be drilled and deburred. Torch cutting is not acceptable.
- H. Clean and lubricate elastomer joints prior to assembly.
- I. Clean damaged galvanized surfaces and touch-up with a zinc rich coating.
- J. Install piping to conserve building space and not interfere with use of space.
- K. Group piping whenever practical at common elevations.
- L. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment.
 - 1. Install piping to allow for expansion and contraction at locations where piping crosses building or structure expansion joints.
- M. Slope piping and arrange systems to drain at low points.
- N. Slope horizontal piping containing non-condensable gases 1 inch per 100 feet, upward in the direction of the flow.
- O. Install piping in concealed locations, unless otherwise indicated and except in equipment rooms and service areas.
- P. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.
- Q. In concealed locations where piping, other than black steel, cast-iron, or galvanized steel, is installed through holes or notches in studs, joists, rafters or similar members less than 1-1/2 inches from the nearest edge of the member, the pipe shall be protected by shield plates. Protective shield plates shall be a minimum of 1/16 inch thick steel, shall

cover the area of the pipe where the member is notched or bored, and shall extend a minimum of 2 inches above sole plates and below top plates.

- R. Do not penetrate building structural members unless specifically indicated on drawings.
- S. Install piping above accessible ceilings to allow sufficient space for ceiling panel and light fixture removal.
- T. Install valves with stems upright or horizontal, not inverted.
- U. Provide clearance for installation of insulation and access to valves and fittings.
- V. Install piping to permit valve and equipment servicing. Do not install piping below valves and/or terminal equipment. Do not install piping above electrical equipment.
- W. Install piping at indicated slopes. Provide drain valves with hose end connections and caps at all piping low points, where piping is trapped and at all equipment.
- X. Install piping free of sags and bends.
- Y. Install fittings for changes in direction and branch connections.
- Z. Unless otherwise indicated or specified, install branch connections to mains using tee fittings in main pipe:
 - 1. Branch connected to bottom of main pipe for HVAC systems. Side connection is acceptable. Connection above centerline of main is unacceptable. For up-feed risers, connect branch to top of main pipe.
 - 2. Branch connected to top of main for steam and condensate, plumbing systems, compressible gasses, and vacuum.
- AA. Install piping to allow application of insulation.
- BB. Select system components with pressure rating equal to or greater than system operating pressure.
- CC. After completion, fill, clean, and treat systems. Refer to Division 23 Sections "Hydronic Piping," "Piping Systems Flushing and Chemical Cleaning," and "HVAC Water Treatment."
- DD. Install escutcheons for penetrations of walls below ceiling, and ceilings.
- EE. Sleeves are not required for core-drilled holes in poured concrete walls.
- FF. Permanent sleeves are not required for holes formed by removable PE sleeves in poured concrete walls.
- GG. Install sleeves for pipes passing through footings and foundation walls, masonry walls, gypsum-board partitions, and concrete floor and roof slabs.

1. Cut sleeves to length for mounting flush with both surfaces of walls.
 - a. Exception: Extend sleeves installed in floors 2 inches above finished floor level.
 2. Install sleeves in new walls and slabs as new walls and slabs are constructed.
 3. Install sleeves that are large enough to provide 1/4-inch annular clear space between sleeve and pipe or pipe insulation. Use the following sleeve materials:
 - a. Schedule 40 Black Steel Sleeves: For pipes smaller than NPS 12 penetrating interior walls.
 - b. 0.375 Inch Wall Black Steel Sleeves: For pipes NPS 12 and larger penetrating interior walls.
 - c. Schedule 40 Galvanized Steel Sleeves: For pipes smaller than NPS 12 penetrating floors, and roof slabs.
 - d. 0.375 Inch Wall Galvanized Steel Sleeves: For pipes NPS 12 and larger penetrating floors and roof slabs.
 4. Seal sleeves in concrete floors roof slabs and masonry walls with grout.
 5. Seal sleeves in plaster/gypsum-board partitions with plaster or dry wall compound and caulk with non-hardening silicone sealant to provide airtight installation.
 6. Except for underground wall penetrations, seal annular space between sleeve and pipe or pipe insulation, using joint sealants appropriate for size, depth, and location of joint. Refer to Division 07 Section "Joint Sealants" for materials and installation.
- HH. Fire-Barrier Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at pipe penetrations. Seal pipe penetrations with firestop materials.
1. Seal openings around pipes in sleeves through walls, floors and ceilings, and where floors, fire rated walls and smoke barriers are penetrated. Firestop materials shall be UL listed and shall have a fire rating equal to or greater than the penetrated barrier.
 2. Refer to Division 07 Specification Sections for materials and UL Classified firestop systems.
- II. Pipe Roof Penetration Enclosures:
1. Coordinate delivery of roof penetration enclosures to jobsite.
 2. Locate and set curbs on roof.
 3. Framing, flashing, and attachment to roof structure are specified under Division 07.
 4. Attach cap to curbs, cut pipe boots to fit pipe, and clamp boots to pipe or conduit.
- JJ. Verify final equipment locations for roughing-in.
- KK. Refer to equipment specifications in other Sections of these Specifications for roughing-in requirements.

3.2 PIPING JOINT CONSTRUCTION

- A. Join pipe and fittings according to the following requirements and Division 21, 22, and 23 Sections specifying piping systems.
- B. Cut piping square.
- C. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.
- D. Remove scale, slag, dirt, oil, and debris from inside and outside of pipe and fittings before assembly.
- E. Clean damaged galvanized surfaces and touch-up with a zinc rich coating.
- F. Use standard long sweep pipe fittings for changes in direction. No mitered joints or field fabricated pipe bends will be permitted. Short radius elbows may be used where specified or specifically authorized by the Architect.
- G. Make tee connections with screwed tee fittings, soldered fittings or specified welded connections. Make welded branch connections with either welding tees or forged branch outlet fittings in accordance with ASTM A234, ANSI B16.9 and ANSI B16.11. For forged branch outlets, furnish forged fittings flared for improved flow where attached to the run, reinforced against external strains and to full pipe-bursting strength requirements. "Fishmouth" connections are not acceptable.
- H. Use eccentric reducers for drainage and venting of pipe lines; bushings are not permitted.
- I. Provide pipe openings using fittings for all systems control devices, thermometers, gauges, etc. Drilling and tapping of pipe wall for connections is prohibited.
- J. Provide temperature sensing device thermal wells and similar piping specialty connections.
- K. Provide instrument connections except thermal wells with specified isolating valves at point of connection to system.
- L. Locate instrument connections in accordance with manufacturer's instructions for accurate read-out of function sensed. Locate instrument connections for easy reading and service of devices.
- M. Soldered Joints: Apply ASTM B 813, water-flushable flux, unless otherwise indicated, to tube end. Construct joints according to ASTM B 828 or CDA's "Copper Tube Handbook."
- N. Brazed Joints: Construct joints according to AWS's "Brazing Handbook," "Pipe and Tube" Chapter.
- O. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:

1. Apply appropriate tape or thread compound to external pipe threads unless dry seal threading is specified.
 2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.
- P. Welded Joints: Construct joints according to AWS D10.12, using qualified processes and welding operators according to Part 1 "Quality Assurance" Article.
1. Weld-o-lets and thread-o-lets can be used for annular flow measuring devices, temperature control components, and thermal wells. Pipe taps shall be drilled and deburred. Torch cutting is not acceptable.
- Q. Pressure-Sealed Joints: Use manufacturer-recommended tool and procedure. Leave insertion marks on pipe after assembly.
- R. Dissimilar-Metal Piping Joints: Construct joints using dielectric fittings compatible with both piping materials. Refer to Application Schedules on the Drawings.
- S. Fiberglass Bonded Joints: Prepare pipe ends and fittings, apply adhesive, and join according to pipe manufacturer's written instructions.
- T. Remake joints which fail pressure tests with new materials including pipe, fittings, gaskets and/or a filler.

3.3 ACCESS DOORS

- A. Provide access doors for installation by architectural trades. Provide access doors in the walls, as required to make all valves, controls, coils, motors, air vents, filters, electrical boxes and other equipment installed by the Contractor accessible. Minimum size 12 inches x 12 inches. Provide access doors in the ceiling, for accessibility as mentioned above, 24 inches x 24 inches minimum size. Areas with accessible ceilings (ceilings where lay-in panels are not fastened in place and can be individually removed without removal of adjacent tiles) will not require access doors. Refer to Division 08 Section "Access Doors and Frames" for manufacturers and model numbers and additional information.
- B. When access doors are in fire resistant walls or ceilings, they shall bear the Underwriters' Laboratories, Inc., Label, with time design rating equal to or greater than the wall or ceiling unless they were a part of the tested assembly.

3.4 EQUIPMENT CONNECTIONS

- A. Make connections to equipment, fixtures, and other items included in the work in accordance with the submittals and rough-in measurements furnished by the manufacturers of the particular equipment furnished.
1. Any and all additional connections not shown on the drawings but shown on the equipment manufacturer's submittal or required for the successful operation of the

equipment shall be installed as part of this Contract at no additional charge to the Owner.

3.5 PIPING CONNECTIONS

- A. Make connections according to the following, unless otherwise indicated:
 - 1. Install unions, in piping NPS 2 and smaller, where indicated on Drawings, at final connection to each piece of equipment and at all control valves.
 - 2. Install flanges, in piping NPS 2-1/2 and larger, where indicated on Drawings, at final connection to each piece of equipment and at all control valves.

3.6 EQUIPMENT INSTALLATION - COMMON REQUIREMENTS

- A. Install equipment to allow maximum possible headroom unless specific mounting heights are indicated. Housekeeping pad locations and sizes shall be coordinated by mechanical contractor prior to the placement of concrete slabs.
- B. Install equipment level and plumb, parallel and perpendicular to other building systems and components in exposed interior spaces, unless otherwise indicated.
- C. Install mechanical equipment to facilitate service, maintenance, and repair or replacement of components. Connect equipment for ease of disconnecting, with minimum interference to other installations. Extend grease fittings to accessible locations.
- D. Install equipment to allow right of way for piping installed at required slope.
- E. For suspended equipment, furnish and install all inserts, rods, structural steel frames, brackets and platforms required. Obtain approval of Architect for same including loads, locations and methods of attachment.
- F. Equipment Rigging Over Roof Areas: Protect building structure against damage during equipment rigging. Make provisions to distribute load of equipment to main roof structure, and to prevent damage to roof decking, roofing, or purlins.
- G. The Contract Documents indicate items to be purchased and installed. The items are noted by a manufacturer's name, catalog number and/or brief description. The catalog number may not designate all the accessory parts for a particular application. Arrange with the manufacturer for the purchase of all items required for a complete installation.

3.7 PAINTING

- A. Painting of mechanical systems, equipment, and components is specified in Division 09.
- B. Damage and Touchup: Repair marred and damaged factory-painted finishes with materials and procedures to match original factory finish.

3.8 ERECTION OF METAL SUPPORTS AND ANCHORAGES

- A. Refer to Division 05 Section "Metal Fabrications" for structural steel.
- B. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor mechanical materials and equipment.
- C. Where pipe and/or equipment support members must be welded to structural building framing, Contractor shall seek prior approval from Architect and structural engineer. Scrape, brush clean, and apply one coat of zinc rich primer after welding.
- D. Field Welding: Comply with AWS D1.1.

3.9 EPOXY BONDING TO EXISTING MATERIALS

- A. Use epoxy bonding compound to set sleeves or pipes in existing concrete to bond new concrete and/or grout to existing materials or to bond dissimilar materials.
- B. The compound, when applied in accordance with the manufacturer's instructions, shall be capable of initial curing within 48 hours at temperatures as low as 40 deg F and shall be capable of bonding any combination of the following properly prepared materials: Wet or dry, cured or uncured concrete or mortar; vitrified clay; cast iron and carbon steel.

3.10 JACKING OF PIPE

- A. Do not jack pipe in place except upon prior approval of proposed materials and complete details of methods.

3.11 ERECTION OF WOOD SUPPORTS AND ANCHORAGES

- A. Cut, fit, and place wood grounds, nailers, blocking, and anchorages to support, and anchor mechanical materials and equipment.
- B. Select fastener sizes that will not penetrate members if opposite side will be exposed to view or will receive finish materials. Tighten connections between members. Install fasteners without splitting wood members.
- C. Attach to substrates as required to support applied loads.

3.12 GROUTING

- A. Mix and install grout for mechanical equipment base bearing surfaces, pump and other equipment base plates, and anchors.
- B. Clean surfaces that will come into contact with grout.

- C. Provide forms as required for placement of grout.
- D. Avoid air entrapment during placement of grout.
- E. Place grout, completely filling equipment bases.
- F. Place grout on concrete bases and provide smooth bearing surface for equipment.
- G. Place grout around anchors.
- H. Cure placed grout.

3.13 CUTTING, CORING AND PATCHING

- A. Refer to Division 01 Specification Sections for requirements for cutting, coring, patching and refinishing work necessary for the installation of mechanical work.
- B. All cutting, coring, patching and repair work shall be performed by the Contractor through approved, qualified subcontractors. Contractor shall include full cost of same in bid.

3.14 FLASHING

- A. Provide all flashing required for mechanical work. Refer to Division 07 Specification Sections.

3.15 LUBRICATION

- A. Provide all lubrication for the operation of the equipment until acceptance by the Owner. Contractor is responsible for all damage to bearings up to the date of acceptance of the equipment. Protect all bearings and shafts during installation. Thoroughly grease steel shafts to prevent corrosion. Provide covers as required for proper protection of all motors and other equipment during construction.

3.16 FILTERS

- A. Provide and maintain filters in air handling systems throughout the construction period and prior to final acceptance of the building. Do not run air handling equipment, without all prefilters and final filters as specified. Immediately prior to final building acceptance by the Owner, Contractor shall:
 - 1. Replace all disposable type air filters with new units.

3.17 CLEANING

- A. Each Mechanical Trade shall be responsible for removing all debris daily as required to maintain the work area in a neat, orderly condition.
- B. Prior to connection of new HVAC piping to existing HVAC piping systems, all new piping shall be subject to initial flushing, cleaning and final flushing. Refer to Division 23 Section "Piping Systems Flushing and Chemical Cleaning" for requirements. Provide temporary bypass piping and fittings, temporary valves and strainers, temporary water make-up piping with approved means of backflow prevention, and temporary pumps as needed to perform specified flushing and cleaning requirements.
- C. Flushing, cleaning, and disinfection of domestic water piping is specified in Division 22 Section "Domestic Water Piping."
- D. Exterior surfaces of all piping, ductwork and equipment shall be wiped down to remove excess dirt and debris prior to concealment by Architectural Trades work.
- E. Upon completion of work in each respective area, clean and protect work. Just prior to final acceptance, perform additional cleaning as necessary to provide clean equipment and areas to the Owner.

END OF SECTION 20 05 10

SECTION 20 05 13 - MOTORS

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PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- B. Related Sections include the following:
 - 1. Division 20 Section "Mechanical General Requirements."
 - 2. Division 20 Section "Mechanical Vibration Controls" for mounting motors and vibration isolation devices.
 - 3. Division 21, 22, and 23 Sections for application of motors and reference to specific motor requirements for motor-driven equipment.
 - 4. Division 26 Section "Enclosed Switches and Circuit Breakers".
 - 5. Division 26 Section "Enclosed Controllers".
 - 6. Division 26 Section "Fuses".

1.2 SUMMARY

- A. This Section includes basic requirements for factory-installed motors.

1.3 DEFINITIONS

- A. ABMA: American Bearing Manufacturers Association. (Formerly AFBMA: Anti-Friction Bearing Manufacturers Association.)
- B. Factory-Installed Motor: A motor installed by motorized-equipment manufacturer as a component of equipment.
- C. Field-Installed Motor: A motor installed at Project site and not factory installed as an integral component of motorized equipment.
- D. Packaged Self Contained Equipment: Equipment which includes component mechanical and electrical equipment mounted on common bases, skids or frames or in common enclosures with internal control and power wiring factory installed and ready to accept a single electrical service connection. Provide the equipment complete with enclosed controllers, main disconnect switches, control transformers, control devices, wiring and accessories as required.

1.4 QUALITY ASSURANCE

- A. Testing Agency Qualifications: A Nationally Recognized Testing Laboratory (NRTL), acceptable to authorities having jurisdiction, with the experience and capability to conduct the testing indicated.
- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by an NRTL acceptable to authorities having jurisdiction, and marked for intended use.
- C. Comply with NFPA 70.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Protect motors stored on site from weather and moisture by maintaining factory covers and suitable weather-proof covering. For extended outdoor storage, remove motors from equipment and store separately.

1.6 COORDINATION

- A. Coordinate features of motors, installed units, and accessory devices. Provide motors that are:
 - 1. Compatible with the following:
 - a. Magnetic controllers.
 - b. Multispeed controllers.
 - c. Reduced-voltage controllers.
 - d. Solid-state controllers.
 - e. Variable frequency controllers.

2. Designed and labeled for use with variable frequency controllers, and suitable for use throughout speed range without overheating.
 3. Matched to torque and horsepower requirements of the load.
 4. Matched to ratings and characteristics of supply circuit and required control sequence.
- B. Coordinate electrical scope of work to be provided by Division 20, 21, 22, and 23 with this Section, related Division 20, 21, 22, and 23 Specifications, Division 26 Specifications and the Drawings.
- C. Electrical work provided under Division 20, 21, 22, and 23: Furnish UL Listed components in accordance with this section, Division 26, and applicable NEMA and NEC (ANSI C 1) requirements. Provide wiring, external to electrical enclosures, in conduit.
- D. Furnished, installed and wired under Division 20, 21, 22, and 23 unless otherwise indicated:
1. Disconnected components in packaged self-contained equipment that are so constructed that components of wiring must be disconnected for shipment and reconnected after installation.
- E. Furnished and installed under Division 20, 21, 22, and 23 and wired under Division 26 unless otherwise indicated:
1. Motors required for mechanical equipment
 2. Packaged Self-Contained Equipment:
 - a. Provide equipment ready to accept a single electrical service connection.
 - b. For equipment with remote mounted control panels, provide mounting of the control panel and external wiring from the control panel to the package self-contained equipment.
 3. Variable frequency controllers.

1.7 EXTRA MATERIALS

- A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
1. Fuses: Quantity equal to 10 percent of each fuse type and size, but no fewer than 3 of each type and size.
 2. Spare Indicating Lights: Six of each type installed.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

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

1. Dayton.
2. Toshiba Intl.
3. Baldor Electric/Reliance.
4. Rockwell Automation/Allen-Bradley.
5. Nidec Motor Corporation; U.S. Electrical Motors.
6. Regal Beloit/GE Commercial Motors.
7. Regal Beloit/Leeson.
8. Regal Beloit/Marathon.
9. Siemens.

2.2 MOTOR REQUIREMENTS

A. Motor requirements apply to factory-installed motors except as follows:

1. Different ratings, performance, or characteristics for a motor are specified in another Section.
2. Manufacturer for a factory-installed motor requires ratings, performance, or characteristics, other than those specified in this Section, to meet performance specified.
3. Submersible motors integral to pumps and excluded from NEMA and EISA standards.

B. Electrical Power Supply Characteristics: Coordinate electrical system requirements with Division 26.

C. Electrical Power System Characteristics: As scheduled on the Drawings.

D. Electrical Connection: Conduit connection boxes, threaded for conduit. For fractional horsepower motors where connection is made directly, provide screwed conduit connection in end frame.

2.3 MOTOR CHARACTERISTICS

A. Motors 1/2 HP and Larger: Three phase, unless otherwise indicated.

B. Motors Smaller Than 1/2 HP: Single phase, unless otherwise indicated.

C. Frequency Rating: 60 Hz.

D. Voltage Rating: NEMA standard voltage selected to operate on nominal circuit voltage to which motor is connected.

E. Service Factor: 1.15 for open dripproof motors; 1.0 for totally enclosed motors.

- F. Duty: Continuous duty at ambient temperature of 105 deg F and at altitude of 3300 feet above sea level.
- G. Capacity and Torque Characteristics: Sufficient to start, accelerate, and operate connected loads at designated speeds, at installed altitude and environment, with indicated operating sequence, and without exceeding nameplate ratings or considering service factor.
- H. Brake Horsepower Input: Shall not exceed 90 percent of the rated motor horsepower.
- I. Enclosure: Open dripproof (ODP) for motors installed indoors and out of the airstream. Totally-enclosed fan-cooled (TEFC) for motors installed outdoors or within the airstream.

2.4 POLYPHASE MOTORS

- A. Description: NEMA MG 1, Design B, medium induction motor.
- B. Efficiency: Fire pump motors, C-face motors, JP and JM frame motors, and motors over 200 horsepower shall be energy efficient motors. Efficiency of the motor shall be determined based on the NEMA MG1. The minimum efficiencies, nominal efficiencies and shall meet or exceed Table 12-11.

HP	1800 RPM OPEN DRIP-PROOF MOTORS 4 POLE		1800 RPM ENCLOSED MOTORS 4 POLE	
	NOMINAL EFF	MINIMUM EFF	NOMINAL EFF	MINIMUM EFF
1	82.5	81.5	82.5	81.5
1.5	84	82.5	84	82.5
2	84	82.5	84	82.5
3	86.5	85.5	87.5	86.5
5	87.5	86.5	87.5	86.5
7.5	88.5	87.5	89.5	88.5
10	89.5	88.5	89.5	88.5
15	91	90.2	91	90.2
20	91	90.2	91	90.2
25	91.7	91	92.4	91.7
30	92.4	91.7	92.4	91.7
40	93	92.4	93	92.4
50	93	92.4	93	93
60	93.6	93	93.6	93
75	94.1	93.6	94.1	93.6
100	94.1	93.6	94.5	94.1
125	94.5	94.1	94.5	94.1
150	95	94.5	95	94.5
200	95	94.5	95	94.5

<u>HP</u>	1200 RPM OPEN DRIP-PROOF MOTORS 6 POLE		3600 RPM OPEN DRIP-PROOF MOTORS 2 POLE	
	<u>NOMINAL EFF</u>	<u>MINIMUM EFF</u>	<u>NOMINAL EFF</u>	<u>MINIMUM EFF</u>
1	80	78.5	--	--
1.5	84	82.5	82.5	81.5
2	85.5	84	84	82.5
3	86.5	85.5	84	82.5
5	87.5	86.5	85.5	84
7.5	88.5	87.5	85.5	86.5
10	90.2	89.5	88.5	87.5
15	90.2	89.5	89.5	88.5
20	91	90.2	90.2	89.5
25	91.7	91	91	90.2
30	92.4	91.7	91	90.2
40	93	92.4	91.7	91
50	93	93	92.4	91.7
60	93.6	93	93	92.4
75	93.6	93	93	92.4
100	94.1	93.6	93	92.4
125	94.1	93.6	93.6	93
150	94.5	94.1	93.6	93
200	94.5	94.1	94.5	94.1

- C. Efficiency: Motors 1 horsepower to 200 horsepower shall be premium efficient motors meeting requirements of NEMA Premium Efficiency Motor Program. Efficiency of the motor shall be determined based on the NEMA MG1. The nominal efficiencies shall meet or exceed Table 12-12.

Nominal Efficiencies For "NEMA Premium™" Induction Motors
Rated 600 Volts or Less (Random Wound)

<u>HP</u>	<u>Open Drip-Proof</u>			<u>Totally Enclosed Fan-Cooled</u>		
	<u>6-pole</u>	<u>4-pole</u>	<u>2-pole</u>	<u>6-pole</u>	<u>4-pole</u>	<u>2-pole</u>
1	82.5	85.5	77.0	82.5	85.5	77.0
1.5	86.5	86.5	84.0	87.5	86.5	84.0
2	87.5	86.5	85.5	88.5	86.5	85.5
3	88.5	89.5	85.5	89.5	89.5	86.5
5	89.5	89.5	86.5	89.5	89.5	88.5
7.5	90.2	91.0	88.5	91.0	91.7	89.5
10	91.7	91.7	89.5	91.0	91.7	90.2
15	91.7	93.0	90.2	91.7	92.4	91.0
20	92.4	93.0	91.0	91.7	93.0	91.0
25	93.0	93.6	91.7	93.0	93.6	91.7
30	93.6	94.1	91.7	93.0	93.6	91.7
40	94.1	94.1	92.4	94.1	94.1	92.4

Nominal Efficiencies For "NEMA Premium™" Induction Motors
Rated 600 Volts or Less (Random Wound)

<u>HP</u>	<u>Open Drip-Proof</u>			<u>Totally Enclosed Fan-Cooled</u>		
	<u>6-pole</u>	<u>4-pole</u>	<u>2-pole</u>	<u>6-pole</u>	<u>4-pole</u>	<u>2-pole</u>
50	94.1	94.5	93.0	94.1	94.5	93.0
60	94.5	95.0	93.6	94.5	95.0	93.6
75	94.5	95.0	93.6	94.5	95.4	93.6
100	95.0	95.4	93.6	95.0	95.4	94.1
125	95.0	95.4	94.1	95.0	95.4	95.0
150	95.4	95.8	94.1	95.8	95.8	95.0
200	95.4	95.8	95.0	95.8	96.2	95.4

Nominal Efficiencies For "NEMA Premium™" Induction Motors
Rated Medium Volts for 5kV or Less (Form Wound)

<u>HP</u>	<u>Open Drip-Proof</u>			<u>Totally Enclosed Fan-Cooled</u>		
	<u>6-pole</u>	<u>4-pole</u>	<u>2-pole</u>	<u>6-pole</u>	<u>4-pole</u>	<u>2-pole</u>
250	95.0	95.0	94.5	95.0	95.0	95.0
300	95.0	95.0	94.5	95.0	95.0	95.0
350	95.0	95.0	94.5	95.0	95.0	95.0
400	95.0	95.0	94.5	95.0	95.0	95.0
450	95.0	95.0	94.5	95.0	95.0	95.0
500	95.0	95.0	94.5	95.0	95.0	95.0

- D. Stator: Copper windings, unless otherwise indicated.
 - 1. Multispeed motors shall have separate winding for each speed.
- E. Rotor: Squirrel cage, unless otherwise indicated.
- F. Bearings: Grease lubricated anti-friction ball bearings with housings equipped with plugged provision for relubrication, rated for minimum ABMA 9, L-10 life of 120,000 hours. Calculate bearing load with NEMA minimum V- belt pulley with belt center line at end of NEMA standard shaft extension. Stamp bearing sizes on nameplate.
- G. Temperature Rise: Match insulation rating, unless otherwise indicated.
- H. Insulation: Class F, unless otherwise indicated.
- I. Code Letter Designation:
 - 1. Motors 10 HP and Larger: NEMA starting Code (KVA Code) F or G.
 - 2. Motors Smaller Than 10 HP: Manufacturer's standard starting characteristic.
 - 3. Fire Pump Motors: NEMA starting Code (KVA Code) B.

- J. Enclosure: Cast iron for motors 7.5 hp and larger; rolled steel for motors smaller than 7.5 hp.
 - 1. Finish: Gray enamel.
- K. Sound Level: Not to exceed NEMA MG-1 12.54.

2.5 ELECTRONICALLY COMMUTATED MOTOR (ECM)

- A. Furnish for equipment where specified or scheduled with ECM.
 - 1. Synchronous, constant torque, ECM with permanent magnet rotor. Rotor magnets to be time-stable, nontoxic ceramic magnets (Sr-Fe).
 - 2. Driven by a frequency converter with an integrated power factor correction filter. Conventional induction motors will not be acceptable.
 - 3. Each motor with an integrated variable-frequency drive, tested as one unit by manufacturer.
 - 4. Motor speed adjustable over full range from 0 rpm to maximum scheduled speed.
 - 5. Variable motor speed to be controlled by a 0- to 10 V-dc or 4- to 20-mA input.
 - 6. Integrated motor protection verified by UL to protect equipment against over-/undervoltage, overtemperature of motor, electronics, or both, overcurrent, locked rotor, and dry run (no-load condition).

2.6 SINGLE-PHASE MOTORS

- A. Type: One of the following, to suit starting torque and requirements of specific motor application:
 - 1. Permanent-split capacitor.
 - 2. Split-phase start, capacitor run.
 - 3. Capacitor start, capacitor run.
- B. Shaded-Pole Motors: For motors 1/20 hp and smaller only.
- C. Thermal Protection: Internal protection to automatically open power supply circuit to motor when winding temperature exceeds a safe value calibrated to temperature rating of motor insulation. Thermal-protection device shall automatically reset when motor temperature returns to normal range.
- D. Bearings: Ball type for belt-connected motors and other motors with high radial forces on motor shaft; sealed, prelubricated-sleeve type for other single-phase motors.

2.7 ENCLOSED CONTROLLERS

- A. Provide enclosed controllers in accordance with requirements specified in Division 26 Section "Enclosed Controllers".

2.8 ENCLOSED SWITCHES AND CIRCUIT BREAKERS

- A. Provide enclosed switches and circuit breakers in accordance with requirements specified in Division 26 Section "Enclosed Switches and Circuit Breakers".

2.9 FUSES

- A. Provide fuses in accordance with requirements specified in Division 26 Section "Fuses".

PART 3 - EXECUTION

3.1 FIELD QUALITY CONTROL

- A. All three phase motors 1/2 HP and above shall be tested by the Testing Agency.
- B. Prepare for acceptance tests as follows:
 - 1. Check motor nameplates for horsepower, speed, phase and voltage.
 - 2. Check coupling alignment and shaft end play.
 - 3. Run each motor with its controller. Demonstrate correct rotation, alignment, and speed at motor design load.
 - 4. Test interlocks and control features for proper operation.
 - 5. Verify that current in each phase is within nameplate rating.
- C. Testing: Engage a qualified testing agency to perform the following field quality-control testing:
 - 1. Perform each electrical test and visual and mechanical inspection stated in NETA ATS, Section 7.15.1. Certify compliance with test parameters.
 - 2. Jog motor as required to verify proper phase and shaft rotation. Immediately after start-up, check bearing temperature and smooth operation. Take current reading at full load using a clamp-on ammeter. If ammeter reading is over the rated full load current, determine reason for discrepancy and take necessary corrective actions. Record all readings, motor nameplate data and overload heater data.
 - 3. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.

3.2 ADJUSTING

- A. Align motors, bases, shafts, pulleys and belts. Tension belts according to manufacturer's written instructions.

3.3 CLEANING

- A. After completing equipment installation, inspect unit components. Remove paint splatters and other spots, dirt, and debris. Repair damaged finish to match original finish.
- B. Clean motors, on completion of installation, according to manufacturer's written instructions.

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PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- B. Related Sections include the following:
 - 1. Division 20 Section "Mechanical General Requirements."
 - 2. Division 20 Section "Basic Mechanical Materials and Methods."
 - 3. Division 21 Section "Fire-Suppression Piping" for listed or approved pressure gages.
 - 4. Division 22 Section "Domestic Water Piping" for domestic and fire-protection water service meters inside the building.

1.2 DEFINITIONS

- A. CR: Chlorosulfonated polyethylene synthetic rubber.
- B. EPDM: Ethylene-propylene-diene terpolymer rubber.
- C. FPR: Fiberglass reinforced plastic.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated; include performance curves.

1.4 INFORMATIONAL SUBMITTALS

- A. Shop Drawings: Schedule for the following indicating manufacturer's number, scale range, and location for each:
1. Thermometers.

1.5 QUALITY ASSURANCE

- A. Regulatory Requirements: Comply with requirements in Public Law 111-380, "Reduction of Lead in Drinking Water Act," about lead content in materials that will be in contact with potable water for human consumption.
- B. Comply with NSF 61, "Drinking Water System Components - Health Effects; Sections 1 through 9," and NSF 372 Drinking Water System Components – Lead Content for potable domestic water piping and components.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

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

2.2 METAL-CASE, LIQUID-IN-GLASS THERMOMETERS

- A. Manufacturers:
1. AMETEK, Inc.; U.S. Gauge Div.
 2. Miljoco Corporation.
 3. REOTEMP Instrument Corporation.
 4. Trefice, H. O. Co.
 5. Weiss Instruments, Inc.
 6. Weksler Instruments Operating Unit; Dresser Industries; Instrument Div.
- B. Case: Die-cast aluminum or Chrome-plated brass, 9 inches long.
- C. Tube: Red, blue, or green reading, organic-liquid filled, with magnifying lens.
- D. Tube Background: Satin-faced, nonreflective aluminum with permanent scale markings.

- E. Window: Glass or plastic.
- F. Connector: Adjustable type, 180 degrees in vertical plane, 360 degrees in horizontal plane, with locking device.
- G. Stem: Copper-plated steel, aluminum, or brass for thermowell installation and of length to suit installation.
- H. Accuracy: Plus or minus 1 percent of range or plus or minus 1 scale division to maximum of 1.5 percent of range.

2.3 THERMOWELLS

- A. Manufacturers: Same as manufacturer of thermometer being used.
- B. Description: Pressure-tight, socket-type metal fitting made for insertion into piping and of type, diameter, and length required to hold thermometer. Brass for compatible services less than 353 degrees F; ANSI 18-8 stainless steel for all others to suit service. Furnish extension neck to accommodate insulation where applicable.

2.4 TEST PLUGS

- A. Manufacturers:
 - 1. Peterson Equipment Co., Inc.
 - 2. Miljoco Corporation.
- B. Description: Corrosion-resistant brass or stainless-steel body with core inserts and gasketed and threaded cap, with extended stem for units to be installed in insulated piping.
- C. Minimum Pressure and Temperature Rating: 500 psig at 200 deg F for cold services, and 500 psig at 275 deg F for hot services.
- D. Core Inserts: One or two self-sealing rubber valves.
 - 1. Insert material for air, water, oil, or gas service at 20 to 200 deg F shall be Neoprene.
 - 2. Insert material for air or water service at minus 30 to plus 275 deg F shall be Nordel.
- E. Test Kit: Furnish test kit(s) containing thermometer(s), and carrying case. Adapter probes and thermometer sensing elements shall be of diameter to fit test plugs and of length to project into piping.
 - 1. Pressure Gage: Small bourdon-tube insertion type with 2- to 3-inch- diameter dial and probe. Dial range shall be 0 to 200 psig.

2. Low-Range Thermometer: Small bimetallic insertion type with 1- to 2-inch-diameter dial and tapered-end sensing element. Dial ranges shall be 25 to 125 deg F.
3. Carrying case shall have formed instrument padding.

2.5 FLOW INDICATORS

A. Manufacturers:

1. Brooks Instrument Div.; Emerson Electric Co.
2. Clark-Reliance Corporation; Jacoby-Tarbox.
3. Dwyer Instruments, Inc.
4. McCrometer, Inc.
5. OPW Engineered Systems; Dover Corp.
6. Penberthy, Inc.

B. Description: Instrument for installation in piping systems for visual verification of flow.

C. Construction: Bronze or stainless-steel body; with sight glass and plastic pelton-wheel indicator, and threaded or flanged ends.

D. Pressure Rating: 125 psig.

E. Temperature Rating: 200 deg F.

F. End Connections for NPS 2 and Smaller: Threaded.

G. End Connections for NPS 2-1/2 and Larger: Flanged.

PART 3 - EXECUTION

3.1 THERMOMETER APPLICATIONS

A. Install liquid-in-glass thermometers in the following locations:

1. Inlet and outlet of each thermal storage tank.
2. Outside-air, return-air, and mixed-air ducts.

B. Provide the following temperature ranges for thermometers:

1. Domestic Hot Water: 30 to 180 deg F, with 2-degree scale divisions.
2. Domestic Cold Water: 30 to 130 deg F, with 2-degree scale divisions.
3. Air Ducts: 30 to 240 deg F, with 2-degree scale divisions.

3.2 INSTALLATIONS

- A. Install direct-mounting thermometers and adjust vertical and tilted positions.
- B. Install thermowells with socket extending to center of pipe and in vertical position in piping tees where thermometers are indicated.
- C. Duct Thermometer Support Flanges: Install in wall of duct where duct thermometers are indicated. Attach to duct with screws.
- D. Install test plugs in tees in piping.
- E. Install flow indicators, in accessible positions for easy viewing, in piping systems.
- F. Install permanent indicators on walls or brackets in accessible and readable positions.
- G. Install connection fittings for attachment to portable indicators in accessible locations.
- H. Mount meters on wall if accessible; if not, provide brackets to support meters.

3.3 CONNECTIONS

- A. Ground equipment according to Division 26 Section "Grounding and Bonding."
- B. Connect wiring according to Division 26 Section "Conductors and Cables."

3.4 ADJUSTING

- A. Calibrate meters according to manufacturer's written instructions, after installation.
- B. Adjust faces of meters to proper angle for best visibility.

END OF SECTION 20 05 19

SECTION 20 05 29 - HANGERS AND SUPPORTS

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PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- B. Related Sections include the following:
 - 1. Division 05 Section "Metal Fabrications" for structural-steel shapes and plates for trapeze hangers for pipe and equipment supports.
 - 2. Division 20 Section "Mechanical General Requirements."
 - 3. Division 20 Section "Basic Mechanical Materials and Methods."
 - 4. Division 20 Section "Mechanical Vibration System Controls" for vibration isolation devices.
 - 5. Division 21 Section "Fire-Suppression System" for pipe hangers for fire-protection piping.
 - 6. Division 23 Section(s) "Metal Ducts" for duct hangers and support.

1.2 DEFINITIONS

- A. MSS: Manufacturers Standardization Society for the Valve and Fittings Industry Inc.
- B. MFMA: Metal Framing Manufacturers Association.

1.3 PERFORMANCE REQUIREMENTS

- A. Design supports for multiple pipes, including pipe stands, capable of supporting combined weight of supported systems, system contents, and test water.
- B. Design equipment supports capable of supporting combined operating weight of supported equipment and connected systems and components.

1.4 ACTION SUBMITTALS

- A. Product Data: For the following:
 - 1. Steel pipe hangers and supports.
 - 2. Thermal-hanger shield inserts.

1.5 INFORMATIONAL SUBMITTALS

- A. Shop Drawings: Show fabrication and installation details and include calculations for the following:
 - 1. Trapeze pipe hangers. Include Product Data for components.
 - 2. Metal framing systems. Include Product Data for components.
 - 3. Pipe stands. Include Product Data for components.
 - 4. Equipment supports.

1.6 QUALITY ASSURANCE

- A. MSS Standards: Pipe hangers, supports, and accessories shall comply with the following:
 - 1. MSS SP-58, Pipe Hangers and Supports – Materials, Design and Manufacture, Selection, Application, and Installation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.

2.2 HANGER ROD MATERIAL

- A. Threaded, hot rolled, steel rod conforming to ASTM A 36 or A575.
 1. Rod continuously threaded.
 2. Use of rod couplings is prohibited.

2.3 STEEL PIPE HANGERS AND SUPPORTS

- A. Description: MSS SP-58, Types 1 through 58, factory-fabricated components. Refer to Part 3 "Hanger and Support Applications" Article, and schedules and details on the Drawings for where to use specific hanger and support types.
 1. Hangers and Supports for Fire Protection Piping: UL listed or FMG approved.
- B. Manufacturers:
 1. Anvil; ASC Engineered Solutions.
 2. B-Line by Eaton.
 3. Carpenter & Paterson, Inc.
 4. Hilti USA.
 5. nVent Electric plc; CADDY.
 6. PHD Manufacturing, Inc.
- C. Galvanized, Metallic Coatings: Pregalvanized or hot dipped.
- D. Nonmetallic Coatings: Plastic coating, jacket, or liner.
- E. Padded Hangers: Hanger with fiberglass or other pipe insulation pad or cushion for support of bearing surface of piping.

2.4 TRAPEZE PIPE HANGERS

- A. Description: MSS SP-58, Type 59, shop- or field-fabricated pipe-support assembly made from structural-steel shapes with MSS SP-58 hanger rods, nuts, saddles, and U-bolts.

2.5 METAL FRAMING SYSTEMS

- A. Description: MFMA-3, shop- or field-fabricated pipe-support assembly made of steel channels and other components.
- B. Manufacturers:
 1. Anvil; Anvil-Strut; ASC Engineered Solutions.
 2. B-Line by Eaton.

3. nVent Electrical plc; ERISTRUT Div.
4. Power-Strut; a part of Atkore International.
5. Unistrut; a part of Atkore International.
6. Hilti USA.

- C. Coatings: Manufacturer's standard finish, unless bare metal surfaces are indicated.
- D. Galvanized, Metallic Coatings: Pregalvanized or hot dipped.
- E. Nonmetallic Coatings: Plastic coating, jacket, or liner.

2.6 METAL INSULATION SHIELDS

A. Manufacturers:

1. Anvil; ASC Engineered Solutions.
2. B-Line by Eaton.
3. Carpenter & Paterson, Inc.
4. nVent Electric plc; CADDY.
5. PHD Manufacturing, Inc.

- B. Description: MSS SP-58, Type 40, protective shields. Shields shall span an arc of 180 degrees.

C. Shield Dimensions for Pipe: Not less than the following:

1. NPS 1/4 to NPS 2: 12 inches long and 0.048 inch thick.

2.7 PIPE COVERING PROTECTION SADDLES

A. Manufacturers:

1. Anvil; ASC Engineered Solutions.
2. B-Line by Eaton.
3. Carpenter & Paterson, Inc.
4. nVent Electric plc; CADDY.
5. PHD Manufacturing, Inc.

- B. Description: MSS SP-58, Type 39A and Type 39B, for suspension of insulated hot pipe where heat losses are to be kept to a minimum.

1. Saddles shall match insulation thickness.
2. Saddle length: 12 inches.
3. Furnish with center rib for pipe sized NPS 12 and larger.

2.8 PLASTIC INSULATION SHIELDS

A. Manufacturers:

1. Anvil; ASC Engineered Solutions.
 2. Armacell LLC; Insuguard.
 3. B-Line by Eaton; Snap'N Shield.
 4. Hydra-Zorb Company; Bronco.
- B. Description: Polypropylene copolymer protective shields with modular elements designed to snap directly onto strut channel, clevis hangers, or structural members. Shields shall span an arc of 180 degrees.
1. Operating Temperature Range: Minus 40 deg F to plus 178 deg F.
- C. Certifications:
1. UL Classified for USA: UL-723 (ASTM E 84).
 2. UL listed for Canada: ULC-S102.2.
 3. Meets UL94 HB flammability standards.
- D. Shield Dimensions for Pipe: Not less than the following:
1. NPS 1/4 to NPS 4: 12 inches long.

2.9 THERMAL-HANGER SHIELDS

- A. Manufacturers:
1. American Mechanical Insulation Sales Inc. (AMIS).
 2. B-Line by Eaton.
 3. nVent Electric plc; CADDY.
 4. Pipe Shields, Inc.; a subsidiary of Piping Technology & Products, Inc.
 5. Rilco Manufacturing Company, Inc.
 6. Value Engineered Products, Inc.
- B. Description: Manufactured assembly consisting of insulation insert encased in 360 degree sheet metal shield.
1. Minimum Compressive Strength of Insert Material:
 - a. 100-psig- for sizes smaller than NPS 6.
 - b. 600-psig- for sizes NPS 6 and larger.
- C. Insulation-Insert Material for Cold Piping: Full 360 degree, water-repellent treated, ASTM C 533, Type I calcium silicate with vapor barrier.
- D. Insulation-Insert Material for Hot Piping: Full 360 degree, water-repellent treated, ASTM C 533, Type I calcium silicate.
- E. Insert Length: Extend 2 inches beyond sheet metal shield for piping operating below ambient air temperature.

- F. Include carbon steel ASTM A36 load distribution plates as required by load, pipe movement, hanger style, and hanger spacing.
- G. Thermal-Hanger Shields for Flexible Foamed Elastomeric Insulated Piping:
 - 1. Manufacturer:
 - a. B-Line by Eaton/Armacell; Armafix IPH.
 - b. Aeroflex USA, Inc.; Aerofix-U.
 - c. ZSi-Foster, Inc.; Cush-A-Therm.
 - 2. Insulation-Insert Material for Copper Piping with Flexible Foamed Elastomeric Insulation: Use the following:
 - a. Flexible foamed elastomeric, ASTM 534, Type I-Tubular Grade 1 with PUR/PIP support inserts.
- H. Thermal-Hanger Shields for Small Diameter Piping:
 - 1. Manufacturer:
 - a. Hydra-Zorb Company; Klo-Shure Insulation Couplings.
 - 2. Insulation-Insert Material for Small Diameter Piping with Flexible Foamed Elastomeric or Glass Fiber Insulation: Use the following:
 - a. Rigid Hytrel thermoplastic insulation coupling designed for use with pipe or tube NPS 4 and smaller, and insulation from 3/8 inch to 1-1/2 inch thick.

2.10 FASTENER SYSTEMS

- A. Post-Installed Anchors:
 - 1. Mechanical-Expansion Anchors: Insert-wedge-type zinc-coated steel, for use in hardened portland cement concrete with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.
 - a. Manufacturers:
 - 1) B-Line by Eaton.
 - 2) DeWalt Engineered by Powers.
 - 3) Hilti, Inc.
 - 4) ITW Ramset/Red Head.
 - 5) MKT Fastening, LLC.
 - 2. Internally Threaded Screw Anchors: Internally threaded, self-tapping screw anchor designed for performance in cracked and uncracked concrete. Suitable base materials include normal-weight concrete, sand-lightweight concrete and concrete over steel deck.

- a. UL Listed or FMG approved for fire sprinkler piping.
 - b. Available Sizes: For 1/4-inch, 3/8-inch, and 1/2-inch diameter rod sizes
 - c. Manufacturers:
 - 1) B-Line by Eaton; Rapid Rod Hangers.
 - 2) DeWalt Engineered by Powers; Snake+.
3. Chemical Fasteners: Insert-type-stud bonding system anchor for use with hardened portland cement concrete, and tension and shear capacities appropriate for application. Exception: Do not use chemical fasteners to support hanger systems for fire protection piping.
- a. Manufacturers:
 - 1) DeWalt Engineered by Powers.
 - 2) Hilti, Inc.
 - 3) ITW Ramset/Red Head.
 - 4) MKT Fastening, LLC.
 - b. Bonding Material: ASTM C 881, Type IV, Grade 3, 2-component epoxy resin suitable for surface temperature of hardened concrete where fastener is to be installed.
 - c. Stud: ASTM A 307, zinc-coated carbon steel with continuous thread on stud, unless otherwise indicated.
 - d. Washer and Nut: Zinc-coated steel.

2.11 ROOF MOUNTED EQUIPMENT SUPPORTS

- A. Equipment Stands, General: Shop or field-fabricated assemblies made of manufactured corrosion-resistant components to support roof-mounted equipment.
- B. Non-Penetrating Equipment Supports: Assembly of two or more bases and horizontal members, for roof installation without membrane penetration.
 1. Manufacturers:
 - a. B-Line by Eaton; Dura-Blok.
 - b. Eco Support Products.
 - c. MIFAB, Inc.; C-Port.
 - d. MIRO Industries; HD and LD Mechanical Unit Supports.
 - e. nVent Electric plc; CADDY.
 - f. Portable Pipe Hangers.
 2. Base: Plastic, stainless steel, or recycled rubber.
 3. Horizontal Member: Cadmium-plated-steel, galvanized-steel, or stainless steel strut, and planking; designed for use with standard strut clamps, all-thread rod, and accessories.

- C. Roof Rail-Type Equipment Stands: Welded 18 gage galvanized steel shell, base plate and counter flashing. Factory installed chemically treated wood nailer. Fully mitered end sections. Internal bulkhead reinforcement.
 - 1. Roof Rail Type Supports: Coordinate installation and type with Architectural Trades. Top shall be level and extend a minimum of 10 inches above top of roof insulation.
 - a. Manufacturers:
 - 1) Pate.
 - 2) Thybar; TEMS Series.
 - 3) Roof Products and Systems.
 - 4) Greenheck.
 - 5) Creative Metals.

2.12 EQUIPMENT SUPPORTS

- A. Description: Welded, shop- or field-fabricated equipment support made from structural-steel shapes.

2.13 MISCELLANEOUS MATERIALS

- A. Structural Steel: ASTM A 36/A 36M, steel plates, shapes, and bars; black and galvanized.
- B. Grout: ASTM C 1107, factory-mixed and -packaged, dry, hydraulic-cement, nonshrink and nonmetallic grout; suitable for interior and exterior applications.
 - 1. Properties: Nonstaining, noncorrosive, and nongaseous.
 - 2. Design Mix: 5000-psi, 28-day compressive strength.

PART 3 - EXECUTION

3.1 HANGER AND SUPPORT APPLICATIONS

- A. Refer to application schedules on the Drawings.
- B. For insulated pipe, oversize hanger elements to accommodate insulation thickness.
- C. Specific hanger and support requirements are specified in Sections specifying piping systems and equipment.
- D. Comply with MSS SP-58 for pipe hanger selections and applications that are not specified in piping system Sections.
- E. Use hangers and supports with galvanized, metallic coatings for outdoor applications or where exposed to outdoor conditions.

- F. Use hangers and supports with plastic coating, or galvanized metallic coatings for applications in corrosive atmospheres.
- G. Use metal framing, with plastic coating, or galvanized metallic coatings for metal framing in corrosive atmospheres.
- H. Use nonmetallic coatings on attachments for electrolytic protection where attachments are in direct contact with copper tubing.
- I. Use padded hangers for piping that is subject to scratching.
- J. Vertical-Piping Clamps: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
 - 1. MSS Type 8 or spring type to meet system requirements.
- K. Hanger-Rod Attachments: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
 - 1. Steel Turnbuckles (MSS Type 13): For adjustment up to 6 inches for heavy loads.
 - 2. Steel Clevises (MSS Type 14): For 120 to 450 deg F piping installations.
 - 3. Swivel Turnbuckles (MSS Type 15): For use with MSS Type 11, split pipe rings.
 - 4. Malleable-Iron Sockets (MSS Type 16): For attaching hanger rods to various types of building attachments.
 - 5. Steel Weldless Eye Nuts (MSS Type 17): For 120 to 450 deg F piping installations.
- L. Concrete Structure Building Attachments: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
 - 1. Anchor Devices, Concrete and Masonry: in accordance with Group I, Group II, Type 2, Class 2, Style 1 and Style 2, Group III and Group VIII or FS FF-S-325A. Furnish cast-in floor type equipment anchor devices with adjustable positions. Furnish built in anchor devices for masonry, unless otherwise approved by the Architect. Powder actuated anchoring devices shall not be used to support any mechanical systems components.
 - 2. Inserts, Concrete: TYPE 18 or 19. When applied to loads equivalent to piping in sizes NPS 2 and larger, and where otherwise required by imposed loads, a one foot length of 1/2 inch reinforcing rod shall be inserted and wired through wing slots. Proprietary type continuous inserts may be proposed and shall be submitted for approval.
 - 3. Use mechanical-expansion anchors where required in concrete construction.
 - 4. Use chemical fasteners where required in concrete construction.
- M. Steel Frame Structure Building Attachments: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
 - 1. Beam Clamps:
 - a. Center Loading: TYPE 21, 28, 29 and 30, unless otherwise indicated. Type 27 shall be allowed to support single pipes NPS 6 size or smaller only.

- b. "C" Clamps: Type 19, 20 or 23, for supporting single pipes NPS 2-1/2 size or smaller only. Use of "C" clamps, or beam clamps of "C" pattern, or any modification thereof, is prohibited for supporting multiple pipes or pipes larger than NPS 2-1/2.
- N. Hanger-Rod Attachments for Wood Construction: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
- 1. All Steel Ceiling Plates: UL listed and suitable for attachment to wood beams. For pipe sizes NPS 1/2 to NPS 2. Install in accordance with manufacturer's instructions to maintain listing.
 - 2. Threaded Side Beam Brackets: UL listed and FMG approved, suitable for attachment to wood beams. For pipe sizes NPS 2 to NPS 4. Install in accordance with manufacturer's instructions to maintain listing.
- O. Spring Hangers and Supports: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
- 1. Use spring supports and sway braces TYPES 48, 49, 50, 51, 52, 53, 54, 55 or 56. For specific points:
 - a. Provide spring supports at point of support where vertical movement will occur.
 - b. For light loads and vertical movement less than 1/4 inch, TYPES 48 or 49 spring cushion supports.
 - c. For vertical movements in excess of 1/4 inch but less than 1/2 inch, TYPES 51, 52 or 53 variable spring supports shall be used, loaded to not more than 75 percent of published load rating.
 - d. For vertical movements of 1/2 inch and more, TYPES 54, 55 and 56 constant support spring hangers.
 - e. Sway braces; TYPE 50.
 - f. Variable spring hangers in accordance with referenced MSS Standards with "medium" allowable load change.
- P. Comply with MSS SP-58 for trapeze pipe hanger selections and applications that are not specified in piping system Sections.
- Q. Comply with MFMA-102 for metal framing system selections and applications that are not specified in piping system Sections.
- 3.2 HANGER AND SUPPORT INSTALLATION**
- A. Steel Pipe Hanger Installation: Comply with MSS SP-58. Install hangers, supports, clamps, and attachments as required to properly support piping from building structural frame.
- B. Provide necessary piping and equipment supporting elements including: building structure attachments, supplementary steel, hanger rods, stanchions and fixtures, vertical pipe attachments, horizontal pipe attachments, anchors, guides, spring supports in accordance with the referenced codes, standards, and requirements specified.

Support piping and equipment from building structure, not from roof deck, floor slab, other pipe, duct or equipment.

- C. At connections between piping systems, hangers and equipment of dissimilar metals, insulate, using dielectric insulating material, nonferrous piping against direct contact with the building steel by insulating the contact point of the hanger and pipe or the hanger and building steel. Test each point of dielectric insulation with an ohm meter to ensure proper isolation of dissimilar materials. Test shall be observed by the Owner's Representative and/or Architect.
- D. Use copper plated or plastic coated supporting element in contact with copper tubing or glass piping.
- E. File and paint cut ends and shop or field prime paint supporting element components.
- F. Secure Type 40 shields to support elements in a manner that prevents movement and damage to insulation and jacket materials.
- G. Hang piping parallel with the lines of the building, unless otherwise indicated. Route piping in an orderly manner and maintain gradient. Space piping and components so a threaded pipe fitting may be removed between adjacent pipes and so there will be not less than 1/2 inch of clear space between finished surfaces and piping. Arrange hangers on adjacent parallel service lines in line with each other.
- H. Flange loads on connected equipment shall not exceed 75 percent of maximum allowed by equipment manufacturer. Flange loads in liquid containing systems shall be checked in the presence of the Architect when piping is full of liquid. No flange load is allowed on pumps, vibration isolated equipment or flexible connectors.
- I. Spring supports, within specified limitations: Constant support type, where necessary to avoid transfer of load from support to support or onto connected equipment; otherwise, variable support type located at points subject to vertical movement.
- J. Incorporate pipe anchors into piping systems to maintain permanent pipe positions. Install alignment guides for the piping adjacent to and on each side of pipe expansion loops and expansion joints to maintain alignment.
- K. Where necessary, brace piping and supports against reaction, sway and vibration.
- L. Do not hang piping from concrete joist pans, floor decks, roof decks, equipment, ductwork, or other piping.
- M. Install turnbuckles, swing eyes and clevises to accommodate temperature changes, pipe accessibility, and adjustment for load pitch. Rod couplings are not acceptable.
- N. Install hangers and supports for piping at intervals specified, at locations not more than 3 feet from the ends of each runout, not more than 3 feet from connections to equipment, and not over 25 percent of specified interval from each change in direction of piping and for concentrated loads such as valves, etc.

- O. Base the load rating for pipe support elements on loads imposed by insulated weight of pipe filled with water. The span deflection shall not exceed slope gradient of pipe.
- P. If structural steel, roofs, or tunnels will allow support spacing greater than that shown above, Contractor shall submit proposed support system along with structural calculations documenting the allowance of such spacing, in accordance with ANSI, B31.1, and MSS Guidelines.
- Q. Support vertical risers independently of connected horizontal piping whenever practical, with supports at the base and at intervals to accommodate system range of load with thermal conditions. Support vertical risers at each floor penetration for piping in shafts or chases. Guide for lateral stability. Fit horizontal piping connected to moving risers with two spring supports connected adjacent to riser, spaced according to required hanger spacing.
- R. For risers at temperatures of 100 deg F or less place riser clamps under fittings. Support carbon steel pipe at each operating level or floor and at not more than 15-foot intervals for pipe 2 inches and smaller, and at not more than 20 foot intervals for pipe 2-1/2 inches and larger.
- S. After the piping systems have been installed, tested and placed in satisfactory operation, firmly tighten hanger rod nut and jam nut and upset threads to prevent movement of fasteners.
- T. Attach pipe anchors and pipe alignment guides to the building structure where indicated. If not indicated, the method used is optional to the Contractor, subject to approval by the Architect. In the case of structural steel, make attachment by clamping in accordance with the American Institute of Steel Construction Specification for the Design, Fabrication and Erection of Structural Steel for Building.
- U. Attach supporting elements connected to structural steel columns to preclude vertical slippage and cascading failure.
- V. Attach pipe hangers and other supporting elements to roof purlins and trusses at panel points.
- W. Where eccentric loading beam clamps are approved and where other work is supported by similar eccentric loading support element from the same structural member, locate eccentric loading support elements to minimize structural member torsion load.
- X. Limit the location of supporting elements for piping and equipment, when supported from roof, to panel points of the bar joists.
- Y. Building structure shall not be reinforced except as approved by the Architect in writing.
- Z. Use approved cast-in-place inserts or built-in anchors for attachment to concrete structure. Size inserts and anchors for the total applied load with a safety factor in accordance with applicable codes but in no case less than 5. Coordinate installation of all imbedded items in accordance with manufacturer's instructions. Position anchorage and imbedded items as indicated and/or where required and support against displacement during placing of concrete. Cutting or repositioning of concrete beam or

girder or reinforcing steel to accommodate inserts will not be allowed. Provide removable closures in imbedded device openings to prevent entry of concrete.

- AA. Support piping and equipment from concrete building frame, not from roof or floor slabs unless otherwise indicated.
- BB. Use cast-in-place inserts in concrete beams and girders. Drilled anchors/wedge type inserts shall be used on vertical surfaces only. Coordinate with structural engineer.
- CC. Attach piping supports to the side of concrete beams and concrete joist. Provide supplementary support steel as required. Cast-in-place or drilled anchors will not be permitted in the bottom of concrete beams and concrete joist.
- DD. Attach piping supports to the side of concrete beams or concrete joist. Where intermediate hangers are required to meet the hanger spacing schedule, the Contractor may propose attachment of intermediate pipe supports to the bottom of the concrete slab pending submittal of a satisfactory pull out test. The Contractor shall submit pull out test criteria, pull out test results, proposed hanger detail and hanger point loads to the Architect for written approval.
- EE. Trapeze Pipe Hanger Installation: Comply with MSS SP-58. Arrange for grouping of parallel runs of horizontal piping and support together on field-fabricated trapeze pipe hangers.
 - 1. Pipes of Various Sizes: Support together and space trapezes for smallest pipe size or install intermediate supports for smaller diameter pipes as specified above for individual pipe hangers.
 - 2. Field fabricate from ASTM A 36/A 36M, steel shapes selected for loads being supported. Weld steel according to AWS D1.1.
- FF. Metal Framing System Installation: Arrange for grouping of parallel runs of piping and support together on field-assembled metal framing systems.
- GG. Fastener System Installation:
 - 1. Install mechanical-expansion anchors in concrete after concrete is placed and completely cured. Install fasteners according to manufacturer's written instructions.
- HH. Roof-Mounting Equipment Stand Installation:
 - 1. Stand Types except Curb-Mounting Type: Assemble components and mount on smooth roof surface. Do not penetrate roof membrane.
 - 2. Curb or Rail Mounting Type Stands: Assemble components or fabricate stand and mount on permanent, stationary roof curb or rail. Refer to Division 07 Section "Roof Accessories" for curb and rail installation.
 - 3. Maintain support manufacturer's recommended spacing.
- II. Install hangers and supports complete with necessary inserts, bolts, rods, nuts, washers, and other accessories.
- JJ. Equipment Support Installation: Fabricate from welded-structural-steel shapes.

- KK. Install hangers and supports to allow controlled thermal movement of piping systems, to permit freedom of movement between pipe anchors, and to facilitate action of expansion joints, expansion loops, expansion bends, and similar units.
- LL. Install lateral bracing with pipe hangers and supports to prevent swaying.
- MM. Install building attachments within concrete slabs or attach to structural steel. Install additional attachments at concentrated loads, including valves, flanges, and strainers, NPS 2-1/2 and larger and at changes in direction of piping. Install concrete inserts before concrete is placed; fasten inserts to forms and install reinforcing bars through openings at top of inserts.
- NN. Load Distribution: Install hangers and supports so piping live and dead loads and stresses from movement will not be transmitted to connected equipment.
- OO. Pipe Slopes: Install hangers and supports to provide indicated pipe slopes and so maximum pipe deflections allowed by ASME B31.1 (for power piping) and ASME B31.9 (for building services piping) are not exceeded.
- PP. Refer to individual piping sections for hanger spacing and hanger rod sizes.

3.3 EQUIPMENT SUPPORTS

- A. Fabricate structural-steel stands to suspend equipment from structure overhead or to support equipment above floor.
- B. Grouting: Place grout under supports for equipment and make smooth bearing surface.
- C. Provide lateral bracing, to prevent swaying, for equipment supports.

3.4 METAL FABRICATIONS

- A. Cut, drill, and fit miscellaneous metal fabrications for trapeze pipe hangers and equipment supports.
- B. Fit exposed connections together to form hairline joints. Field weld connections that cannot be shop welded because of shipping size limitations.
- C. Field Welding: Comply with AWS D1.1 procedures for shielded metal arc welding, appearance and quality of welds, and methods used in correcting welding work, and with the following:
 - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 - 2. Obtain fusion without undercut or overlap.
 - 3. Remove welding flux immediately.
 - 4. Finish welds at exposed connections so no roughness shows after finishing and contours of welded surfaces match adjacent contours.

3.5 ADJUSTING

- A. Hanger Adjustments: Adjust hangers to distribute loads equally on attachments and to achieve indicated slope of pipe.
- B. Trim excess length of continuous-thread hanger and support rods to 1-1/2 inches.

3.6 PAINTING

- A. Touch Up: Clean field welds and abraded areas of shop paint. Paint exposed areas immediately after erecting hangers and supports. Use same materials as used for shop painting. Comply with SSPC-PA 1 requirements for touching up field-painted surfaces.
 - 1. Apply paint by brush or spray to provide minimum dry film thickness of 2.0 mils.
- B. Equipment Supports: Painting is specified in Division 09 painting Sections.
- C. Touch Up: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint on miscellaneous metal are specified in Division 09 painting Sections.
- D. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A 780.

END OF SECTION 20 05 29

SECTION 20 05 53 - MECHANICAL IDENTIFICATION

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PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- B. Related Sections include the following:
 - 1. Division 20 Section "Mechanical General Requirements."

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.

1.3 INFORMATIONAL SUBMITTALS

- A. Samples: For color, letter style, and graphic representation required for each identification material and device.

- B. Valve numbering scheme.

1.4 CLOSEOUT SUBMITTALS

- A. Valve Schedules: For each piping system. Furnish extra copies (in addition to mounted copies) to include in Maintenance Manuals.

1.5 QUALITY ASSURANCE

- A. ASME Compliance: Comply with ASME (ANSI) A13.1, "Scheme for the Identification of Piping Systems," for letter size, length of color field, colors, and viewing angles of identification devices for piping.

1.6 COORDINATION

- A. Coordinate installation of identifying devices with completion of covering and painting of surfaces where devices are to be applied.
- B. Coordinate installation of identifying devices with location of access panels and doors.
- C. Install identifying devices before installing acoustical ceilings and similar concealment.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified:
 - 1. Seton.
 - 2. Brady.
 - 3. EMED.
 - 4. Craftmark.
 - 5. Brimar Industries, Inc.
 - 6. Marking Services Inc. (MSI).
 - 7. Kolbi Pipe Marker Co.

2.2 EQUIPMENT IDENTIFICATION DEVICES

- A. Equipment Nameplates: Metal, with data engraved or stamped, for permanent attachment on equipment.
 - 1. Data:
 - a. Manufacturer, product name, model number, and serial number.
 - b. Capacity, operating and power characteristics, and essential data.

- c. Labels of tested compliances.
 2. Location: Accessible and visible.
 3. Fasteners: As required to mount on equipment.
- B. Equipment Markers: Engraved, color-coded laminated plastic. Include contact-type, permanent adhesive.
 1. Terminology: Match schedules as closely as possible.
 2. Data:
 - a. Name and plan number.
 - b. Equipment service.
 - c. Design capacity.
 - d. Other design parameters such as pressure drop, entering and leaving conditions, and speed.
 3. Size: 2-1/2 by 4 inches for control devices, dampers, and valves; 4-1/2 by 6 inches for equipment.

2.3 PIPING IDENTIFICATION DEVICES

- A. Manufactured Pipe Markers, General: Preprinted, color-coded, with lettering indicating service, and showing direction of flow.
 1. Colors: Comply with ASME (ANSI) A13.1, unless otherwise indicated.
 2. Type and Size of Letters: Comply with ANSI A13.1, unless otherwise indicated.
 3. Legends: Spelled out in full or commonly used and accepted abbreviations.
 4. Pipes with OD, Including Insulation, Less Than 6 Inches: Full-band pipe markers extending 360 degrees around pipe at each location.
 5. Pipes with OD, Including Insulation, 6 Inches and Larger: Either full-band or strip-type pipe markers at least three times letter height and of length required for label.
 6. Arrows: Integral with piping system service lettering to accommodate both directions; or as separate unit on each pipe marker to indicate direction of flow.
- B. Self-Adhesive Pipe Markers: Plastic with pressure-sensitive, permanent-type, self-adhesive back.
- C. Plastic Tape: Continuously printed, vinyl tape at least 3 mils thick with pressure-sensitive, permanent-type, self-adhesive back.
 1. Width for Markers on Pipes with OD, Including Insulation, Less Than 6 Inches: 3/4 inch minimum.
 2. Width for Markers on Pipes with OD, Including Insulation, 6 Inches or Larger: 1-1/2 inches minimum.

2.4 DUCT IDENTIFICATION DEVICES

- A. Duct Markers: Vinyl, 2-inch minimum character height, with permanent pressure sensitive adhesive. Include direction and quantity of airflow, air handling unit or fan number, and duct service (such as supply, return, and exhaust).

2.5 VALVE TAGS

- A. Valve Tags: Stamped or engraved with 1/4-inch letters for piping system abbreviation and 1/2-inch numbers, with numbering scheme to match existing numbering scheme. Provide 5/32-inch hole for fastener.
 - 1. Material: 0.032-inch- thick brass.
 - 2. Valve-Tag Fasteners: Brass wire-link chain or beaded chain.

2.6 VALVE SCHEDULES

- A. Valve Schedules: For each piping system, on standard-size bond paper. Tabulate valve number, piping system, system abbreviation (as shown on valve tag), location of valve (room or space), normal-operating position (open, closed, or modulating), and variations for identification. Mark valves for emergency shutoff and similar special uses.
 - 1. Valve-Schedule Frames: Glazed display frame for removable mounting on masonry walls for each page of valve schedule. Include mounting screws.
 - 2. Frame: Finished hardwood or extruded aluminum.
 - 3. Glazing: ASTM C 1036, Type I, Class 1, Glazing Quality B, 2.5-mm, single-thickness glass.

PART 3 - EXECUTION

3.1 APPLICATIONS, GENERAL

- A. Products specified are for applications referenced in other Division 20, 21, 22, and 23 Sections. If more than single-type material, device, or label is specified for listed applications, selection is Installer's option.

3.2 EQUIPMENT IDENTIFICATION

- A. Install and permanently fasten equipment nameplates on each major item of mechanical equipment that does not have nameplate or has nameplate that is damaged or located where not easily visible. Locate nameplates where accessible and visible. Include nameplates for the following general categories of equipment:
 - 1. Fans, blowers, primary balancing dampers, and mixing boxes.
 - 2. Packaged HVAC central-station and zone-type units.

- B. Install equipment markers with permanent adhesive on or near each major item of mechanical equipment. Data required for markers may be included on signs, and markers may be omitted if both are indicated.
 - 1. Letter Size: Minimum 1/4 inch for name of units if viewing distance is less than 24 inches, 1/2 inch for viewing distances up to 72 inches, and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-fourths the size of principal lettering.
 - 2. Data: Distinguish among multiple units, indicate operational requirements, indicate safety and emergency precautions, warn of hazards and improper operations, and identify units.
 - 3. Locate markers where accessible and visible. Include markers for the following general categories of equipment:
 - a. Fans, blowers, primary balancing dampers, and mixing boxes.
 - b. Packaged HVAC central-station and zone-type units.
 - c. Tanks and pressure vessels.

- C. Install equipment signs with screws or permanent adhesive on or near each major item of mechanical equipment. Locate signs where accessible and visible.
 - 1. Identify mechanical equipment with equipment markers in the following color codes:
 - a. Green: For cooling equipment and components.
 - b. Yellow: For heating equipment and components.
 - 2. Letter Size: Minimum 1/4 inch for name of units if viewing distance is less than 24 inches, 1/2 inch for viewing distances up to 72 inches, and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-fourths the size of principal lettering.
 - 3. Data: Distinguish among multiple units, indicate operational requirements, indicate safety and emergency precautions, warn of hazards and improper operations, and identify units.
 - 4. Include signs for the following general categories of equipment:
 - a. Fans, blowers, primary balancing dampers, and mixing boxes.
 - b. Packaged HVAC central-station and zone-type units.
 - c. Tanks and pressure vessels.

- D. Install access panel markers with screws on equipment access panels.

- E. Area Served: Equipment serving different areas of a building other than where the equipment is installed shall be permanently marked in a manner that, in addition to identifying the equipment as specified in this Section, also identifies the area it serves.

3.3 PIPING IDENTIFICATION

- A. Install manufactured pipe markers indicating service on each piping system. Install with flow indication arrows showing direction of flow.

1. Pipes with OD, Including Insulation, Less Than 6 Inches: Self-adhesive pipe markers. Use color-coded, self-adhesive plastic tape, minimum 3/4 inch wide, lapped at least 1-1/2 inches at both ends of pipe marker, and covering full circumference of pipe.
 2. Pipes with OD, Including Insulation, 6 Inches and Larger: Self-adhesive pipe markers. Use color-coded, self-adhesive plastic tape, minimum 1-1/2 inches wide, lapped at least 3 inches at both ends of pipe marker, and covering full circumference of pipe.
- B. Locate pipe markers and color bands where piping is exposed in finished spaces; machine rooms; accessible maintenance spaces such as shafts, tunnels, and plenums; and exterior non-concealed locations as follows:
1. Near each valve and control device.
 2. Near each branch connection, excluding short takeoffs for fixtures and terminal units. Where flow pattern is not obvious, mark each pipe at branch.
 3. Near penetrations through walls, floors, ceilings, and non-accessible enclosures.
 4. At access doors, manholes, and similar access points that permit view of concealed piping.
 5. Near major equipment items and other points of origination and termination.
 6. Spaced at maximum intervals of 50 feet along each run. Reduce intervals to 25 feet in areas of congested piping and equipment.
 7. On piping above removable acoustical ceilings. Omit intermediately spaced markers.

3.4 DUCT IDENTIFICATION

- A. Identify ductwork with vinyl markers and flow direction arrows.

3.5 VALVE-TAG INSTALLATION

- A. Install tags on valves and control devices in piping systems, except check valves; valves within factory-fabricated equipment units; plumbing fixture supply stops; faucets; convenience and lawn-watering hose connections; and HVAC terminal devices and similar roughing-in connections of end-use fixtures and units. List tagged valves in a valve schedule.
- B. Valve-Tag Application Schedule: Tag valves according to size, shape, and color scheme and with captions similar to those indicated in the following:
1. Valve-Tag Size and Shape:
 - a. Cold Water: Minimum 1-1/2 inches, round or square.
 - b. Hot Water: Minimum 1-1/2 inches, round or square.
 - c. Fire Protection: Minimum 1-1/2 inches, round or square.

3.6 VALVE-SCHEDULE INSTALLATION

- A. Mount valve schedule on wall in accessible location in each major equipment room.

3.7 ADJUSTING

- A. Relocate mechanical identification materials and devices that have become visually blocked by other work.

3.8 CLEANING

- A. Clean faces of mechanical identification devices and glass frames of valve schedules.

3.9 SCHEDULES

- A. Paint colors are listed here for reference only. Painting is specified under Division 9.

PIPE LABELING AND COLOR CODING

<u>Pipe System Label</u>	<u>Drawing Abbrev.</u>	<u>Labels</u>	<u>Piping</u>
Sanitary Sewer	SAN	White on Green	Dark Brown
Sanitary Vent	V	White on Green	Dark Brown
Domestic Cold Water	CW	White on Green	Light Green
Domestic Hot Water	HW	Black on Yellow	Dark Green
Fire Protection	FP	White on Red	Bright Red

SHEET METAL WORK

<u>Service</u>	<u>Abbrev.</u>	<u>Labels</u>	<u>Ductwork</u>
Air Conditioning Supply	Supply Air	White on Green	White
Air Conditioning Return	Return Air	White on Green	White
Exhaust Systems	Exhaust Air	Black on Yellow	Green

END OF SECTION 20 05 53

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PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

- B. Related Sections include the following:
 - 1. Division 20 Section "Mechanical General Requirements."
 - 2. Division 20 Section "Basic Mechanical Materials and Methods."
 - 3. Division 20 Section "Hanger and Supports" for thermal hanger shield inserts.
 - 4. Division 22 Section "Plumbing Fixtures: for protective shielding guards.
 - 5. Division 23 Section "Metal Ducts" for duct liners.

1.2 SUMMARY

- A. This Section includes mechanical insulation for pipe, duct, and equipment.

1.3 DEFINITIONS

- A. ASJ: All-service jacket.
- B. FSK: Foil, scrim, kraft paper.
- C. PSK: Polypropylene, scrim, kraft paper.
- D. PVC: Polyvinyl Chloride.
- E. SSL: Self-sealing lap.

1.4 INDOOR PIPING INSULATION SYSTEMS DESCRIPTION

- A. Acceptable preformed pipe and tubular insulation materials and thicknesses are scheduled on the Drawings, or identified for each piping system and pipe size range.
- B. Existing Plastic Water Piping Within Return Air Plenum Space:
 - 1. All Pipe Sizes: Fire-Rated Plenum Wrap: 1/2 inch thick.

1.5 INDOOR DUCT AND PLENUM INSULATION SYSTEMS DESCRIPTION

- A. Acceptable indoor duct and plenum insulation materials and thicknesses are scheduled on the Drawings.

1.6 EQUIPMENT INSULATION SYSTEMS DESCRIPTION

- A. Acceptable equipment insulation materials and thicknesses are scheduled on the Drawings.

1.7 FIELD-APPLIED JACKETING SYSTEMS DESCRIPTION

- A. Acceptable field-applied jacketing materials and thicknesses are scheduled on the Drawings, or identified for each piping system and pipe specialty.
- B. Steam Condensate Piping within Air Handling Units: Aluminum, Stucco Embossed: 0.016 inch thick.
- C. Piping Within Energy Recovery Units: Type 304 Stainless Steel, Smooth: 0.010 inch thick. Seams and joints calked with chemically resistant sealer.
- D. Steam Pressure Reducing Valves: Sound Barrier Jacketing: Smooth or stucco embossed.

1.8 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated, identify thermal conductivity, thickness, and jackets (both factory and field applied, if any).
 - 1. ESR Report: For fire-rated grease duct insulation.

1.9 QUALITY ASSURANCE

- A. Fire-Test-Response Characteristics: Insulation and related materials shall have fire-test-response characteristics indicated, as determined by testing identical products per ASTM E 84, by a testing and inspecting agency acceptable to authorities having jurisdiction. Factory label insulation and jacket materials and adhesive, mastic, and cement material containers, with appropriate markings of applicable testing and inspecting agency.
 - 1. Insulation Installed Indoors: Flame-spread index of 25 or less, and smoke-developed index of 50 or less.
- B. Ductwork Maximum Temperature Limits: Based on ASTM C 411 test procedures.

1.10 DELIVERY, STORAGE, AND HANDLING

- A. Prior to installation, protect insulation from exposure to water and from physical damage. Prior to installation, store insulation in manufacturer's original packaging.

1.11 COORDINATION

- A. Coordinate size and location of supports, hangers, and pre-insulated pipe shields/supports specified in Division 20 Section "Hangers and Supports."
- B. Coordinate clearance requirements with piping Installer for piping insulation application, duct Installer for duct insulation application, and equipment Installer for equipment insulation application. Before preparing piping and ductwork Shop Drawings, establish

and maintain clearance requirements for installation of insulation and field-applied jackets and finishes and for space required for maintenance.

- C. Coordinate installation and testing of heat tracing.

1.12 SCHEDULING

- A. Schedule insulation application after pressure testing systems. Insulation application may begin on segments that have satisfactory test results.
- B. Complete installation and concealment of plastic materials as rapidly as possible in each area of construction.

PART 2 - PRODUCTS

2.1 INSULATION MATERIALS, GENERAL REQUIREMENTS

- A. Products shall not contain asbestos, lead, mercury, or mercury compounds.
- B. Products that come in contact with stainless steel shall have a leachable chloride content of less than 50 ppm when tested according to ASTM C 871.
- C. Insulation materials for use on austenitic stainless steel shall be qualified as acceptable according to ASTM C 795.
- D. Foam insulation materials shall not use CFC or HCFC blowing agents in the manufacturing process.
- E. Adhesives used shall be fire resistant in their dry states and UL listed.

2.2 PIPE INSULATION MATERIALS

- A. Flexible Elastomeric: Closed-cell, sponge- or expanded-rubber materials. Comply with ASTM C 534, Type I for tubular materials.
 - 1. Products: Subject to compliance with requirements, provide one of the products specified.
 - a. Aeroflex USA, Inc.; Aerocel Tube and Sheet.
 - b. Armacell LLC; AP Armaflex.
 - c. IK Insulation Group; K-Flex USA LLC; Insul-Tube and Insul-Sheet.
- B. Glass-Fiber, Preformed Pipe Insulation, Type I:
 - 1. Products: Subject to compliance with requirements, provide one of the products specified.
 - a. Johns Manville; Micro-Lok.

- b. Knauf Insulation; 1000 Pipe Insulation.
 - c. Manson Insulation Inc.; Alley-K.
 - d. Owens Corning; Fiberglas Pipe Insulation.
2. Type I, 850 deg F Materials: Glass fibers bonded with a thermosetting resin. Comply with ASTM C 547, Type I, Grade A, with factory-applied ASJ or ASJ-SSL. Factory-applied jacket requirements are specified in Part 2 "Factory-Applied Jackets" Article.

2.3 DUCTWORK INSULATION MATERIALS

- A. Blanket Insulation: Glass fibers bonded with a thermosetting resin. Comply with ASTM C 553, Type II and ASTM C 1290, Type III with factory-applied FSK jacket. Factory-applied jacket requirements are specified in Part 2 "Factory-Applied Jackets" Article.
1. Products: Subject to compliance with requirements, provide one of the products specified.
 - a. CertainTeed Corp.; Duct Wrap.
 - b. Johns Manville; Microlite EQ.
 - c. Knauf Insulation; Duct Wrap.
 - d. Manson Insulation Inc.; Alley Wrap B.
 - e. Owens Corning; All-Service Duct Wrap.

2.4 FIRE-RATED INSULATION SYSTEMS

- A. Fire-Rated Plenum Wrap: High-temperature, flexible, blanket insulation with FSK jacket that is UL tested, and designed to provide a single-layer, flexible enclosure around combustible items located within fire-rated return air plenums.
1. Products: Subject to compliance with requirements, provide one of the products specified.
 - a. Unifrax Corporation; FyreWrap 0.5 Plenum Insulation.
 - b. 3M Fire Protection Products; Fire Barrier Plenum Wrap 5A+.
 - c. Morgan Advanced Materials; Thermal Ceramics; FireMaster PlenumWrap and PlenumWrap+.

2.5 ADHESIVES

- A. Materials shall be compatible with insulation materials, jackets, and substrates and for bonding insulation to it and to surfaces to be insulated, unless otherwise indicated.
- B. Flexible Elastomeric Adhesive: Comply with MIL-A-24179A, Type II, Class I.
1. Products: Subject to compliance with requirements, provide one of the products specified.

- a. Aeroflex USA, Inc.; Aero seal and Aero seal LVOC.
 - b. Armacell LCC; 520 Adhesive.
 - c. Foster Products Corporation, H. B. Fuller Company; 85-75.
- C. ASJ Adhesive, and FSK and PVDC Jacket Adhesive: Comply with MIL-A-3316C, Class 2, Grade A for bonding insulation jacket lap seams and joints.
1. Products: Subject to compliance with requirements, provide one of the products specified.
 - a. Childers Products, H.B. Fuller Company; CP-82.
 - b. Foster Products Corporation, H. B. Fuller Company; 85-20.
 - c. Johns Manville Industrial Insulation; S-90/80.
 - d. Marathon Industries, Inc.; 225.
 - e. Mon-Eco Industries, Inc.; 22-25.

2.6 MASTICS

- A. Materials shall be compatible with insulation materials, jackets, and substrates; comply with MIL-C-19565C, Type II.
- B. Vapor-Barrier Mastic: Water based; suitable for indoor and outdoor use on below ambient services.
1. Products: Subject to compliance with requirements, provide one of the products specified.
 - a. Childers Products, H.B. Fuller Company; CP-35.
 - b. Foster Products Corporation, H. B. Fuller Company; 30-90.
 - c. Johns Manville Industrial Insulation; CB-50.
 - d. Marathon Industries, Inc.; 590.
 - e. Mon-Eco Industries, Inc.; 55-40.
 - f. Vimasco Corporation; 749.
 2. Water-Vapor Permeance: ASTM E 96, Procedure B, 0.013 perm at 43-mil dry film thickness.
 3. Service Temperature Range: Minus 20 to plus 180 deg F.
 4. Solids Content: ASTM D 1644, 59 percent by volume and 71 percent by weight.
 5. Color: White.
- C. Breather Mastic: Water based; suitable for indoor and outdoor use on above ambient services.
1. Products: Subject to compliance with requirements, provide one of the products specified.
 - a. Childers Products, H.B. Fuller Company; CP-10.
 - b. Foster Products Corporation, H. B. Fuller Company; 35-00.
 - c. Johns Manville Industrial Insulation; CB-05/15.
 - d. Marathon Industries, Inc.; 550.

- e. Mon-Eco Industries, Inc.; 55-50.
 - f. Vimasco Corporation; WC-1/WC-5.
- 2. Water-Vapor Permeance: ASTM F 1249, 3 perms at 0.0625-inch dry film thickness.
 - 3. Service Temperature Range: Minus 20 to plus 200 deg F.
 - 4. Solids Content: 63 percent by volume and 73 percent by weight.
 - 5. Color: White.

2.7 SEALANTS

A. FSK and Metal Jacket Flashing Sealants:

- 1. Products: Subject to compliance with requirements, provide one of the products specified.
 - a. Childers Products, H.B. Fuller Company; CP-76-8.
 - b. Foster Products Corporation, H. B. Fuller Company; 95-44.
 - c. Marathon Industries, Inc.; 405.
 - d. Mon-Eco Industries, Inc.; 44-05.
 - e. Vimasco Corporation; 750.
- 2. Materials shall be compatible with insulation materials, jackets, and substrates.
- 3. Fire- and water-resistant, flexible, elastomeric sealant.
- 4. Service Temperature Range: Minus 40 to plus 250 deg F.
- 5. Color: Aluminum.

2.8 FACTORY-APPLIED JACKETS

A. Insulation systems indicate factory-applied jackets on various applications. When factory-applied jackets are indicated, comply with the following:

- 1. ASJ: White, kraft-paper, fiberglass-reinforced scrim with aluminum-foil backing; complying with ASTM C 1136, Type I.
- 2. ASJ-SSL: ASJ with self-sealing, pressure-sensitive, acrylic-based adhesive covered by a removable protective strip; complying with ASTM C 1136, Type I.
- 3. FSK Jacket: Aluminum-foil, fiberglass-reinforced scrim with kraft-paper backing; complying with ASTM C 1136, Type II.
- 4. PSK Jacket: Metalized polypropylene, fiberglass-reinforced scrim with kraft-paper backing; complying with ASTM C 1136, Type II.

2.9 FIELD-APPLIED JACKETS

- A. Field-applied jackets shall comply with ASTM C 921, Type I, unless otherwise indicated.
- B. ASJ: White, kraft-paper, fiberglass-reinforced scrim with aluminum-foil backing; complying with ASTM C 1136, Type I.

- C. ASJ-SSL: ASJ with self-sealing, pressure-sensitive, acrylic-based adhesive covered by a removable protective strip; complying with ASTM C 1136, Type I.

2.10 TAPES

- A. ASJ Tape: White vapor-retarder tape matching factory-applied jacket with acrylic adhesive, complying with ASTM C 1136 and UL listed.

- 1. Basis-of-Design Product: Subject to compliance with requirements, provide Ideal Tape Co., Inc., an American Biltrite company; 728 Cold Seal ASJ or comparable products by one of the following:

- a. Avery Dennison Corporation, Specialty Tapes Division.
- b. 3M Venture Tape.

- 2. Width: 3 inches.
- 3. Thickness: 9 mils.
- 4. Adhesion: 70 ounces force/inch in width.
- 5. Elongation: 3 percent.
- 6. Tensile Strength: 45 lbf/inch in width.
- 7. ASJ Tape Disks and Squares: Precut disks or squares of ASJ tape.

- B. FSK Tape: Foil-face, vapor-retarder tape matching factory-applied jacket with rubber or acrylic adhesive; complying with ASTM C 1136 and UL listed.

- 1. Basis-of-Design Product: Subject to compliance with requirements, provide Ideal Tape Co., Inc., an American Biltrite company; 491 FSK or 791 Cold Seal Acrylic FSK, or comparable products by one of the following:

- a. Avery Dennison Corporation, Specialty Tapes Division.
- b. 3M Venture Tape.

- 2. Width: 3 inches.
- 3. Thickness: 6 mils.
- 4. Adhesion (Rubber Adhesive): 100 ounces force/inch in width.
- 5. Adhesion (Acrylic Adhesive): 90 ounces force/inch in width.
- 6. Elongation: 3 percent.
- 7. Tensile Strength: 35 lbf/inch in width.
- 8. FSK Tape Disks and Squares: Precut disks or squares of FSK tape.

2.11 SECUREMENTS

- A. Bands:

- 1. Products: Subject to compliance with requirements, provide one of the products specified.
 - a. PABCO-Childers Metals; Johns Manville Industrial Insulation; Pab-Bands and Fabstraps.

- b. RPR Products, Inc.; Bands.
 - 2. Stainless Steel: ASTM A 167 or ASTM A 240/A 240M, Type 304 or Type 316; 0.015 inch thick, 1/2 inch wide with wing or closed seal.
 - 3. Aluminum: ASTM B 209, Alloy 3003, 3005, 3105, or 5005; Temper H-14, 0.020 inch thick, 1/2 inch wide with wing or closed seal.
 - 4. Springs: Twin spring set constructed of stainless steel with ends flat and slotted to accept metal bands. Spring size determined by manufacturer for application.
- B. Insulation Pins and Hangers:
- 1. Capacitor-Discharge-Weld Pins: Copper- or zinc-coated steel pin, fully annealed for capacitor-discharge welding, 0.106-inch- diameter shank, length to suit depth of insulation indicated.
 - a. Products: Subject to compliance with requirements, provide one of the products specified.
 - 1) AGM Industries, Inc.; CWP-1.
 - 2) GEMCO; CD.
 - 3) Midwest Fasteners, Inc.; CD.
 - 4) Nelson Stud Welding; TPA, TPC, and TPS.
 - 2. Cupped-Head, Capacitor-Discharge-Weld Pins: Copper- or zinc-coated steel pin, fully annealed for capacitor-discharge welding, 0.106-inch- diameter shank, length to suit depth of insulation indicated with integral 1-1/2-inch galvanized carbon-steel washer.
 - a. Products: Subject to compliance with requirements, provide one of the products specified.
 - 1) AGM Industries, Inc.; CWP-1.
 - 2) GEMCO; Cupped Head Weld Pin.
 - 3) Midwest Fasteners, Inc.; Cupped Head.
 - 4) Nelson Stud Welding; CHP.
 - 3. Metal, Adhesively Attached, Perforated-Base Insulation Hangers: Baseplate welded to projecting spindle that is capable of holding insulation, of thickness indicated, securely in position indicated when self-locking washer is in place. Comply with the following requirements:
 - a. Products: Subject to compliance with requirements, provide one of the products specified.
 - 1) AGM Industries, Inc.; Tactoo Insul-Hangers, Series T.
 - 2) GEMCO; Perforated Base.
 - 3) Midwest Fasteners, Inc.; Spindle.
 - b. Baseplate: Perforated, galvanized carbon-steel sheet, 0.030 inch thick by 2 inches square.

- c. Spindle: Copper- or zinc-coated, low carbon steel, fully annealed, 0.106-inch- diameter shank, length to suit depth of insulation indicated.
 - d. Adhesive: Recommended by hanger manufacturer. Product with demonstrated capability to bond insulation hanger securely to substrates indicated without damaging insulation, hangers, and substrates.
4. Nonmetal, Adhesively Attached, Perforated-Base Insulation Hangers: Baseplate fastened to projecting spindle that is capable of holding insulation, of thickness indicated, securely in position indicated when self-locking washer is in place. Comply with the following requirements:
- a. Products: Subject to compliance with requirements, provide one of the products specified.
 - 1) GEMCO; Nylon Hangers.
 - 2) Midwest Fasteners, Inc.; Nylon Insulation Hangers.
 - b. Baseplate: Perforated, nylon sheet, 0.030 inch thick by 1-1/2 inches in diameter.
 - c. Spindle: Nylon, 0.106-inch- diameter shank, length to suit depth of insulation indicated, up to 2-1/2 inches.
 - d. Adhesive: Recommended by hanger manufacturer. Product with demonstrated capability to bond insulation hanger securely to substrates indicated without damaging insulation, hangers, and substrates.
5. Self-Sticking-Base Insulation Hangers: Baseplate welded to projecting spindle that is capable of holding insulation, of thickness indicated, securely in position indicated when self-locking washer is in place. Comply with the following requirements:
- a. Products: Subject to compliance with requirements, provide one of the products specified.
 - 1) AGM Industries, Inc.; Tactoo Insul-Hangers, Series TSA.
 - 2) GEMCO; Press and Peel.
 - 3) Midwest Fasteners, Inc.; Self Stick.
 - b. Baseplate: Galvanized carbon-steel sheet, 0.030 inch thick by 2 inches square.
 - c. Spindle: Copper- or zinc-coated, low carbon steel, fully annealed, 0.106-inch- diameter shank, length to suit depth of insulation indicated.
 - d. Adhesive-backed base with a peel-off protective cover.
6. Insulation-Retaining Washers: Self-locking washers formed from 0.016-inch- thick, galvanized-steel sheet, with beveled edge sized as required to hold insulation securely in place but not less than 1-1/2 inches in diameter.
- a. Products: Subject to compliance with requirements, provide one of the products specified.
 - 1) AGM Industries, Inc.; RC-150.

- 2) GEMCO; R-150.
 - 3) Midwest Fasteners, Inc.; WA-150.
 - 4) Nelson Stud Welding; Speed Clips.
- b. Protect ends with capped self-locking washers incorporating a spring steel insert to ensure permanent retention of cap in exposed locations.
7. Nonmetal Insulation-Retaining Washers: Self-locking washers formed from 0.016-inch-thick nylon sheet, with beveled edge sized as required to hold insulation securely in place but not less than 1-1/2 inches in diameter.
- a. Manufacturers:
 - 1) GEMCO.
 - 2) Midwest Fasteners, Inc.
- C. Staples: Outward-clinching insulation staples, nominal 3/4-inch-wide, stainless steel or Monel.
- D. Wire: 0.062-inch soft-annealed, stainless steel.
1. Manufacturers:
 - a. ACS Industries, Inc.
 - b. C & F Wire.
 - c. PABCO-Childers Metals; Johns Manville Industrial Insulation.
 - d. RPR Products, Inc.

2.12 CORNER ANGLES

- A. PVC Corner Angles: 30 mils thick, minimum 1 by 1 inch, PVC according to ASTM D 1784, Class 16354-C. White or color-coded to match adjacent surface.
- B. Aluminum Corner Angles: 0.040 inch thick, minimum 1 by 1 inch, aluminum according to ASTM B 209, Alloy 3003, 3005, 3105 or 5005; Temper H-14.
- C. Stainless-Steel Corner Angles: 0.024 inch thick, minimum 1 by 1 inch, stainless steel according to ASTM A 167 or ASTM A 240/A 240M, Type 304 or 316.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions for compliance with requirements for installation and other conditions affecting performance of insulation application.
 1. Verify that systems and equipment to be insulated have been tested and are free of defects.
 2. Verify that surfaces to be insulated are clean and dry.

3. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Surface Preparation: Clean and dry surfaces to receive insulation. Remove materials that will adversely affect insulation application.
- B. Coordinate insulation installation with the trade installing heat tracing. Comply with requirements for heat tracing that applies to insulation.
- C. Mix insulating cements with clean potable water; if insulating cements are to be in contact with stainless-steel surfaces, use demineralized water.

3.3 COMMON INSTALLATION REQUIREMENTS

- A. Install insulation materials, accessories, and finishes with smooth, straight, and even surfaces; free of voids throughout the length of equipment, ducts and fittings, and piping including fittings, valves, and specialties.
- B. Install insulation materials, forms, vapor barriers or retarders, jackets, and thicknesses required for each item of equipment, duct system, and pipe system as specified in insulation system schedules.
- C. Install accessories compatible with insulation materials and suitable for the service. Install accessories that do not corrode, soften, or otherwise attack insulation or jacket in either wet or dry state.
- D. Install insulation with longitudinal seams at the 4 o'clock or 8 o'clock position on horizontal runs.
- E. Install multiple layers of insulation with longitudinal and end seams staggered.
- F. Do not weld brackets, clips, or other attachment devices to piping, fittings, and specialties.
- G. Keep insulation materials dry during application and finishing.
- H. Install insulation with tight longitudinal seams and end joints. Bond seams and joints with adhesive as recommended by insulation material manufacturer.
- I. Install insulation with least number of joints practical.
- J. For services with surface temperatures below ambient, install a continuous unbroken vapor barrier. Seal joints, seams, and penetrations in insulation at hangers, supports, anchors, and other projections with vapor-barrier mastic.
 1. Install insulation continuously through hangers and around anchor attachments.

2. For insulation application where vapor barriers are indicated, extend insulation on anchor legs from point of attachment to supported item to point of attachment to structure. Taper and seal ends at attachment to structure with vapor-barrier mastic.
 3. Install thermal hanger insert materials and install insulation to tightly join the insert. Seal insulation to insulation inserts with adhesive or sealing compound recommended by insulation material manufacturer.
 4. Cover thermal hanger inserts with jacket material matching adjacent pipe insulation. Install shields over jacket, arranged to protect jacket from tear or puncture by hanger, support, and shield.
- K. Apply adhesives, mastics, and sealants at manufacturer's recommended coverage rate and wet and dry film thicknesses.
- L. Install insulation with factory-applied jackets as follows:
1. Draw jacket tight and smooth.
 2. Cover circumferential joints with 3-inch- wide strips, of same material as insulation jacket. Secure strips with adhesive and outward clinching staples along both edges of strip, spaced 4 inches o.c.
 3. Overlap jacket longitudinal seams at least 1-1/2 inches. Install insulation with longitudinal seams at the 4 o'clock or 8 o'clock position on the pipe. Clean and dry surface to receive self-sealing lap. Staple laps with outward clinching staples along edge at 4 inches o.c.
 - a. For below ambient services, apply vapor-barrier mastic over staples.
 4. Cover joints and seams with tape as recommended by insulation material manufacturer to maintain vapor seal.
 5. Where vapor barriers are indicated, apply vapor-barrier mastic on seams and joints and at ends adjacent to duct and pipe flanges and fittings.
- M. Cut insulation in a manner to avoid compressing insulation more than 75 percent of its nominal thickness. Where compression of insulation is possible, fabricate/install insulation per manufacturer's recommendations.
- N. Finish installation with systems at operating conditions. Repair joint separations and cracking due to thermal movement.
- O. Repair damaged insulation facings by applying same facing material over damaged areas. Extend patches at least 4 inches beyond damaged areas. Adhere, staple, and seal patches similar to butt joints.
- P. For above ambient services, do not install insulation to the following:
1. Vibration-control devices.
 2. Testing agency labels and stamps.
 3. Nameplates and data plates.
 4. Manholes.
 5. Handholes.
 6. Cleanouts.

3.4 PENETRATIONS

- A. Insulation Installation at Roof Penetrations: Install insulation continuously through roof penetrations.
 - 1. Seal penetrations with flashing sealant.
 - 2. For applications requiring only indoor insulation, terminate insulation above roof surface and seal with joint sealant. For applications requiring indoor and outdoor insulation, install insulation for outdoor applications tightly joined to indoor insulation ends. Seal joint with joint sealant.
 - 3. Extend jacket of outdoor insulation outside roof flashing at least 2 inches below top of roof flashing.
 - 4. Seal jacket to roof flashing with flashing sealant.

- B. Insulation Installation at Interior Wall and Partition Penetrations that Are Not Fire Rated: Install insulation through walls and partitions as detailed.

- C. Insulation Installation at Fire-Rated Wall and Partition Penetrations:
 - 1. Terminate ductwork insulation at angle closure of fire damper sleeves.
 - 2. Install pipe insulation continuously through penetrations of fire-rated walls and partitions.
 - a. Firestopping is specified in Division 07 Section "Through-Penetration Firestop Systems."

- D. Insulation Installation at Floor Penetrations:
 - 1. Duct: Install insulation through floor penetrations that are not fire rated. For penetrations through fire-rated assemblies, terminate insulation at angle closure of fire damper sleeves.
 - 2. Pipe: Install insulation continuously through floor penetrations.
 - a. Seal penetrations through fire-rated assemblies according to Division 07 Section "Through-Penetration Firestop Systems."

3.5 GENERAL PIPE INSULATION INSTALLATION

- A. Requirements in this Article generally apply to all insulation materials except where more specific requirements are specified in various pipe insulation material installation articles.

- B. Insulation Installation on Fittings, Valves, Strainers, Flanges, and Unions:
 - 1. Install insulation over fittings, valves, strainers, flanges, unions, and other specialties with continuous thermal and vapor-retarder integrity, unless otherwise indicated.
 - 2. Insulate pipe elbows using preformed fitting insulation or mitered fittings made from same material and density as adjacent pipe insulation. Each piece shall be butted tightly against adjoining piece and bonded with adhesive. Fill joints, seams, voids,

- and irregular surfaces with insulating cement finished to a smooth, hard, and uniform contour that is uniform with adjoining pipe insulation.
3. Insulate tee fittings with preformed fitting insulation or sectional pipe insulation of same material and thickness as used for adjacent pipe. Cut sectional pipe insulation to fit. Butt each section closely to the next and hold in place with tie wire. Bond pieces with adhesive.
 4. Insulate valves using preformed fitting insulation or sectional pipe insulation of same material, density, and thickness as used for adjacent pipe. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker. For valves, insulate up to and including the bonnets, valve stuffing-box studs, bolts, and nuts. Fill joints, seams, and irregular surfaces with insulating cement.
 5. Insulate strainers using preformed fitting insulation or sectional pipe insulation of same material, density, and thickness as used for adjacent pipe. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker. Fill joints, seams, and irregular surfaces with insulating cement. Insulate strainers so strainer basket flange or plug can be easily removed and replaced without damaging the insulation and jacket. Provide a removable reusable insulation cover. For below ambient services, provide a design that maintains vapor barrier.
 6. Insulate flanges and unions using a section of oversized preformed pipe insulation. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker.
 7. Cover segmented insulated surfaces with a layer of finishing cement and coat with a mastic. Install vapor-barrier mastic for below ambient services and a breather mastic for above ambient services. Reinforce the mastic with fabric-reinforcing mesh. Trowel the mastic to a smooth and well-shaped contour.
 8. For services not specified to receive a field-applied jacket except for flexible Elastomeric, install fitted PVC cover over elbows, tees, strainers, valves, flanges, and unions. Terminate ends with PVC end caps. Tape PVC covers to adjoining insulation facing using PVC tape.
 9. Stencil or label the outside insulation jacket of each union with the word "UNION." Match size and color of pipe labels.
- C. Insulate instrument connections for thermometers, pressure gages, pressure temperature taps, test connections, flow meters, sensors, switches, and transmitters on insulated pipes, vessels, and equipment. Shape insulation at these connections by tapering it to and around the connection with insulating cement and finish with finishing cement, mastic, and flashing sealant.
- D. Install removable insulation covers at locations indicated. Installation shall conform to the following:
1. Make removable flange and union insulation from sectional pipe insulation of same thickness as that on adjoining pipe. Install same insulation jacket as adjoining pipe insulation.
 2. When flange and union covers are made from sectional pipe insulation, extend insulation from flanges or union at least two times the insulation thickness over adjacent pipe insulation on each side of flange or union. Secure flange cover in place with stainless-steel or aluminum bands. Select band material compatible with insulation and jacket.

3. Construct removable valve insulation covers in same manner as for flanges except divide the two-part section on the vertical center line of valve body.
 4. When covers are made from block insulation, make two halves, each consisting of mitered blocks wired to stainless-steel fabric. Secure this wire frame, with its attached insulation, to flanges with tie wire. Extend insulation at least 2 inches over adjacent pipe insulation on each side of valve. Fill space between flange or union cover and pipe insulation with insulating cement. Finish cover assembly with insulating cement applied in two coats. After first coat is dry, apply and trowel second coat to a smooth finish.
 5. Unless a PVC jacket is indicated in field-applied jacket schedules, finish exposed surfaces with a metal jacket.
- E. Install removable and reusable insulation covers in accordance with fabricator's instructions, and at the following locations:
1. At valves, flanges, and expansion joints. Expansion joints shall have jacket installed in a manner to allow for replacing of joints without removing insulation cover.

3.6 FLEXIBLE ELASTOMERIC PIPE INSULATION INSTALLATION

- A. Seal longitudinal seams and end joints with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.
- B. Insulation Installation on Pipe Flanges:
1. Install pipe insulation to outer diameter of pipe flange.
 2. Make width of insulation section same as overall width of flange and bolts, plus twice the thickness of pipe insulation.
 3. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with cut sections of sheet insulation of same thickness as pipe insulation.
 4. Secure insulation to flanges and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.
- C. Insulation Installation on Pipe Fittings and Elbows:
1. Install mitered sections of pipe insulation.
 2. Secure insulation materials and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.
- D. Insulation Installation on Valves and Pipe Specialties:
1. Install preformed valve covers manufactured of same material as pipe insulation when available.
 2. When preformed valve covers are not available, install cut sections of pipe and sheet insulation to valve body. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.

3. Install insulation to flanges as specified for flange insulation application.
4. Secure insulation to valves and specialties and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

3.7 GLASS-FIBER AND MINERAL WOOL PIPE INSULATION INSTALLATION

A. Insulation Installation on Straight Pipes and Tubes:

1. Secure each layer of preformed pipe insulation to pipe with wire or bands and tighten bands without deforming insulation materials.
2. Where vapor barriers are indicated, seal longitudinal seams, end joints, and protrusions with vapor-barrier mastic and joint sealant.
3. For insulation with factory-applied jackets on above ambient surfaces, secure laps with outward clinched staples at 6 inches o.c.
4. For insulation with factory-applied jackets on below ambient surfaces, do not staple longitudinal tabs but secure tabs with additional adhesive as recommended by insulation material manufacturer and seal with vapor-barrier mastic and flashing sealant.

B. Insulation Installation on Pipe Flanges:

1. Install PVC fitting covers when available.
2. When PVC fitting covers are not available, install preformed pipe insulation to outer diameter of pipe flange:
 - a. Make width of insulation section same as overall width of flange and bolts, plus twice the thickness of pipe insulation.
 - b. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with fiberglass or mineral wool blanket insulation as specified for system.
3. Install jacket material with manufacturer's recommended adhesive, overlap seams at least 1 inch, and seal joints with flashing sealant.

C. Insulation Installation on Pipe Fittings and Elbows:

1. Install PVC fitting covers when available.
2. When PVC fitting covers are not available, install mitered sections of pipe insulation, to a thickness equal to adjoining pipe insulation. Secure insulation materials with wire or bands.

D. Insulation Installation on Valves and Pipe Specialties:

1. Install PVC fitting covers when available.
2. When PVC fitting covers are not available, install mitered sections of pipe insulation to valve body.
3. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
4. Install insulation to flanges as specified for flange insulation application.

3.8 DUCT AND PLENUM INSULATION INSTALLATION

- A. Blanket Insulation Installation on Ducts and Plenums: Secure with insulation pins.
1. Install either capacitor-discharge-weld pins and speed washers or cupped-head, capacitor-discharge-weld pins on sides and bottom of horizontal ducts and sides of vertical ducts as follows:
 - a. On duct sides with dimensions 18 inches and smaller, place pins along longitudinal centerline of duct. Space 3 inches maximum from insulation end joints, and 16 inches o.c.
 - b. On duct sides with dimensions larger than 18 inches, place pins 16 inches o.c. each way, and 3 inches maximum from insulation joints. Install additional pins to hold insulation tightly against surface at cross bracing.
 - c. Pins may be omitted from top surface of horizontal, rectangular ducts and plenums.
 - d. Do not over compress insulation during installation.
 - e. Impale insulation over pins and attach speed washers.
 - f. Cut excess portion of pins extending beyond speed washers or bend parallel with insulation surface. Cover exposed pins and washers with tape matching insulation facing.
 2. For ducts and plenums with surface temperatures below ambient, install a continuous unbroken vapor barrier. Create a facing lap for longitudinal seams and end joints with insulation by removing 2 inches from 1 edge and 1 end of insulation segment. Secure laps to adjacent insulation section with 1/2-inch outward-clinching staples, 1 inch o.c. Install vapor barrier consisting of factory- or field-applied jacket, adhesive, vapor-barrier mastic, and sealant at joints, seams, and protrusions.
 - a. Repair punctures, tears, and penetrations with tape or mastic to maintain vapor-barrier seal.
 - b. Install vapor stops for ductwork and plenums operating below 50 deg F at 18-foot intervals. Vapor stops shall consist of vapor-barrier mastic applied in a Z-shaped pattern over insulation face, along butt end of insulation, and over the surface. Cover insulation face and surface to be insulated a width equal to 2 times the insulation thickness but not less than 3 inches.
 3. Overlap unfaced blankets a minimum of 2 inches on longitudinal seams and end joints. At end joints, secure with steel bands spaced a maximum of 18 inches o.c.
 4. Install insulation on rectangular duct elbows and transitions with a full insulation section for each surface. Install insulation on round and flat-oval duct elbows with individually mitered gores cut to fit the elbow.
 5. Insulate duct stiffeners, hangers, and flanges that protrude beyond insulation surface with 6-inch- wide strips of same material used to insulate duct. Secure on alternating sides of stiffener, hanger, and flange with pins spaced 6 inches o.c.

- B. Flexible Elastomeric Thermal Insulation Installation for Ducts and Plenums: Install insulation over entire surface of ducts and plenums.
 - 1. Apply 100 percent coverage of adhesive to surface with manufacturer's recommended adhesive.
 - 2. Seal longitudinal seams and end joints.
 - 3. Insulate duct stiffeners, hangers, and flanges that protrude beyond insulation surface with strips of same material used to insulate duct and following manufacturer's installation instructions.

3.9 FIELD-APPLIED JACKET INSTALLATION

- A. Install jacket over insulation material. For insulation with factory-applied jacket, install the field-applied jacket over the factory-applied jacket.
- B. Where glass-cloth jackets are indicated, install directly over bare insulation or insulation with factory-applied jackets.
 - 1. Draw jacket smooth and tight to surface with 2-inch overlap at seams and joints.
 - 2. Embed glass cloth between two 0.062-inch- thick coats of lagging adhesive.
 - 3. Completely encapsulate insulation with coating, leaving no exposed insulation.
- C. Where PVC jackets are indicated, install with 1-inch overlap at longitudinal seams and end joints; for horizontal applications, install with longitudinal seams along top and bottom of tanks and vessels. Seal with manufacturer's recommended adhesive.
 - 1. Apply two continuous beads of adhesive to seams and joints, one bead under lap and the finish bead along seam and joint edge.
- D. Where self-adhesive jackets are indicated, install according to manufacturer's instructions and details on the drawings. Overlap seams arranged to shed water.

3.10 FIRE-RATED INSULATION SYSTEM INSTALLATION

- A. Where fire-rated insulation system is indicated, install two layers in strict accordance with manufacturer's instructions, secure system to ducts and duct hangers and supports to maintain a continuous fire rating.
- B. Insulate duct access panels and doors in strict accordance with insulation manufacturer's to achieve same fire rating as duct.
- C. Maintain a copy of insulation manufacturer's installation instructions on site for Code Official.
- D. Where fire-rated plenum wrap system is indicated, secure to system piping to maintain a continuous UL-listed fire rating.
- E. Install firestopping at penetrations through fire-rated assemblies. Fire-stop systems are specified in Division 07 Section "Through-Penetration Firestop Systems."

3.11 FINISHES

- A. Duct, Equipment, and Pipe Insulation with ASJ, Glass-Cloth, or Other Paintable Jacket Material: Paint jacket with paint system specified in Division 09 painting Sections.
- B. Flexible Elastomeric Thermal Insulation: After adhesive has fully cured, apply two coats of insulation manufacturer's recommended protective coating.
- C. Color: Final color as selected by Architect. Vary first and second coats to allow visual inspection of the completed Work.
- D. Do not field paint aluminum or stainless-steel jackets.

END OF SECTION 20 07 00

SECTION 21 11 00 - FIRE-SUPPRESSION SYSTEM

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PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- B. Provisions of Division 20 Section "Mechanical General Requirements" apply to this Section.
- C. Related Sections include the following:
 - 1. Division 10 Section "Fire-Protection Specialties" for cabinets and fire extinguishers.
 - 2. Division 20 Section "Basic Mechanical Materials and Methods."
 - 3. Division 20 Section "Hangers and Supports."
 - 4. Division 28 Section "Fire Alarm" for alarm devices not specified in this Section.

1.2 DEFINITIONS

- A. CR: Chlorosulfonated polyethylene synthetic rubber.
- B. High-Pressure Piping System: Fire-suppression piping system designed to operate at working pressure higher than standard 175 psig.
- C. Underground Service-Entrance Piping: Underground service piping below the building.
- D. Hose Connection: Valve with threaded outlet matching fire hose coupling thread for attaching fire hose.
- E. Hose Station: Hose connection, fire hose rack, and fire hose.
- F. Working Plans: Documents, including drawings, calculations, and material specifications prepared according to NFPA 13 and NFPA 14 for obtaining approval from authorities having jurisdiction.

1.3 SYSTEM DESCRIPTIONS

- A. Wet-Pipe Sprinkler System: Automatic sprinklers are attached to piping containing water and that is connected to water supply. Water discharges immediately from sprinklers when they are opened. Sprinklers open when heat melts fusible link or destroys frangible device. Hose connections are included if indicated.

1.4 PERFORMANCE REQUIREMENTS

- A. Standard Piping System Component Working Pressure: Listed for at least 175 psig.
- B. High-Pressure Piping System Component Working Pressure: Listed for 300 psig.

- C. Delegated Design: Design sprinkler system(s), including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.
- D. Fire-suppression standpipe system design shall be approved by authorities having jurisdiction.
 - 1. Minimum residual pressure at each hose-connection outlet shall be based on NFPA 14 and the requirements of the Owner:
 - a. Examples:
 - 1) NPS 1-1/2 Hose Connections: 65 psig.
 - 2) NPS 2-1/2 Hose Connections: 100 psig.
 - 2. Unless otherwise indicated, the following is maximum residual pressure at required flow at each hose-connection outlet:
 - a. NPS 1-1/2 Hose Connections: 100 psig.
 - b. NPS 2-1/2 Hose Connections: 175 psig.
- E. Fire-suppression sprinkler system design shall be approved by authorities having jurisdiction.
 - 1. Margin of Safety for Available Water Flow and Pressure: 10 percent, including losses through water-service piping, valves, and backflow preventers.
 - 2. Sprinkler Occupancy Hazard Classifications, for bidding purposes, as follows:
 - a. General Storage Areas: Ordinary Hazard, Group 1.
 - b. Libraries, Except Stack Areas: Light Hazard.
 - c. Library Stack Areas: Ordinary Hazard, Group 2.
 - d. Office and Public Areas: Light Hazard.
 - 3. Minimum Density for Automatic-Sprinkler Piping Design:
 - a. Light-Hazard Occupancy: 0.10 gpm/sq. ft. over 1500-sq. ft. area.
 - b. Ordinary-Hazard, Group 1 Occupancy: 0.15 gpm over 1500-sq. ft. area.
 - c. Ordinary-Hazard, Group 2 Occupancy: 0.20 gpm/sq. ft. over 1500-sq. ft. area.
 - d. Extra-Hazard, Group 1 Occupancy: 0.30 gpm/sq. ft. over 2500-sq. ft. area.
 - e. Extra-Hazard, Group 2 Occupancy: 0.40 gpm/sq. ft. over 2500-sq. ft. area.
 - f. Special Occupancy Hazard: As determined by authorities having jurisdiction.
 - 4. Maximum Protection Area per Sprinkler:
 - a. Office Spaces: 120 sq. ft.
 - b. Storage Areas: 130 sq. ft.
 - c. Mechanical Equipment Rooms: 130 sq. ft.
 - d. Electrical Equipment Rooms: 130 sq. ft.
 - e. Other Areas: According to NFPA 13 recommendations, unless otherwise indicated.

F. Water velocity in the piping system shall not exceed the following:

1. Aboveground mains: 32 ft./sec.
2. Sprinkler branch lines: 24 ft./sec.

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

1.6 INFORMATIONAL SUBMITTALS

A. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.

1. Wiring Diagrams: For power, signal, and control wiring.

B. Delegated-Design Submittal: For sprinkler systems indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

C. Coordination Drawings: Sprinkler systems, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:

1. Domestic water piping.
2. Items penetrating finished ceiling include the following:
 - a. Lighting fixtures.
 - b. Air outlets and inlets.

D. Qualification Data: For qualified Installer.

E. Approved Sprinkler Piping Drawings: Working plans, prepared according to NFPA 13, that have been approved by authorities having jurisdiction, including hydraulic calculations, if applicable.

1. Sprinklers shall be referred to on drawings, submittals, and other documentation, by the sprinkler identification number (SIN) or model number as specifically published in the appropriate agency listing or approval. Trade names or other abbreviated designations shall not be allowed.

F. Fire-hydrant flow test report.

1.7 CLOSEOUT SUBMITTALS

A. Field Test Reports and Certificates: Indicate and interpret test results for compliance with performance requirements and as described in NFPA 13 and NFPA 14. Include "Contractor's Material and Test Certificate for Aboveground Piping".

- B. Field quality-control reports.
- C. Operation and Maintenance Data: For standpipe and sprinkler specialties to include in operation and maintenance manuals.

1.8 QUALITY ASSURANCE

- A. Installer Qualifications:
 - 1. Installer's responsibilities include designing, fabricating, and installing fire-suppression systems and providing professional engineering services needed to assume engineering responsibility. Base calculations on results of fire-hydrant flow test.
 - a. Engineering Responsibility: Preparation of working plans, calculations, and field test reports by a qualified professional engineer.
 - B. The provisions and requirements of the NFPA and the Owner's insurance underwriter constitute mandatory minimum requirements for the work of this Section.
 - C. NFPA Standards: Fire-suppression-system equipment, specialties, accessories, installation, and testing shall comply with the following:
 - 1. NFPA 13, "Installation of Sprinkler Systems."
 - 2. NFPA 14, "Installation of Standpipe, Private Hydrant, and Hose Systems."
 - D. Grooved couplings, fittings, valves, and specialties shall be the products of a single manufacturer.

1.9 COORDINATION

- A. Coordinate layout and installation of sprinklers with other construction that penetrates ceilings, including light fixtures, HVAC equipment, and partition assemblies.

1.10 EXTRA MATERIALS

- A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Sprinkler Cabinets: Finished, wall-mounting, steel cabinet with hinged cover, with space for minimum of six spare sprinklers plus sprinkler wrench. Include number of sprinklers required by NFPA 13 and sprinkler wrench. Include separate cabinet with sprinklers and wrench for each type of sprinkler on Project.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

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

2.2 DUCTILE-IRON PIPE AND FITTINGS

- A. Mechanical-Joint, Ductile-Iron Pipe: AWWA C151, pressure class 350, with mechanical-joint bell end and plain end.
1. Mechanical-Joint, Ductile-Iron Fittings: AWWA C110, ductile- or gray-iron standard pattern or AWWA C153, ductile-iron compact pattern.
 2. Glands, Gaskets, and Bolts: AWWA C111, ductile- or gray-iron gland, rubber gasket, and steel bolts and nuts.
- B. Push-on-Joint, Ductile-Iron Pipe: AWWA C151, pressure class 350, with push-on-joint bell end and plain end.
1. Push-on-Joint, Ductile-Iron Fittings: AWWA C110, ductile- or gray-iron standard pattern or AWWA C153, ductile-iron compact pattern.
 2. Gaskets: AWWA C111, rubber.

2.3 STANDARD-WEIGHT BLACK STEEL PIPE AND FITTINGS

- A. Threaded-End, Standard-Weight Steel Pipe: ASTM A 53/A 53M, ASTM A 135, or ASTM A 795, with factory- or field-formed threaded ends, and with factory applied antimicrobial coating on inner wall of pipe.
1. Cast-Iron Threaded Flanges: ASME B16.1.
 2. Malleable-Iron Threaded Fittings: ASME B16.3.
 3. Gray-Iron Threaded Fittings: ASME B16.4.
 4. Steel Threaded Pipe Nipples: ASTM A 733, made of ASTM A 53/A 53M or ASTM A 106, Schedule 40, seamless steel pipe. Include ends matching joining method.
 5. Steel Threaded Couplings: ASTM A 865.
- B. Plain-End, Standard-Weight Steel Pipe: ASTM A 53/A 53M, ASTM A 135, or ASTM A 795, and with factory applied antimicrobial coating on inner wall of pipe.
1. Steel Welding Fittings: ASTM A 234/A 234M, and ASME B16.9 or ASME B16.11.
 2. Steel Flanges and Flanged Fittings: ASME B16.5.
- C. Grooved-End, Standard-Weight Steel Pipe: ASTM A 53/A 53M, ASTM A 135, or ASTM A 795, with factory- or field-formed, square-cut- or roll- grooved ends, and with factory applied antimicrobial coating on inner wall of pipe.

1. Grooved-Joint Piping Systems:
 - a. Manufacturers:
 - 1) Anvil; Models 74FP and 7401; ASC Engineered Solutions.
 - 2) Tyco Fire Protection Products by Johnson Controls Company; Grinnell G-Fire.
 - 3) Victaulic Co. of America; Style 005H, 009N, 107N and 109.
 - b. Grooved-End Fittings: UL-listed, ASTM A 536, ductile-iron casting with OD matching steel-pipe OD.
 - c. Grooved-End-Pipe Couplings: UL 213 and AWWA C606, rigid pattern, unless otherwise indicated; gasketed fitting matching steel-pipe OD. Include ductile-iron housing with keys matching steel-pipe and fitting grooves, rubber gasket listed for use with housing, and steel bolts and nuts.

2.4 STANDARD-WEIGHT GALVANIZED STEEL PIPE AND FITTINGS

- A. Threaded-End, Standard-Weight Steel Pipe: ASTM A 53/A 53M, ASTM A 135, or ASTM A 795, hot-dip galvanized, with factory- or field-formed threaded ends.
 1. Cast-Iron Threaded Flanges: ASME B16.1, hot-dip galvanized.
 2. Malleable-Iron Threaded Fittings: ASME B16.3, hot-dip galvanized.
 3. Gray-Iron Threaded Fittings: ASME B16.4, hot-dip galvanized.
 4. Steel Threaded Pipe Nipples: ASTM A 733, made of ASTM A 53/A 53M or ASTM A 106, Schedule 40, seamless steel pipe, hot-dip galvanized. Include ends matching joining method.
 5. Steel Threaded Couplings: ASTM A 865, hot-dip galvanized.

2.5 SCHEDULE 10 BLACK STEEL PIPE AND FITTINGS

- A. Plain-End, Schedule 10 Steel Pipe: ASTM A 135 or ASTM A 795, Schedule 10 in NPS 5 and smaller; and NFPA 13 specified wall thickness in NPS 6 to NPS 10, and with factory applied antimicrobial coating on inner wall of pipe.
 1. Steel Welding Fittings: ASTM A 234/A 234M, and ASME B16.9 or ASME B16.11.
 2. Steel Flanges and Flanged Fittings: ASME B16.5.
- B. Grooved-End, Schedule 10 Steel Pipe: ASTM A 135 or ASTM A 795, Schedule 10 in NPS 5 and smaller; and NFPA 13-specified wall thickness in NPS 6 to NPS 10; with factory- or field-formed, roll-grooved ends, and with factory applied antimicrobial coating on inner wall of pipe.
 1. Grooved-Joint Piping Systems:
 - a. Manufacturers:
 - 1) Anvil; Models 74FP and 7400; ASC Engineered Solutions.

- 2) Tyco Fire Protection Products by Johnson Controls Company; Grinnell G-Fire.
 - 3) Victaulic Co. of America; Styles 005H, 009N, 107N, and 109.
- b. Grooved-End Fittings: UL-listed, ASTM A 536, ductile-iron casting with OD matching steel-pipe OD.
 - c. Grooved-End-Pipe Couplings: UL 213 and AWWA C606, rigid pattern, unless otherwise indicated; gasketed fitting matching steel-pipe OD. Include ductile-iron housing with keys matching steel-pipe and fitting grooves, rubber gasket listed for use with housing, and steel bolts and nuts.

2.6 COVER SYSTEM FOR SPRINKLER PIPING

- A. Manufacturers:
 1. DecoShield Systems, Inc.
- B. Description: System of support brackets and covers made to protect sprinkler piping.
- C. Brackets: Glass-reinforced nylon.
- D. Covers: Extruded PVC sections of length, shape, and size required for size and routing of CPVC piping.

2.7 SPRINKLER SPECIALTY FITTINGS

- A. Sprinkler specialty fittings shall be UL listed or FMG approved, with 175-psig minimum working-pressure rating, and made of materials compatible with piping. Sprinkler specialty fittings shall have 300-psig working-pressure rating if fittings are components of high-pressure piping system.
- B. Sprinkler Drain and Alarm Test Fittings: Cast-bronze or ductile-iron body; with threaded or locking-lug inlet and outlet, test valve, and orifice and sight glass.
 1. Manufacturers:
 - a. Tyco Fire Protection Products by Johnson Controls Company.
 - b. Fire-End and Croker Corp.
 - c. Viking Corp.
 - d. Victaulic Co. of America; Series UTD Universal Test and Drain.
- C. Sprinkler Branch-Line Test Fittings: Brass body with threaded inlet, capped drain outlet, and threaded outlet for sprinkler.
 1. Manufacturers:
 - a. Elkhart Brass Mfg. Co., Inc.

- D. Sprinkler Inspector's Test Fitting: Cast- or ductile-iron housing with threaded inlet and drain outlet and sight glass.
 - 1. Manufacturers:
 - a. AGF Manufacturing Co.
 - b. G/J Innovations, Inc.
 - c. Triple R Specialty of Ajax, Inc.
 - d. Tyco Fire Protection Products by Johnson Controls Company.
- E. Drop-Nipple Fittings: UL 1474, adjustable with threaded inlet and outlet, and seals.
 - 1. Manufacturers:
 - a. CECA, LLC.
 - b. Merit.

2.8 LISTED FIRE-PROTECTION VALVES

- A. Valves: UL listed or FMG approved.
 - 1. Valves shall have 175-psig minimum pressure rating.
- B. Gate Valves with Wall Indicator Posts:
 - 1. Gate Valves: UL 262, cast-iron body, bronze mounted, with solid disc, nonrising stem, operating nut, and flanged ends.
 - 2. Indicator Posts: UL 789, horizontal-wall type, cast-iron body, with hand wheel, extension rod, locking device, and cast-iron barrel.
 - 3. Manufacturers:
 - a. McWane, Inc.; Kennedy Valve Div.
 - b. NIBCO.
 - c. Crane Co.; Crane Valve Group; Stockham Valves.
- C. Ball Valves: Comply with UL 1091, except with ball instead of disc.
 - 1. NPS 1-1/2 and Smaller: Bronze body with threaded ends.
 - 2. NPS 2 and NPS 2-1/2: Bronze body with threaded ends or ductile-iron body with grooved ends.
 - 3. NPS 3: Ductile-iron body with grooved ends.
 - 4. Manufacturers:
 - a. NIBCO.
 - b. Victaulic Co. of America.
- D. Butterfly Valves: UL 1091.
 - 1. NPS 2-1/2 and Larger: Bronze, cast-iron, or ductile-iron body; wafer type or with flanged or grooved ends.

- a. Manufacturers:
 - 1) McWane, Inc.; Kennedy Valve Div.
 - 2) Mueller Company; ASC Engineered Solutions.
 - 3) NIBCO.
 - 4) Tyco Fire Protection Products by Johnson Controls Company.
 - 5) Victaulic Co. of America; Series 705.

- E. Check Valves NPS 2 and Larger: UL 312, swing type, cast-iron body with flanged or grooved ends.
 - 1. Manufacturers:
 - a. Crane Co.; Crane Valve Group; Crane Valves.
 - b. Crane Co.; Crane Valve Group; Jenkins Valves.
 - c. Crane Co.; Crane Valve Group; Stockham Valves.
 - d. Hammond Valve.
 - e. McWane, Inc.; Kennedy Valve Div.
 - f. Mueller Company; ASC Engineered Solutions.
 - g. NIBCO.
 - h. Tyco Fire Protection Products by Johnson Controls.
 - i. Victaulic Co. of America.
 - j. Watts Water Technologies, Inc.; Watts Regulator Co.

- F. Gate Valves: UL 262, OS&Y type.
 - 1. NPS 2 and Smaller: Bronze body with threaded ends.
 - a. Manufacturers:
 - 1) Crane Co.; Crane Valve Group; Crane Valves.
 - 2) Hammond Valve.
 - 3) NIBCO.

 - 2. NPS 2-1/2 and Larger: Cast or ductile -iron body with flanged or grooved ends.
 - a. Manufacturers:
 - 1) McWane, Inc.; Clow Valve Co.
 - 2) Crane Co.; Crane Valve Group; Crane Valves.
 - 3) Crane Co.; Crane Valve Group; Jenkins Valves.
 - 4) Hammond Valve.
 - 5) Milwaukee Valve Company.
 - 6) Mueller Company.
 - 7) NIBCO.
 - 8) Victaulic Co. of America: Series 771.

2.9 UNLISTED GENERAL-DUTY VALVES

- A. Ball Valves NPS 2 and Smaller: MSS SP-110, 2-piece copper-alloy body with chrome-plated brass ball, 600-psig minimum CWP rating, blowout-proof stem, and threaded ends.
- B. Check Valves NPS 2 and Smaller: MSS SP-80, Type 4, Class 125 minimum, swing type with bronze body, nonmetallic disc, and threaded ends.
- C. Gate Valves NPS 2 and Smaller: MSS SP-80, Type 2, Class 125 minimum, with bronze body, solid wedge, and threaded ends.
- D. Globe Valves NPS 2 and Smaller: MSS SP-80, Type 2, Class 125 minimum, with bronze body, nonmetallic disc, and threaded ends.

2.10 ALARM CHECK VALVES

- A. General Requirements:
 - 1. Standard: UL listed or FMG approved.
 - 2. Pressure Rating:
 - a. Standard-Pressure Valves: 175 psig minimum.
 - b. High-Pressure Valves: 300 psig.
 - 3. Body Material: Cast or ductile iron.
 - 4. Size: Same as connected piping.
 - 5. End Connections: Flanged or grooved.
- B. Manufacturers:
 - 1. Reliable Automatic Sprinkler Co., Inc.
 - 2. Tyco Fire Protection Products by Johnson Controls Company.
 - 3. Viking Corp.
 - 4. Victaulic Co. of America.
- C. Description: UL 193, designed for horizontal or vertical installation, with bronze grooved seat with O-ring seals, single-hinge pin, and latch design. Include trim sets for bypass, drain, electrical sprinkler alarm switch, pressure gages, and fill-line attachment with strainer.
 - 1. Drip Cup Assembly: Pipe drain without valves and separate from main drain piping.

2.11 AUTOMATIC (BALL DRIP) DRAIN VALVES

- A. General:
 - 1. Standard: UL 1726.
 - 2. Pressure Rating: 175 psig minimum.

3. Type: Automatic draining, ball check.
4. Size: NPS 3/4.
5. End Connections: Threaded.

B. Manufacturer:

1. Reliable Automatic Sprinkler Co., Inc.
2. Tyco Fire Protection Products by Johnson Controls Company.

2.12 SPRINKLERS

- A. Sprinklers shall be UL listed or FMG approved, with 175-psig minimum pressure rating. Sprinklers shall have 300-psig pressure rating if sprinklers are components of high-pressure piping system.

B. Manufacturers:

1. Reliable Automatic Sprinkler Co., Inc.
2. Tyco Fire Protection Products by Johnson Controls Company.
3. Victaulic Co. of America.
4. Viking Corp.

C. Automatic Sprinklers:

1. With heat-responsive glass bulb element complying with the following:
 - a. UL 199, for nonresidential applications.
 - b. UL 1767, for early-suppression, fast-response applications.

- D. Sprinkler Types and Categories: Nominal 1/2-inch orifice for 165 deg F "Ordinary" temperature classification rating, unless otherwise indicated or required by application.

E. Sprinkler types, features, and options as follows:

1. Concealed ceiling sprinklers, including cover plate.
2. Extended-coverage sprinklers.
3. Flush ceiling sprinklers, including escutcheon.
4. High-pressure sprinklers.
5. Institution sprinklers, made with a small, breakaway projection.
6. Open sprinklers.
7. Pendent sprinklers.
8. Quick-response sprinklers.
9. Recessed sprinklers, including escutcheon.
10. Sidewall sprinklers.
11. Concealed sidewall sprinklers, including cover plate.
12. Upright sprinklers.

- F. Sprinkler Finishes: Chrome plated, bronze, and painted.

- G. Special Coatings: Wax, lead, and corrosion-resistant paint.

- H. Sprinkler Escutcheons: Materials, types, and finishes for the following sprinkler mounting applications. Escutcheons for concealed, flush, and recessed-type sprinklers are specified with sprinklers. Escutcheons listed, supplied, and approved for use with the sprinkler by the sprinkler manufacturer.
 - 1. Ceiling Mounting: Chrome-plated steel, 2 piece, with 3/4-inch vertical adjustment.
 - 2. Sidewall Mounting: Chrome-plated steel, one piece, flat.
- I. Sprinkler Guards: Wire-cage type, including fastening device for attaching to sprinkler. Sprinkler guards listed, supplied, and approved for use with the sprinkler by the sprinkler manufacturer.

2.13 ALARM DEVICES

- A. Alarm-device types shall match piping and equipment connections.

2.14 PRESSURE GAGES

- A. Manufacturers:
 - 1. AMETEK, Inc.; U.S. Gauge.
 - 2. Ashcroft Inc.
 - 3. Marsh Bellofram.
 - 4. Viking Corp.
 - 5. Weiss Instruments, Inc.
- B. Description: UL 393, 3-1/2- to 4-1/2-inch- diameter, dial pressure gage with range of 0 to 250 psig minimum.
 - 1. Water System Piping: Include caption "WATER" or "AIR/WATER" on dial face.
 - 2. Air System Piping: Include caption "AIR" or "AIR/WATER" on dial face.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Perform fire-hydrant flow test according to NFPA 13, NFPA 14, and NFPA 291. Use results for system design calculations required in Part 1 "Quality Assurance" Article.
- B. Report test results promptly and in writing.

3.2 EXAMINATION

- A. Examine roughing-in for hose connections and stations to verify actual locations of piping connections before installation.

- B. Examine walls and partitions for suitable thicknesses, fire- and smoke-rated construction, framing for hose-station cabinets, and other conditions where hose connections and stations are to be installed.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 PIPING APPLICATIONS, GENERAL

- A. Flanges, flanged fittings, unions, nipples, grooved-joint couplings, and transition and special fittings with finish and pressure ratings same as or higher than system's pressure rating may be used in aboveground applications, unless otherwise indicated.
- B. Piping between Fire Department Connections and Check Valves: Galvanized, standard-weight steel pipe with threaded ends; cast- or malleable-iron threaded fittings; and threaded joints; or grooved ends; grooved-end fittings; grooved-end-pipe couplings; and grooved joints.

3.4 SPRINKLER SYSTEM PIPING APPLICATIONS

- A. Wet-Pipe Sprinklers: Use the following:

<u>Pipe Type</u>	<u>1 ½" & Smaller</u>	<u>2"</u>	<u>2 ½" – 3 ½"</u>	<u>4"</u>	<u>5" – 6"</u>
Standard weight steel, threaded fittings	YES	YES	YES	YES	NO
Standard weight steel, grooved fittings	NO	NO	YES	YES	YES
Standard weight steel, welded fittings	NO	YES	YES	YES	YES
Galv. standard weight steel, threaded fittings	YES	YES	YES	YES	YES
Galv. standard weight steel, grooved fittings	NO	NO	YES	YES	YES
Schedule 10 steel, welded fittings	NO	YES	YES	YES	YES
Schedule 10 steel, grooved fittings	NO	NO	YES	YES	YES
Type K copper, brazed fittings	NO	NO	NO	NO	NO
Type L copper, brazed fittings	NO	NO	NO	NO	NO
Type K copper, grooved fittings	NO	NO	NO	NO	NO
Type L copper, grooved fittings	NO	NO	NO	NO	NO
CPVC pipe, solvent cement fittings	NO	NO	NO	NO	NO

3.5 VALVE APPLICATIONS

- A. The following requirements apply:

1. Listed Fire-Protection Valves: UL listed or FMG approved for applications where required by NFPA 13 and NFPA 14.
 - a. Shutoff Duty: Use ball, butterfly, or gate valves.
2. Unlisted General-Duty Valves: For applications where UL-listed and FMG-approved valves are not required by NFPA 13 and NFPA 14.
 - a. Shutoff Duty: Use ball, butterfly, or gate valves.
 - b. Throttling Duty: Use ball or globe valves.

3.6 JOINT CONSTRUCTION

- A. Refer to Division 20 Section "Basic Mechanical Materials and Methods" for basic piping joint construction.
- B. Threaded Joints: Comply with NFPA 13 for pipe thickness and threads. Do not thread pipe smaller than NPS 8 with wall thickness less than Schedule 40 unless approved by authorities having jurisdiction and threads are checked by a ring gage and comply with ASME B1.20.1.
- C. Welded Joints: Construct joints according to AWS D10.12M/D10.12, using qualified processes and welding operators according to "Quality Assurance" Article.
 1. Shop weld pipe joints where welded piping is indicated. Do not use welded joints for galvanized-steel pipe.
- D. Use of saddle style tees is not acceptable.
- E. Grooved Joints: Assemble joints with listed coupling and gasket, lubricant, and bolts.
 1. All grooved couplings, fittings, gaskets, valves, and specialties shall be the product of a single manufacturer.
 2. Steel Pipe: Square-cut or roll-groove piping as indicated. Use grooved-end fittings and rigid, grooved-end-pipe couplings, unless otherwise indicated.
- F. Dissimilar-Metal Piping Joints: Construct joints using dielectric fittings compatible with both piping materials. Refer to Division 20 Section "Basic Mechanical Materials and Methods" for additional requirements.

3.7 WATER-SUPPLY CONNECTION

- A. Connect fire-suppression piping to building's interior water distribution piping.
- B. Install shutoff valve, backflow prevention device, pressure gage, drain, and other accessories indicated at connection to water distribution piping.
- C. Install shutoff valve, check valve, pressure gage, and drain at connection to water supply.

3.8 PIPING INSTALLATION

- A. Refer to Division 20 Section "Basic Mechanical Materials and Methods" for basic piping installation.
- B. Install underground ductile-iron service-entrance piping according to NFPA 24 and with restrained joints.
- C. Use approved fittings to make changes in direction, branch takeoffs from mains, and reductions in pipe sizes.
- D. Install unions adjacent to each valve in pipes NPS 2 and smaller. Unions are not required on flanged devices or in piping installations using grooved joints.
- E. Install flanges or flange adapters on valves, apparatus, and equipment having NPS 2-1/2 and larger connections.
- F. Install "Inspector's Test Connections" in sprinkler system piping, complete with shutoff valve, sized and located according to NFPA 13.
- G. Install sprinkler piping with drains for complete system drainage.
- H. Install sprinkler zone control valves, test assemblies, and drain risers adjacent to standpipes when sprinkler piping is connected to standpipes.
- I. Install drain valves on standpipes.
- J. Install ball drip valves to drain piping between fire department connections and check valves. Drain to floor drain or outside building.
- K. Install alarm devices in piping systems.
- L. Hangers and Supports: Comply with NFPA 13 for hanger materials.
 - 1. Install standpipe system piping according to NFPA 14.
 - 2. Install sprinkler system piping according to NFPA 13, except use of "C" clamps, or beam clamps of "C" pattern, or any modification thereof, is prohibited for supporting pipes larger than NPS 2-1/2.
 - 3. Refer to Division 20 Section "Hangers and Supports" for additional requirements.
- M. Install pressure gages on riser or feed main, at each sprinkler test connection, and at top of each standpipe. Include pressure gages with connection not less than NPS 1/4 and with soft metal seated globe valve, arranged for draining pipe between gage and valve. Install gages to permit removal, and install where they will not be subject to freezing.
- N. Fill wet-standpipe system piping with water.
- O. Fill wet-pipe sprinkler system piping with water.

3.9 INSTALLATION OF COVER SYSTEM FOR SPRINKLER PIPING

- A. Install cover system, brackets, and cover components for sprinkler piping according to manufacturer's "Installation Manual" and with NFPA 13 or NFPA 13R for supports.

3.10 VALVE INSTALLATION

- A. Install listed fire-protection valves, unlisted general-duty valves, specialty valves and trim, controls, and specialties according to NFPA 13 and NFPA 14 and authorities having jurisdiction.
- B. Install listed fire-protection shutoff valves supervised-open, located to control sources of water supply except from fire department connections. Install permanent identification signs indicating portion of system controlled by each valve.
- C. Install check valve in each water-supply connection. Install backflow preventers instead of check valves in potable-water supply sources.
- D. Specialty Valves:
 - 1. Alarm Check Valves: Install in vertical position for proper direction of flow, including bypass check valve and retarding chamber drain-line connection.

3.11 SPRINKLER APPLICATIONS

- A. Use the following sprinkler types:
 - 1. Rooms without Ceilings: Upright sprinklers.
 - 2. Rooms with Suspended Ceilings: Pendent sprinklers.
 - 3. Wall Mounting: Sidewall sprinklers.
 - 4. Sprinkler Finishes:
 - a. Upright, Pendent, and Sidewall Sprinklers: Chrome plated in finished spaces exposed to view; rough bronze in unfinished spaces not exposed to view; wax coated where exposed to acids, chemicals, or other corrosive fumes; white polyester finish in natatoriums.
 - b. Concealed Sprinklers: Rough brass, with factory-painted white cover plate.
 - c. Flush Sprinklers: Bright chrome, with painted white escutcheon.
 - d. Recessed Sprinklers: Bright chrome, with bright chrome escutcheon.
 - 5. Sprinkler Guards: For exposed sprinkler heads subject to damage.

3.12 SPRINKLER INSTALLATION

- A. Install sprinklers in suspended ceilings in center of acoustical ceiling panels and tiles.
- B. Do not install pendent or sidewall, wet-type sprinklers in areas subject to freezing. Use dry-type sprinklers with water supply from heated space.

3.13 CONNECTIONS

- A. Install piping adjacent to equipment to allow service and maintenance.
- B. Connect water-supply piping to fire-suppression piping. Include backflow preventer between potable-water piping and fire-suppression piping. Refer to Division 22 Section "Domestic Water Piping Specialties" for backflow preventers.
- C. Install ball drip valves at each check valve for fire department connection. Drain to floor drain or outside building.
- D. Connect piping to specialty valves, hose valves, specialties, fire department connections, and accessories.
- E. Electrical Connections: Power wiring and fire alarm wiring are specified in Division 26.
- F. Connect alarm devices to fire alarm.
- G. Ground equipment according to Division 26 Section "Grounding and Bonding."
- H. Connect wiring according to Division 26 Section "Conductors and Cables."
- I. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

3.14 LABELING AND IDENTIFICATION

- A. Install labeling and pipe markers on equipment and piping according to requirements in NFPA 13 and NFPA 14 and in Division 20 Section "Mechanical Identification."

3.15 FIELD QUALITY CONTROL

- A. Perform the following field tests and inspections and prepare test reports:
 - 1. Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.
 - 2. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
 - 3. Flush, test, and inspect sprinkler systems according to NFPA 13, "Systems Acceptance" Chapter.
 - 4. Flush, test, and inspect standpipe systems according to NFPA 14, "System Acceptance" Chapter.
 - 5. Verify that equipment hose threads are same as local fire department equipment.
 - 6. Test each backflow prevention device according to authorities having jurisdiction and the device's reference standard.

- B. Verify that specialty valves, trim, fittings, controls, and accessories are installed and operate correctly.
- C. Verify that excess-pressure pumps and accessories are installed and operate correctly.
- D. Verify that air compressors and their accessories are installed and operate correctly.
- E. Verify that specified tests of piping are complete.
- F. Verify that damaged sprinklers and sprinklers with paint or coating not specified are replaced with new, correct type.
- G. Verify that sprinklers are correct types, have correct finishes and temperature ratings, and have guards as required for each application.
- H. Verify that potable-water supplies have correct types of backflow preventers.
- I. Verify that hose connections are correct type and size.
- J. Verify that hose stations are correct type and size.
- K. Energize circuits to electrical equipment and devices.
- L. Adjust operating controls and pressure settings.
- M. Coordinate with fire alarm tests. Operate as required.
- N. Coordinate with fire-pump tests. Operate as required.
- O. Report test results promptly and in writing to Architect and authorities having jurisdiction.

3.16 CLEANING AND PROTECTION

- A. Clean dirt and debris from sprinklers.
- B. Remove and replace sprinklers with paint other than factory finish.
- C. Protect sprinklers from damage until Substantial Completion.

3.17 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain specialty valves.

END OF SECTION 21 11 00

SECTION 22 05 23 - GENERAL-DUTY VALVES FOR PLUMBING

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PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- B. Related Sections include the following:
 - 1. Division 20 Section "Mechanical Identification" for valve tags and charts.
 - 2. Division 21 Fire-Suppression Piping and Fire Pump Sections for fire-protection valves.
 - 3. Division 22 Piping Sections for specialty valves applicable to those Sections only.
 - 4. Division 23 Section "Temperature Controls" for control valves and actuators.

1.2 SUMMARY

- A. This Section includes valves for general plumbing applications. Refer to piping Sections for specialty valve applications.

1.3 DEFINITIONS

- A. The following are standard abbreviations for valves:
 - 1. CWP: Cold working pressure.

2. EPDM: Ethylene-propylene-diene terpolymer rubber.
3. NBR: Acrylonitrile-butadiene rubber.
4. NRS: Nonrising stem.
5. OS&Y: Outside screw and yoke.
6. PTFE: Polytetrafluoroethylene plastic.
7. RPTFE: Reinforced polytetrafluoroethylene plastic.
8. SWP: Steam working pressure.
9. TFE: Tetrafluoroethylene plastic.
10. WOG: Water, oil, and gas.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of valve indicated. Include body, seating, and trim materials; valve design; pressure and temperature classifications; end connections; arrangement; dimensions; and required clearances. Include list indicating valve and its application. Include rated capacities; shipping, installed, and operating weights; furnished specialties; and accessories.
 1. Certification that products for use in potable water systems comply with NSF 61 and NSF 372.

1.5 QUALITY ASSURANCE

- A. ASME Compliance for Ferrous Valves: ASME B16.10 and ASME B16.34 for dimension and design criteria.
- B. Regulatory Requirements: Comply with requirements in Public Law 111-380, "Reduction of Lead in Drinking Water Act," about lead content in materials that will be in contact with potable water for human consumption.
- C. NSF Compliance: NSF 61 and NSF 372 for valve materials for potable-water service.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Prepare valves for shipping as follows:
 1. Protect internal parts against rust and corrosion.
 2. Protect threads, flange faces, grooves, and weld ends.
 3. Set ball and plug valves open to minimize exposure of functional surfaces.
 4. Set butterfly valves closed or slightly open.
 5. Block check valves in either closed or open position.
- B. Use the following precautions during storage:
 1. Maintain valve end protection.
 2. Store valves indoors and maintain at higher than ambient dew-point temperature. If outdoor storage is necessary, store valves off the ground in watertight enclosures.

- C. Use sling to handle large valves; rig sling to avoid damage to exposed parts. Do not use handwheels or stems as lifting or rigging points.

PART 2 - PRODUCTS

2.1 VALVES, GENERAL

- A. Isolation valves are scheduled on the Drawings. For other general plumbing valve applications, use the following:
 - 1. Shutoff Service: Ball or butterfly valves. Throttling Service: Ball or butterfly valves.
- B. Valve Pressure and Temperature Ratings: Not less than indicated and as required for system pressures and temperatures.
- C. If valves with specified SWP classes or CWP ratings are not available, the same types of valves with higher SWP class or CWP ratings may be substituted.
- D. For valves not indicated in the Application Schedules, select valves with the following end connections:
 - 1. For Copper Tubing, NPS 2 and Smaller: Solder-joint or threaded ends, except provide valves with threaded ends for condenser water, heating hot water, steam, and steam condensate services.
 - 2. For Copper Tubing, NPS 2-1/2 to NPS 4: Solder-joint, or threaded ends.
- E. Bronze valves shall be made with dezincification-resistant materials. Bronze valves made with copper alloy (brass) containing more than 15 percent zinc are not permitted unless otherwise noted.
- F. Wetted surfaces of valves contacted by consumable water shall contain not more than 0.25 percent weighted average lead content.
 - 1. Exceptions:
 - a. Drain valves.
- G. Valve Sizes: Same as upstream pipe, unless otherwise indicated.
- H. Valve Actuators:
 - 1. Handwheel: For valves other than quarter-turn types.
- I. Extended Valve Stems: On insulated valves.
- J. Valve Flanges: ASME B16.1 for cast-iron valves, ASME B16.5 for steel valves, and ASME B16.24 for bronze valves.
- K. Solder Joint: With sockets according to ASME B16.18.

1. Caution: Disassemble valves when soldering, as recommended by the manufacturer, to prevent damage to internal parts.

L. Threaded: With threads according to ASME B1.20.1.

M. Valve Bypass and Drain Connections: MSS SP-45.

2.2 BRONZE BALL VALVES

A. Bronze Ball Valves, General: MSS SP-110 and have bronze body complying with ASTM B 584, except for Class 250 which shall comply with ASTM B 61, full-depth ASME B1.20.1 threaded or solder ends, and blowout-proof stems.

B. Two-Piece, Regular Port Bronze Ball Valves with Stainless-Steel Trim: Type 316 stainless-steel ball and stem, reinforced TFE seats, blow-out-proof stem, with adjustable stem packing, soldered or threaded ends; and 150 psig SWP and 600-psig CWP ratings.

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

- a. Apollo Valves; by Conbraco Industries, Inc.; Series 70LF-140/240.
- b. Hammond Valve.
- c. Kitz Corporation; Kitz Valves.
- d. Milwaukee Valve Company; Model UPBA100S/150S.
- e. NIBCO INC.; Models S-580-70-66-LF/T-580-70-66-LF.
- f. Watts Water Technologies, Inc.

2.3 GENERAL SERVICE BUTTERFLY VALVES

A. General: MSS SP-67, for bubble-tight shutoff, extended-neck for insulation, disc and lining suitable for potable water, unless otherwise indicated, and with the following features:

1. Full lug, and grooved valves shall be suitable for bi-directional dead end service at full rated pressure without the use or need of a downstream flange.
2. Valve sizes NPS 2 through NPS 6 shall have lever lock operator; valve sizes NPS 8 and larger shall have weatherproof gear operator.

B. Lug-Style (Single-Flange) Size NPS 2-1/2 through NPS 12, 200-psig CWP Rating, Aluminum-Bronze Disc, EPDM Seat, Ferrous-Alloy Butterfly Valves: Full-lug type with ductile-iron body, Type 416 stainless-steel stem, copper bushing, aluminum-bronze disc, and molded-in EPDM seat (liner).

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

- a. Apollo Valves; by Conbraco Industries, Inc.; Series 143 and Series LD145.
- b. Bray International, Inc.
- c. DeZurik.

- d. Emerson Automation Solutions; Keystone.
- e. Forum Energy Technologies; ABZ Valve.
- f. Hammond Valve.
- g. Milwaukee Valve Company.
- h. NIBCO INC.; LD-2000-3/5.
- i. Tyco Flow Control; Grinnell Flow Control.
- j. Watts Water Technologies.

2.4 DRAIN VALVES

A. Ball-Valve-Type, Hose-End Drain Valves:

- 1. Bronze ball valve as specified in this Section. Lead free construction is not required.
- 2. Outlet: Threaded, short nipple with garden-hose thread complying with ASME B1.20.7 and cap with brass chain.

2.5 SOURCE QUALITY CONTROL

- A. Identification: Factory label or color coding to identify lead free valves.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine piping system for compliance with requirements for installation tolerances and other conditions affecting performance.
 - 1. Proceed with installation only after unsatisfactory conditions have been corrected.
- B. Examine valve interior for cleanliness, freedom from foreign matter, and corrosion. Remove special packing materials, such as blocks, used to prevent disc movement during shipping and handling.
- C. Operate valves in positions from fully open to fully closed. Examine guides and seats made accessible by such operations.
- D. Examine threads on valve and mating pipe for form and cleanliness.
- E. Examine mating flange faces for conditions that might cause leakage. Check bolting for proper size, length, and material. Verify that gasket is of proper size, that its material composition is suitable for service, and that it is free from defects and damage.
- F. Do not attempt to repair defective valves; replace with new valves.

3.2 VALVE INSTALLATION

- A. Piping installation requirements are specified in other Division 20 and 22 Sections. Drawings indicate general arrangement of piping, fittings, and specialties.
- B. Install valves with unions or flanges at each piece of equipment arranged to allow service, maintenance, and equipment removal without system shutdown.
- C. Locate valves for easy access and provide separate support where necessary.
- D. Install valves in horizontal piping with stem at or above center of pipe. Butterfly valves shall be installed with stem horizontal to allow support for the disc and the cleaning action of the disc.
- E. Install valves in position to allow full stem movement.

3.3 JOINT CONSTRUCTION

- A. Refer to Division 20 Section "Basic Mechanical Materials and Methods" for basic piping joint construction.

3.4 ADJUSTING

- A. Adjust or replace valve packing after piping systems have been tested and put into service but before final adjusting and balancing. Replace valves if persistent leaking occurs.

END OF SECTION 22 05 23

SECTION 22 11 16 - DOMESTIC WATER PIPING

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PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- B. Related Sections include the following:
 - 1. Division 20 Section "Mechanical General Requirements."
 - 2. Division 20 Section "Basic Mechanical Materials and Methods" for materials and methods common to mechanical piping systems.
 - 3. Division 20 Section "Hangers and Supports."
 - 4. Division 20 Section "Meters and Gages" for thermometers, pressure gages, and fittings.
 - 5. Division 22 Section "General-Duty Valves for Plumbing."
 - 6. Division 22 Section "Domestic Water Piping Specialties" for water distribution piping specialties.

1.2 SUMMARY

- A. This Section includes domestic water piping inside the building.

1.3 PERFORMANCE REQUIREMENTS

- A. Where not indicated on the Drawings, provide components and installation capable of producing domestic water piping systems with 125 psig, unless otherwise indicated.

1.4 SYSTEMS DESCRIPTION

- A. Potable and non-potable domestic water piping system materials are scheduled on the Drawing.
- B. Refer to Application Schedules on the Drawings for valve types to be used. Where specific valve types are not indicated, the following requirements apply:
 - 1. Hot-Water-Piping, Balancing Duty: Calibrated balancing valves.
 - 2. Drain Duty: Hose-end drain valves.
- C. Transition and special fittings with pressure ratings at least equal to piping rating may be used unless otherwise indicated.

1.5 ACTION SUBMITTALS

- A. Product Data: For pipe, tube, fittings, and couplings.

1.6 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: For piping in equipment rooms and other congested areas, drawn to scale, on which the following items are shown and coordinated with each other, using input from Installers of the items involved:
 - 1. Fire-suppression-water piping.
 - 2. Domestic water piping.

1.7 CLOSEOUT SUBMITTALS

- A. Field quality-control test reports.
- B. Water Samples: Specified in Part 3 "Cleaning" Article.

1.8 QUALITY ASSURANCE

- A. Piping materials shall bear label, stamp, or other markings of specified testing agency.

- B. Regulatory Requirements: Comply with requirements in Public Law 111-380, "Reduction of Lead in Drinking Water Act," about lead content in materials that will be in contact with potable water for human consumption.
- C. Comply with NSF 14, "Plastics Piping System Components and Related Materials," for plastic, potable domestic water piping and components. Include marking "NSF-pw" on piping.
- D. Comply with NSF 61, "Drinking Water System Components - Health Effects; Sections 1 through 9," and NSF 372 Drinking Water System Components – Lead Content for potable domestic water piping and components.
- E. All grooved joint couplings, fittings, valves, and specialties shall be the products of a single manufacturer. Grooving tools shall be as recommended by the manufacturer of the grooved components.

1.9 PROJECT CONDITIONS

- A. Interruption of Existing Water Service: Do not interrupt water service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary water service according to requirements indicated:
 - 1. Notify Owner no fewer than two days in advance of proposed interruption of water service.
 - 2. Do not proceed with interruption of water service without Owner's written permission.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

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

2.2 PIPING MATERIALS

- A. Transition Couplings for Aboveground Pressure Piping: Coupling or other manufactured fitting the same size as, with pressure rating at least equal to and ends compatible with, piping to be joined.

2.3 COPPER TUBE AND FITTINGS

- A. Hard Copper Tube: ASTM B 88, Type L, water tube, drawn temper.

1. Copper Pressure Fittings: ASME B16.18, cast-copper-alloy or ASME B16.22, wrought- copper, solder-joint fittings. Furnish wrought-copper fittings if indicated.
2. Bronze Flanges: ASME B16.24, Class 150, with solder-joint ends. Furnish Class 300 flanges if required to match piping.
3. Copper Unions: MSS SP-123, cast-copper-alloy, hexagonal-stock body, with ball-and-socket, metal-to-metal seating surfaces, and solder-joint or threaded ends.

B. Copper or Bronze Pressure-Seal Fittings:

1. Manufacturers: Subject to compliance with requirements, provide products by the following:
 - a. Viega North America; ProPress System.
 - b. NIBCO Inc.; Press System.
 - c. Mueller Industries, Inc.; Streamline PRS.
 - d. Elkhart Products Corporation; an Aalberts Industries Company; Xpress.
 - e. Apollo Valves; by Conbraco Industries; ApolloXpress.
 - f. ASC Engineered Solutions; Anvil Press.
2. Housing: Copper.
3. O-Rings and Pipe Stops: EPDM.
4. Tools: Manufacturer's special tools.
5. Maximum 200-psig working-pressure rating at 250 deg F.

2.4 VALVES

- A. General-duty plumbing valves; and drain valves are specified in Division 22 Section "Plumbing Valves."
- B. Balancing valves are specified in Division 22 Section "Domestic Water Piping Specialties."

PART 3 - EXECUTION

3.1 PIPING SYSTEM INSTALLATION

- A. Basic piping installation requirements are specified in Division 20 Section "Basic Mechanical Materials and Methods."
- B. Install under-building-slab copper tubing according to Copper Development Association's "Copper Tube Handbook." Joints under slab are not allowed. Install PVC sleeve where piping penetrates slab.
- C. Install sleeve with water stop and mechanical sleeve seal at each service pipe penetration through foundation wall. Select number of interlocking rubber links required to make installation watertight. Sleeves and mechanical sleeve seals are specified in Division 20 Section "Basic Mechanical Materials and Methods."

- D. Install wall penetration system at each service pipe penetration through foundation wall. Make installation watertight. Wall penetration systems are specified in Division 20 Section "Basic Mechanical Materials and Methods."
- E. Install shutoff valve close to water main on each branch and riser serving plumbing fixtures or equipment, on each water supply to equipment, and on each water supply to plumbing fixtures that do not have supply stops.
- F. Install drain valves for equipment at base of each water riser, at low points in horizontal piping, and where required to drain water piping.
 - 1. Install hose-end drain valves at low points in water mains, risers, and branches.
 - 2. Install stop-and-waste drain valves where indicated.
- G. Install calibrated balancing valves in each hot-water circulation return branch and discharge side of each pump and circulator. Set calibrated balancing valves partly open to restrict but not stop flow. Calibrated balancing valves are specified in Division 22 Section "Domestic Water Piping Specialties."

3.2 JOINT CONSTRUCTION

- A. Basic piping joint construction requirements are specified in Division 20 Section "Basic Mechanical Materials and Methods."

3.3 HANGER AND SUPPORT INSTALLATION

- A. Pipe hanger and support devices are specified in Division 20 Section "Hangers and Supports." Install the following:
 - 1. Vertical Piping: MSS Type 8 or Type 42, clamps.
 - 2. Individual, Straight, Horizontal Piping Runs: According to the following:
 - a. 100 Feet and Less: MSS Type 1, adjustable, steel clevis hangers.
 - b. Longer than 100 Feet: MSS Type 43, adjustable roller hangers.
 - c. Longer than 100 Feet: MSS Type 49, spring cushion rolls, if indicated.
 - 3. Multiple, Straight, Horizontal Piping Runs 100 Feet or Longer: MSS Type 44, pipe rolls. Support pipe rolls on trapeze.
 - 4. Base of Vertical Piping: MSS Type 52, spring hangers.
- B. Install supports according to Division 20 Section "Hangers and Supports."
- C. Support vertical piping and tubing at base and at each floor.
- D. Rod diameter may be reduced 1 size for double-rod hangers, to a minimum of 3/8 inch.
- E. Install hangers for drawn-temper copper tubing with the following maximum horizontal spacing and minimum rod diameters:

1. NPS 3/4 and Smaller: 60-inches with 3/8-inch rod.
 2. NPS 1 and NPS 1-1/4: 72 inches with 3/8-inch rod.
 3. NPS 1-1/2 and NPS 2: 96 inches with 3/8-inch rod.
 4. NPS 2-1/2: 108 inches with 1/2-inch rod.
 5. NPS 3 to NPS 5: 10 feet with 1/2-inch rod.
 6. NPS 6: 10 feet with 5/8-inch rod.
 7. NPS 8: 10 feet with 3/4-inch rod.
- F. Install supports for vertical copper tubing every 10 feet.
- G. Alternate support for copper tubing NPS 3/4 and smaller: Continuous support using v-shaped plastic pipe channel, maximum hanger spacing 8 feet with 3/8-inch rod.
- H. Support piping and tubing not listed above according to MSS SP-69 and manufacturer's written instructions.

3.4 CONNECTIONS

- A. Drawings indicate general arrangement of piping, fittings, and specialties.
- B. Connect domestic water piping to distribution side of water meter with shutoff valve.
- C. Connect domestic water piping to existing domestic water distribution piping. Use dielectric fitting if connection dissimilar metals. Refer to Application Schedule on the Drawings and Division 20 Section "Basic Mechanical Materials and Methods" for dielectric fittings.
- D. Install piping adjacent to equipment and machines to allow service and maintenance.
- E. Connect domestic water piping to the following:
1. Plumbing Fixtures: Cold- and hot-water supply piping in sizes indicated, but not smaller than required by plumbing code. Refer to Division 22 Section "Plumbing Fixtures."
 2. Equipment: Cold- and hot-water supply piping as indicated, but not smaller than equipment connections. Provide shutoff valve and union for each connection. Use flanges instead of unions for NPS 2-1/2 and larger.
 3. Water Heaters: Cold-water supply and hot-water outlet piping in sizes indicated, but not smaller than sizes of water heater connections.

3.5 FIELD QUALITY CONTROL

- A. Inspect domestic water piping as follows:
1. Do not enclose, cover, or put piping into operation until it has been inspected and approved by authorities having jurisdiction.
 2. During installation, notify authorities having jurisdiction at least 24 hours before inspection must be made. Perform tests specified below in presence of authorities having jurisdiction:

- a. Roughing-in Inspection: Arrange for inspection of piping before concealing or closing-in after roughing-in and before setting fixtures.
 - b. Final Inspection: Arrange final inspection for authorities having jurisdiction to observe tests specified below and to ensure compliance with requirements.
3. Reinspection: If authorities having jurisdiction find that piping will not pass test or inspection, make required corrections and arrange for reinspection.
 4. Reports: Prepare inspection reports and have them signed by authorities having jurisdiction.
- B. Test domestic water piping as follows:
1. Fill domestic water piping. Check components to determine that they are not air bound and that piping is full of water.
 2. Test for leaks and defects in new piping and parts of existing piping that have been altered, extended, or repaired. If testing is performed in segments, submit separate report for each test, complete with diagram of portion of piping tested.
 3. Leave new, altered, extended, or replaced domestic water piping uncovered and unconcealed until it has been tested and approved. Expose work that was covered or concealed before it was tested.
 4. Cap and subject piping to static water pressure of 150 psig. Isolate test source and allow to stand for four hours. Leaks and loss in test pressure constitute defects that must be repaired.
 5. Repair leaks and defects with new materials and retest piping or portion thereof until satisfactory results are obtained.
 6. Prepare reports for tests and required corrective action.

3.6 ADJUSTING

- A. Perform the following adjustments before operation:
1. Close drain valves, hydrants, and hose bibbs.
 2. Open shutoff valves to fully open position.
 3. Open throttling valves to proper setting.
 4. Adjust balancing valves in hot-water-circulation return piping to provide adequate flow.
 - a. Manually adjust ball-type balancing valves in hot-water-circulation return piping to provide flow of hot water in each branch.
 - b. Adjust calibrated balancing valves to flows indicated.
 5. Remove plugs used during testing of piping and plugs used for temporary sealing of piping during installation.
 6. Remove and clean strainer screens. Close drain valves and replace drain plugs.
 7. Remove filter cartridges from housings and verify that cartridges are as specified for application where used and are clean and ready for use.
 8. Check plumbing specialties and verify proper settings, adjustments, and operation.

3.7 CLEANING AND DISINFECTION

- A. Clean interior of domestic water piping system. Remove dirt and debris as work progresses.
- B. Clean and disinfect potable domestic water piping as follows:
 - 1. Purge new piping and parts of existing domestic water piping that have been altered, extended, or repaired before using.
 - 2. Use purging and disinfecting procedures prescribed by authorities having jurisdiction or, if methods are not prescribed, procedures described in either AWWA C651 or AWWA C652 or as described below:
 - a. Flush piping system with clean, potable water until dirty water does not appear at outlets.
 - b. Fill and isolate system according to either of the following:
 - 1) Fill system or part thereof with water/chlorine solution with at least 50 ppm of chlorine. Isolate with valves and allow to stand for 24 hours.
 - 2) Fill system or part thereof with water/chlorine solution with at least 200 ppm of chlorine. Isolate and allow to stand for three hours.
 - c. Flush system with clean, potable water until no chlorine is in water coming from system after the standing time.
 - d. Submit water samples in sterile bottles to authorities having jurisdiction. Repeat procedures if biological examination shows contamination.
- C. Prepare and submit reports of purging and disinfecting activities.

END OF SECTION 22 11 16

SECTION 22 11 19 - DOMESTIC WATER PIPING SPECIALTIES

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PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- B. Related Sections include the following:
 - 1. Division 20 Section "Mechanical General Requirements."
 - 2. Division 20 Section "Basic Mechanical Materials and Methods."
 - 3. Division 20 Section "Meters and Gages" for thermometers, pressure gages, and flow meters in domestic water piping.
 - 4. Division 22 Section "Domestic Water Piping " for water meters.

1.2 PERFORMANCE REQUIREMENTS

- A. Minimum Working Pressure for Domestic Water Piping Specialties: 125 psig, unless otherwise indicated.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.

1.4 INFORMATIONAL SUBMITTALS

- A. Shop Drawings: Diagram power, signal, and control wiring.

1.5 CLOSEOUT SUBMITTALS

- A. Field quality-control test reports.
- B. Flow Reports and Settings: For calibrated balancing valves.
- C. Operation and Maintenance Data: For domestic water piping specialties to include in emergency, operation, and maintenance manuals.

1.6 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by an NRTL acceptable to authorities having jurisdiction, and marked for intended use.
- B. Regulatory Requirements: Comply with requirements in Public Law 111-380, "Reduction of Lead in Drinking Water Act," about lead content in materials that will be in contact with potable water for human consumption.
- C. NSF Compliance:
 - 1. Comply with NSF 14, "Plastics Piping Components and Related Materials," for plastic domestic water piping components.
 - 2. Comply with NSF 61, "Drinking Water System Components - Health Effects; Sections 1 through 9."
 - 3. Comply with NSF 372, "Drinking Water System Components – Lead Content" for components with wetted surfaces in contact with potable water.

PART 2 - PRODUCTS

2.1 BACKFLOW PREVENTERS

- A. Beverage-Dispensing-Equipment Backflow Preventers:
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Apollo Valves; Conbraco Industries, Inc.
 - b. Watts Water Technologies, Inc.; Watts Regulator Co.

- c. Zurn Plumbing Products Group; Wilkins Div.
- 2. Standard: ASSE 1022.
- 3. Operation: Continuous-pressure applications.
- 4. Size: NPS 1/4 or NPS 3/8.
- 5. Body: Stainless steel or Acetal plastic.
- 6. End Connections: Threaded.

2.2 BALANCING VALVES

A. Calibrated Balancing Valves NPS 1/2:

- 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Armstrong International, Inc.
 - b. Armstrong Pumps, Inc.
 - c. Apollo Valves; by Conbraco Industries, Inc.
 - d. Bell & Gossett; Xylem Inc.
 - e. Flo Fab Inc.
 - f. Flow Design Inc.
 - g. Griswold Controls.
 - h. NIBCO INC.
 - i. IMI Indoor Climate; Tour & Andersson.
 - j. Taco, Inc.
 - k. Watts Water Technologies, Inc.; Watts Regulator Co.
- 2. Type: Ball or Y-pattern globe valve with two readout ports and memory setting indicator.
- 3. Body: Dezincification resistant brass, or bronze.
- 4. Minimum Flow Rate: 0.3 gpm.
- 5. Accessories: Meter hoses, fittings, valves, differential pressure meter, and carrying case.

B. Calibrated Balancing Valves NPS 3/4 to NPS 2:

- 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Armstrong International, Inc.
 - b. Armstrong Pumps, Inc.
 - c. Apollo Valves; by Conbraco Industries, Inc.
 - d. Bell & Gossett; Xylem Inc.
 - e. Flo Fab Inc.
 - f. Flow Design Inc.
 - g. Griswold Controls.
 - h. NIBCO INC.
 - i. IMI Indoor Climate; Tour & Andersson.
 - j. Taco, Inc.
 - k. Watts Water Technologies, Inc.; Watts Regulator Co.

2. Type: Ball or Y-pattern globe valve with two readout ports and memory setting indicator.
3. Body: Dezincification resistant brass, or bronze.
4. Size: Same as connected piping, but not larger than NPS 2.
5. Accessories: Meter hoses, fittings, valves, differential pressure meter, and carrying case.

C. Calibrated Balancing Valves NPS 2-1/2 to NPS 4:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Armstrong International, Inc.
 - b. Bell & Gossett; Xylem Inc.
 - c. Flo Fab Inc.
 - d. Flow Design Inc.
 - e. Griswold Controls.
 - f. NIBCO INC.
 - g. IMI Indoor Climate; Tour & Andersson.
 - h. Watts Water Technologies, Inc.; Watts Regulator Co.
2. Type: Adjustable with Y-pattern globe valve, two readout ports, and memory-setting indicator.
3. Size: Same as connected piping, but not smaller than NPS 2-1/2.
4. Accessories: Meter hoses, fittings, valves, differential pressure meter, and carrying case.

2.3 TEMPERATURE-ACTUATED WATER MIXING VALVES

A. Water-Temperature Limiting Devices:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Acorn Controls; Morris Group International; ST70.
 - b. Apollo Valves; Conbraco Industries, Inc.; Model MVD (34D Series).
 - c. Bradley Corporation.
 - d. Lawler Manufacturing Company, Inc.
 - e. Leonard Valve Company; Series 170-LF and 270-LF.
 - f. Watts Water Technologies, Inc.; Powers Division; Hydroguard Series LFe480, LFG480, and LFLM495.
 - g. Watts Water Technologies, Inc.; Watts Regulator Co.
 - h. Zurn Plumbing Products Group; Wilkins Div.
2. Standard: ASSE 1070.
3. Pressure Rating: 125 psig.
4. Type: Thermostatically controlled water mixing valve.
5. Material: Bronze body with corrosion-resistant interior components.
6. Connections: 1/2-inch union or 3/8-inch compression; with integral check valves.
7. Accessories: Adjustable temperature-control knob.

8. Outlet Temperature Range: Adjustable from 85 deg F to 120 deg F. Set at 105 deg F.
9. Minimum Flow Rate: 0.5 gpm.
10. Valve Finish: Chrome plated.

2.4 STRAINERS FOR DOMESTIC WATER PIPING

A. Y-Pattern Strainers:

1. Manufacturers:

- a. Apollo Valves; Conbraco Industries, Inc.
- b. Keckley Company.
- c. Metraflex Company.
- d. Mueller Steam Specialty; a Watts Brand.
- e. NIBCO, Inc.
- f. Titan Flow Control, Inc.
- g. Watts.
- h. Yarway; Emerson Automation Solutions.

2. CWP: 200 psig minimum, unless otherwise indicated.

3. SWP: 125 psig minimum, unless otherwise indicated.

4. Body: Bronze for NPS 2 and smaller; cast iron with interior lining complying with AWWA C550 or FDA-approved, epoxy coating and for NPS 2-1/2 and larger.

5. End Connections: Threaded or soldered for NPS 2 and smaller; flanged for NPS 2-1/2 and larger.

6. Screen: Stainless steel with round perforations, unless otherwise indicated.

7. Perforation Size:

- a. Strainers NPS 2 and Smaller: 0.033 inch.
- b. Strainers NPS 2-1/2 to NPS 4: 0.045 inch.
- c. Strainers NPS 5 and Larger: 0.045 inch.

8. Drain: Pipe plug.

2.5 OUTLET BOXES

A. Icemaker Outlet Boxes:

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

- a. Sioux Chief Manufacturing Company, Inc.; Ox Box.
- b. Oatey SCS.
- c. LSP Products Group, Inc.
- d. Acorn Engineering Company.

2. Mounting: Recessed.
3. Material and Finish: Enameled- or epoxy-painted-steel or Stainless-steel box and faceplate.
4. Faucet: Valved fitting complying with ASME A112.18.1. Include NPS 1/2 or smaller copper tube outlet.
5. Supply Shutoff Fitting: NPS 1/2 gate, globe, or ball valve and NPS 1/2 copper, water tubing.

2.6 WATER HAMMER ARRESTERS

A. Water Hammer Arresters (Copper Tube Type):

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. MIFAB, Inc.
 - b. PPP Inc.
 - c. Sioux Chief Manufacturing Company, Inc.
 - d. Smith, Jay R. Mfg. Co.; Division of Smith Industries, Inc.
 - e. Tyler Pipe; Wade Div.
 - f. Watts Drainage Products Inc.
 - g. Watts Water Technologies, Inc.; Watts Regulator Co.
2. Standard: ASSE 1010 or PDI-WH 201.
3. Type: Copper tube with piston.
4. Size: ASSE 1010, Sizes AA and A through F or PDI-WH 201, Sizes A through F.

B. Water Hammer Arresters (Metal Bellows Type):

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. AMTROL, Inc.
 - b. Josam Company.
 - c. MIFAB, Inc.
 - d. Smith, Jay R. Mfg. Co.; Division of Smith Industries, Inc.
 - e. Tyler Pipe; Wade Div.
 - f. Watts Drainage Products Inc.
 - g. Zurn Plumbing Products Group; Specification Drainage Operation.
2. Standard: ASSE 1010 or PDI-WH 201.
3. Type: Precharged stainless steel bellows.
4. Size: ASSE 1010, Sizes AA and A through F or PDI-WH 201, Sizes A through F.

2.7 AIR VENTS

A. Bolted-Construction Automatic Air Vents:

1. Body: Bronze.

2. Pressure Rating: 125-psig minimum pressure rating at 140 deg F.
3. Float: Replaceable, corrosion-resistant metal.
4. Mechanism and Seat: Stainless steel.
5. Size: NPS 3/8 minimum inlet.
6. Inlet and Vent Outlet End Connections: Threaded.

B. Welded-Construction Automatic Air Vents:

1. Body: Stainless steel.
2. Pressure Rating: 150-psig minimum pressure rating.
3. Float: Replaceable, corrosion-resistant metal.
4. Mechanism and Seat: Stainless steel.
5. Size: NPS 3/8 minimum inlet.
6. Inlet and Vent Outlet End Connections: Threaded.

2.8 TRAP-SEAL PRIMER VALVES

A. Supply-Type, Trap-Seal Primer Valves:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. MIFAB, Inc.
 - b. PPP Inc.
 - c. Sioux Chief Manufacturing Company, Inc.
 - d. Smith, Jay R. Mfg. Co.; Division of Smith Industries, Inc.
 - e. Watts Water Technologies, Inc.
2. Standard: ASSE 1018.
3. Pressure Rating: 125 psig minimum.
4. Body: Bronze.
5. Inlet and Outlet Connections: NPS 1/2 threaded, union, or solder joint.
6. Gravity Drain Outlet Connection: NPS 1/2 threaded or solder joint.
7. Finish: Chrome plated, or rough bronze for units used with pipe or tube that is not chrome finished.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Refer to Division 20 Section "Basic Mechanical Materials and Methods" for piping joining materials, joint construction, and basic installation requirements.
- B. Install balancing valves in locations where they can easily be adjusted.
- C. Install temperature-actuated water mixing valves with strainers, and check stops or shutoff valves on inlets and with shutoff valve on outlet.

1. Install thermometers and water regulators if specified.
 2. Install cabinet-type units recessed in or surface mounted on wall as specified.
- D. Install Y-pattern strainers for water on supply side of each control valve.
- E. Install outlet boxes recessed in wall. Install 2-by-4-inch fire-retardant-treated-wood blocking wall reinforcement between studs. Fire-retardant-treated-wood blocking is specified in Division 06 Section "Rough Carpentry."
- F. Install air vents at high points of water piping. Install drain piping and discharge onto floor drain.

3.2 CONNECTIONS

- A. Piping installation requirements are specified in other Division 20 and 22 Sections. Drawings indicate general arrangement of piping and specialties.

3.3 LABELING AND IDENTIFYING

- A. Equipment Nameplates and Signs: Install engraved plastic-laminate equipment nameplate or sign on or near each of the following:
1. Carbonated-beverage-machine backflow preventers.
 2. Calibrated balancing valves.
 3. Primary, thermostatic, water mixing valves.
 4. Outlet boxes.
 5. Trap-seal primer systems.
- B. Distinguish among multiple units, inform operator of operational requirements, indicate safety and emergency precautions, and warn of hazards and improper operations, in addition to identifying unit. Nameplates and signs are specified in Division 20 Section "Mechanical Identification."

3.4 FIELD QUALITY CONTROL

- A. Perform the following tests and prepare test reports:
1. Test each backflow prevention device according to authorities having jurisdiction and the device's reference standard.
- B. Remove and replace malfunctioning domestic water piping specialties and retest as specified above.

3.5 ADJUSTING

- A. Set field-adjustable pressure set points of water pressure-reducing valves.
- B. Set field-adjustable flow set points of balancing valves as follows:
 - 1. Set calibrated balancing valves at calculated presettings.
 - 2. Measure flow each station and adjust where necessary.
 - 3. Record settings and mark balancing devices.
- C. Set field-adjustable temperature set points of temperature-actuated water mixing valves.

END OF SECTION 22 11 19

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PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- B. Related Sections include the following:
 - 1. Division 20 Section "Mechanical General Requirements".
 - 2. Division 20 Section "Basic Mechanical Materials and Methods".
 - 3. Division 22 Section "Drainage Piping Specialties".

1.2 DEFINITIONS

- A. ABS: Acrylonitrile-butadiene-styrene plastic.
- B. EPDM: Ethylene-propylene-diene terpolymer rubber.
- C. LLDPE: Linear, low-density polyethylene plastic.
- D. NBR: Acrylonitrile-butadiene rubber.

- E. PE: Polyethylene plastic.
- F. PVC: Polyvinyl chloride plastic.
- G. TPE: Thermoplastic elastomer.

1.3 SYSTEMS DESCRIPTIONS

- A. Sanitary waste and vent piping system materials are scheduled on the Drawing.

1.4 ACTION SUBMITTALS

- A. Product Data: For pipe, tube, fittings, and couplings.

1.5 CLOSEOUT SUBMITTALS

- A. Field quality-control inspection and test reports.

1.6 QUALITY ASSURANCE

- A. Piping materials shall bear label, stamp, or other markings of specified testing agency.
- B. Cast-iron soil pipe shall be marked with the collective trademark of Cast Iron Soil Pipe Institute (CISPI).
- C. Comply with NSF 14, "Plastics Piping Systems Components and Related Materials," for plastic piping components. Include marking with "NSF-dwv" for plastic drain, waste, and vent piping; "NSF-drain" for plastic drain piping; "NSF-tubular" for plastic continuous waste piping; and "NSF-sewer" for plastic sewer piping.

1.7 PROJECT CONDITIONS

- A. Interruption of Existing Sanitary Waste Service: Do not interrupt service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary service according to requirements indicated:
 - 1. Notify Owner no fewer than two days in advance of proposed interruption of sanitary waste service.
 - 2. Do not proceed with interruption of sanitary waste service without Owner's written permission.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

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

2.2 HUBLESS CAST-IRON SOIL PIPE AND FITTINGS

- A. Pipe and Fittings: ASTM A 888 or CISPI 301.
- B. CISPI, Hubless-Piping Couplings:
1. Manufacturers:
 - a. ANACO-Husky; McWane Plumbing Group.
 - b. Ferguson Enterprises, Inc.; ProFlo (Private labeled IDEAL-TRIDON).
 - c. IDEAL-TRIDON.
 - d. MIFAB, Inc.
 - e. Mission Rubber Company; a division of MCP Industries, Inc.
 - f. Tyler Pipe; McWane Plumbing Group.
 2. Standards: CISPI 310.
 3. Description: NSF certified for compliance with CISPI 310. Stainless-steel corrugated shield with stainless-steel bands and tightening devices; and ASTM C 564, rubber sleeve with integral, center pipe stop.

2.3 COPPER TUBE AND FITTINGS

- A. Copper DWV Tube: ASTM B 306, drainage tube, drawn temper.
1. Copper Drainage Fittings: ASME B16.23, cast copper or ASME B16.29, wrought copper, solder-joint fittings.
- A. Hard Copper Tube: ASTM B 88, Types M, water tube, drawn temper.
1. Copper Pressure Fittings: ASME B16.18, cast-copper-alloy or ASME B16.22, wrought-copper, solder-joint fittings. Furnish wrought-copper fittings if indicated.
 2. Copper Flanges: ASME B16.24, Class 150, cast copper with solder-joint end.
 3. Copper Unions: MSS SP-123, copper-alloy, hexagonal-stock body with ball-and-socket, metal-to-metal seating surfaces, and solder-joint or threaded ends.

PART 3 - EXECUTION

3.1 PIPING SYSTEM INSTALLATION

- A. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated unless deviations to layout are approved on coordination drawings.
- B. Sanitary sewer piping outside the building is specified in Division 22 Section "Sanitary Sewerage."
- C. Basic piping installation requirements are specified in Division 20 Section "Basic Mechanical Materials and Methods."
- D. Install cleanouts at grade and extend to where building sanitary drains connect to building sanitary sewers.
- E. Install cleanout fitting with closure plug inside the building in sanitary force-main piping.
- F. Install cast-iron sleeve with water stop and mechanical sleeve seal at each service pipe penetration through foundation wall. Select number of interlocking rubber links required to make installation watertight. Sleeves and mechanical sleeve seals are specified in Division 20 Section "Basic Mechanical Materials and Methods."
- G. Install cast-iron soil piping according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook," Chapter IV, "Installation of Cast Iron Soil Pipe and Fittings."
- H. Make changes in direction for soil and waste drainage and vent piping using appropriate branches, bends, and long-sweep bends. Sanitary tees and short-sweep 1/4 bends may be used on vertical stacks if change in direction of flow is from horizontal to vertical. Use long-turn, double Y-branch and 1/8-bend fittings if 2 fixtures are installed back to back or side by side with common drain pipe. Straight tees, elbows, and crosses may be used on vent lines. Do not change direction of flow more than 90 degrees. Use proper size of standard increasers and reducers if pipes of different sizes are connected. Reducing size of drainage piping in direction of flow is prohibited.
- I. Lay buried building drainage piping beginning at low point of each system. Install true to grades and alignment indicated, with unbroken continuity of invert. Place hub ends of piping upstream. Install required gaskets according to manufacturer's written instructions for use of lubricants, cements, and other installation requirements. Maintain swab in piping and pull past each joint as completed.
- J. Install soil and waste drainage and vent piping at the following minimum slopes, unless otherwise indicated:
 - 1. Building Sanitary Drain: 1/8-inch per foot downward in direction of flow, unless otherwise noted.
 - 2. Horizontal Sanitary Drainage Piping: 1/8-inch per foot downward in direction of flow, unless otherwise noted.
 - 3. Vent Piping: 1/8-inch per foot down toward vertical fixture vent or toward vent stack.

- K. Sleeves are not required for cast-iron soil piping passing through concrete slabs-on-grade if slab is without membrane waterproofing.
- L. Do not enclose, cover, or put piping into operation until it is inspected and approved by authorities having jurisdiction.

3.2 JOINT CONSTRUCTION

- A. Basic piping joint construction requirements are specified in Division 20 Section "Basic Mechanical Materials and Methods."
- B. Join hubless cast-iron soil piping according to CISPI 310 and CISPI's "Cast Iron Soil Pipe and Fittings Handbook" for hubless-coupling joints.

3.3 SPECIALTY PIPE FITTING INSTALLATION

- A. Transition Couplings:
 - 1. Install transition couplings at joints of piping with small differences in OD's.
 - 2. In Drainage Piping: Shielded, nonpressure transition couplings.
 - 3. In Aboveground Force Main Piping: Fitting-type transition couplings.
 - 4. In Underground Force Main Piping:
 - a. NPS 1-1/2 and Smaller: Fitting-type transition couplings.
 - b. NPS 2 and Larger: Pressure transition couplings.

3.4 VALVE INSTALLATION

- A. General valve installation requirements are specified in Division 20 Section "Valves."

3.5 HANGER AND SUPPORT INSTALLATION

- A. Pipe hangers and supports are specified in Division 20 Section "Hangers and Supports." Install the following:
 - 1. Vertical Piping: MSS Type 8 or Type 42, clamps.
 - 2. Install individual, straight, horizontal piping runs according to the following:
 - a. 100 Feet and Less: MSS Type 1, adjustable, steel clevis hangers.
 - b. Longer Than 100 Feet: MSS Type 43, adjustable roller hangers.
 - c. Longer Than 100 Feet, if Indicated: MSS Type 49, spring cushion rolls.
 - 3. Multiple, Straight, Horizontal Piping Runs 100 Feet or Longer: MSS Type 44, pipe rolls. Support pipe rolls on trapeze.
 - 4. Base of Vertical Piping: MSS Type 52, spring hangers.
- B. Install supports according to Division 20 Section "Hangers and Supports."

- C. Support vertical piping and tubing at base and at each floor.
- D. Rod diameter may be reduced 1 size for double-rod hangers, with 3/8-inch minimum rods.
- E. Install hangers for cast-iron soil piping with the following maximum horizontal spacing and minimum rod diameters:
 - 1. NPS 1-1/2 and NPS 2: 60 inches with 3/8-inch rod.
 - 2. NPS 3: 60 inches with 1/2-inch rod.
 - 3. NPS 4 and NPS 5: 60 inches with 5/8-inch rod.
 - 4. NPS 6 and NPS 8: 60 inches with 3/4-inch rod.
 - 5. NPS 10 and NPS 12: 60 inches with 7/8-inch rod.
- F. Install supports for vertical cast-iron soil piping every 15 feet.
- G. Install hangers for copper tubing with the following maximum horizontal spacing and minimum rod diameters:
 - 1. NPS 1-1/4: 72 inches with 3/8-inch rod.
 - 2. NPS 1-1/2 and NPS 2: 96 inches with 3/8-inch rod.
 - 3. NPS 2-1/2: 108 inches with 1/2-inch rod.
 - 4. NPS 3 to NPS 5: 10 feet with 1/2-inch rod.
 - 5. NPS 6: 10 feet with 5/8-inch rod.
 - 6. NPS 8: 10 feet with 3/4-inch rod.
- H. Install supports for vertical copper tubing every 10 feet.
- I. Support piping and tubing not listed above according to MSS SP-69 and manufacturer's written instructions.

3.6 CONNECTIONS

- A. Drawings indicate general arrangement of piping, fittings, and specialties.
- B. Connect soil and waste piping to exterior sanitary sewerage piping. Use transition fitting to join dissimilar piping materials.
- C. Connect drainage and vent piping to the following:
 - 1. Plumbing Fixtures: Connect drainage piping in sizes indicated, but not smaller than required by plumbing code.
 - 2. Plumbing Fixtures and Equipment: Connect atmospheric vent piping in sizes indicated, but not smaller than required by authorities having jurisdiction.
 - 3. Plumbing Specialties: Connect drainage and vent piping in sizes indicated, but not smaller than required by plumbing code.
 - 4. Equipment: Connect drainage piping as indicated. Provide shutoff valve, if indicated, and union for each connection. Use flanges instead of unions for connections NPS 2-1/2 and larger.

- D. Connect force-main piping to the following:
 - 1. Sanitary Sewer: To exterior force main or sanitary manhole.

3.7 IDENTIFICATION

- A. Identify exposed sanitary waste and vent piping. Comply with requirements for identification specified in Division 20 Section "Mechanical Identification."

3.8 FIELD QUALITY CONTROL

- A. During installation, notify authorities having jurisdiction at least 24 hours before inspection must be made. Perform tests specified below in presence of authorities having jurisdiction.
 - 1. Roughing-in Inspection: Arrange for inspection of piping before concealing or closing-in after roughing-in and before setting fixtures.
 - 2. Final Inspection: Arrange for final inspection by authorities having jurisdiction to observe tests specified below and to ensure compliance with requirements.
- B. Reinspection: If authorities having jurisdiction find that piping will not pass test or inspection, make required corrections and arrange for reinspection.
- C. Reports: Prepare inspection reports and have them signed by authorities having jurisdiction.
- D. Test sanitary drainage and vent piping according to procedures of authorities having jurisdiction or, in absence of published procedures, as follows:
 - 1. Test for leaks and defects in new piping and parts of existing piping that have been altered, extended, or repaired. If testing is performed in segments, submit separate report for each test, complete with diagram of portion of piping tested.
 - 2. Leave uncovered and unconcealed new, altered, extended, or replaced drainage and vent piping until it has been tested and approved. Expose work that was covered or concealed before it was tested.
 - 3. Roughing-in Plumbing Test Procedure: Test drainage and vent piping, except outside leaders, on completion of roughing-in. Close openings in piping system and fill with water to point of overflow, but not less than 10-foot head of water. From 15 minutes before inspection starts to completion of inspection, water level must not drop. Inspect joints for leaks.
 - 4. Finished Plumbing Test Procedure: After plumbing fixtures have been set and traps filled with water, test connections and prove they are gastight and watertight. Plug vent-stack openings on roof and building drains where they leave building. Introduce air into piping system equal to pressure of 1-inch wg. Use U-tube or manometer inserted in trap of water closet to measure this pressure. Air pressure must remain constant without introducing additional air throughout period of inspection. Inspect plumbing fixture connections for gas and water leaks.

5. Repair leaks and defects with new materials and retest piping, or portion thereof, until satisfactory results are obtained.
 6. Prepare reports for tests and required corrective action.
- E. Test force-main piping according to procedures of authorities having jurisdiction or, in absence of published procedures, as follows:
1. Leave uncovered and unconcealed new, altered, extended, or replaced force-main piping until it has been tested and approved. Expose work that was covered or concealed before it was tested.
 2. Cap and subject piping to static-water pressure of 150 psig, without exceeding pressure rating of piping system materials. Isolate test source and allow to stand for four hours. Leaks and loss in test pressure constitute defects that must be repaired.
 3. Repair leaks and defects with new materials and retest piping, or portion thereof, until satisfactory results are obtained.
 4. Prepare reports for tests and required corrective action.

3.9 CLEANING

- A. Clean interior of piping. Remove dirt and debris as work progresses.
- B. Protect drains during remainder of construction period to avoid clogging with dirt and debris and to prevent damage from traffic and construction work.
- C. Place plugs in ends of uncompleted piping at end of day and when work stops.

END OF SECTION 22 13 16

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PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- B. Related Sections include the following:
 - 1. Division 20 Section "Mechanical General Requirements."
 - 2. Division 20 Section "Basic Mechanical Materials and Methods."
 - 3. Division 22 Section "Plumbing Fixtures" for hair interceptors.

1.2 DEFINITIONS

- A. ABS: Acrylonitrile-butadiene-styrene plastic.
- B. FRP: Fiberglass-reinforced plastic.
- C. HDPE: High-density polyethylene plastic.
- D. PE: Polyethylene plastic.

- E. PP: Polypropylene plastic.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated. Include rated capacities, operating characteristics, and accessories.

1.4 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For drainage piping specialties to include in operation and maintenance manuals.

1.5 QUALITY ASSURANCE

- A. Drainage piping specialties shall bear label, stamp, or other markings of specified testing agency.
- B. Comply with NSF 14, "Plastics Piping Components and Related Materials," for plastic sanitary and storm piping specialty components.

1.6 COORDINATION

- A. Coordinate size and location of roof penetrations.

PART 2 - PRODUCTS

2.1 CAST-IRON CLEANOUTS

- A. Size: Cleanouts shall be same nominal size as the pipe they serve up to 4 inches. For pipes larger than 4 inches nominal size, minimum size of cleanout shall be 4 inches.
- B. Exposed Cast-Iron Cleanouts:
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Josam Company; Josam Div.; Series 58910.
 - b. MIFAB, Inc.; C1460.
 - c. Smith, Jay R. Mfg. Co.; Division of Smith Industries, Inc.; 4510 Series.
 - d. Tyler Pipe; Wade Div.
 - e. Watts Drainage Products Inc.
 - f. Zurn Plumbing Products Group; Specification Drainage Operation.
 - 2. Standard: ASME A112.36.2M for cast iron for cleanout test tee.
 - 3. Body Material: Hub-and-spigot, cast-iron soil pipe T-branch or hubless, cast-iron soil pipe test tee as required to match connected piping.

4. Closure: Countersunk or raised-head, brass or bronze plug with tapered threads.
- C. Cast-Iron Floor Cleanouts (On-Grade Interior Floor Areas):
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Josam Company; Josam Div.
 - b. MIFAB, Inc.; C1220-R.
 - c. Sioux Chief Manufacturing Company, Inc.
 - d. Smith, Jay R. Mfg. Co.; Division of Smith Industries, Inc.; Model 4023S-F.
 - e. Tyler Pipe; Wade Div.
 - f. Watts Drainage Products Inc.
 - g. Zurn Plumbing Products Group; Specification Drainage Operation.
 2. Standard: ASME A112.36.2M.
 3. Type: Adjustable housing.
 4. Body or Ferrule: Cast iron.
 5. Clamping Device: Not required.
 6. Outlet Connection: Spigot.
 7. Closure: Brass, bronze, or plastic plug with tapered threads.
 8. Adjustable Housing Material: Cast iron with threads, set-screws or other device.
 9. Frame and Cover Material and Finish: Nickel-bronze, copper alloy with scoriated cover in service areas, and recessed cover to accept floor finish material in finished floor areas.
 10. Frame and Cover Shape: Round.
 11. Top Loading Classification: Medium Duty.
 12. Riser: ASTM A 74, Service class, cast-iron drainage pipe fitting and riser to cleanout.
- D. Cast-Iron Floor Cleanouts (Not-On-Grade Interior Floor Areas):
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Josam Company; Josam Div.
 - b. MIFAB, Inc.; C-1100-C-R-34.
 - c. Sioux Chief Manufacturing Company, Inc.
 - d. Smith, Jay R. Mfg. Co.; Division of Smith Industries, Inc.; Model 4333C.
 - e. Tyler Pipe; Wade Div.
 - f. Watts Drainage Products Inc.
 - g. Zurn Plumbing Products Group; Specification Drainage Operation.
 2. Standard: ASME A112.36.2M.
 3. Type: Adjustable housing.
 4. Body or Ferrule: Cast iron.
 5. Clamping Device: Required.
 6. Outlet Connection: Spigot.
 7. Closure: Brass, bronze, or plastic plug with tapered threads.
 8. Adjustable Housing Material: Cast iron with threads, set-screws or other device.

9. Frame and Cover Material and Finish: Nickel-bronze, copper alloy with scoriated cover in service areas, and recessed cover to accept floor finish material in finished floor areas.
10. Frame and Cover Shape: Round.
11. Top Loading Classification: Medium Duty.
12. Riser: ASTM A 74, Service class, cast-iron drainage pipe fitting and riser to cleanout.

E. Cast-Iron Wall Cleanouts (Finished Wall Areas):

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Josam Company; Josam Div.; Model 58790-20.
 - b. MIFAB, Inc.; C1460-RD.
 - c. Smith, Jay R. Mfg. Co.; Division of Smith Industries, Inc.
 - d. Tyler Pipe; Wade Div.
 - e. Watts Drainage Products Inc.
 - f. Zurn Plumbing Products Group; Specification Drainage Operation.
2. Standard: ASME A112.36.2M. Include wall access.
3. Body: Hub-and-spigot, cast-iron soil pipe T-branch or hubless, cast-iron soil pipe test tee as required to match connected piping.
4. Closure: Countersunk or raised-head, drilled-and-threaded bronze or brass plug with tapered threads.
5. Wall Access: Round, flat, chrome-plated brass or stainless-steel cover plate with screw.

2.2 FLOOR DRAINS

A. Cast-Iron Floor Drains (Toilet Rooms, Labs, and Janitor's Closet) FD-1:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Josam Company; Josam Div.
 - b. MIFAB, Inc.
 - c. Sioux Chief Manufacturing Company, Inc.; Finish Line Adjustable Drainage System.
 - d. Smith, Jay R. Mfg. Co.; Division of Smith Industries, Inc.; Model 2005Y-A.
 - e. Tyler Pipe; Wade Div.
 - f. Watts Drainage Products Inc.
 - g. Zurn Plumbing Products Group; Specification Drainage Operation.
2. Standard: ASME A112.6.7.
3. Pattern: Floor drain.
4. Body Material: Gray iron.
5. Seepage Flange: Required.
6. Clamping Device: Required.
7. Outlet: Bottom unless otherwise noted.

8. Coating on Interior and Exposed Exterior Surfaces: Enamel.
9. Top or Strainer Material: Nickel bronze.
10. Top of Body and Strainer Finish: Nickel bronze.
11. Top Shape: Round, with vandal proof screws.
12. Dimensions of Top or Strainer: 7 inch diameter.
13. Top Loading Classification: Light Duty.
14. Inlet Fitting: Gray iron, with spigot outlet.

2.3 AIR-ADMITTANCE VALVES

A. Fixture Air-Admittance Valves:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Ayrlett, LLC.
 - b. Durgo, Inc.
 - c. Oatey.
 - d. ProSet Systems Inc.
 - e. RectorSeal.
 - f. Studor, Inc.
2. Standard: ASSE 1051, Type A for single fixture or Type B for branch piping.
3. Housing: Plastic.
4. Operation: Mechanical sealing diaphragm.
5. Size: Same as connected fixture or branch vent piping.

2.4 ROOF FLASHING ASSEMBLIES

A. Roof Flashing Assemblies:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Acorn Engineering Company; Elmdor/Stoneman Div.
 - b. Thaler Metal Industries Ltd.

B. Description: Manufactured assembly consisting of metal flashing collar and skirt extending at least 8 inches from pipe, with boot reinforcement and counterflashing fitting.

1. Open-Top Vent Cap: Without cap.
2. Low-Silhouette Vent Cap: With vandal-proof vent cap.
3. Extended Vent Cap: With field-installed, vandal-proof vent cap.

2.5 TRAP SEAL PROTECTION DEVICES

A. Barrier Type Trap Seal Protection Devices:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Smith, Jay R. Mfg. Co.; Quad Close Trap Seal Device Fig. 2692.
 - b. Rectorseal; a CSW Industrials Company; SureSeal Plus Inline Floor Drain Trap Sealer.
2. Standard: ASSE 1072-2007.
3. Sealing Element: Neoprene rubber or chemically resistant elastomer.
4. Size: 2 inch, 3 inch, 3-1/2 inch, or 4 inch.
5. Gravity Drain Outlet Connection: Compression fit sealing gasket 80 durometer.

2.6 MISCELLANEOUS DRAINAGE PIPING SPECIALTIES

A. Air-Gap Fittings:

1. Standard: ASME A112.1.2, for fitting designed to ensure fixed, positive air gap between installed inlet and outlet piping.
2. Body: Bronze or cast iron.
3. Inlet: Opening in top of body.
4. Outlet: Larger than inlet.
5. Size: Same as connected waste piping and with inlet large enough for associated indirect waste piping.

B. Sleeve Flashing Device:

1. Description: Manufactured, cast-iron fitting, with clamping device, that forms sleeve for pipe floor penetrations of floor membrane. Include galvanized-steel pipe extension in top of fitting that will extend 2 inches above finished floor and galvanized-steel pipe extension in bottom of fitting that will extend through floor slab.
2. Size: As required for close fit to riser or stack piping.

C. Vent Caps:

1. Description: Cast-iron body with threaded or hub inlet and vandal-proof design. Include vented hood and setscrews to secure to vent pipe.
2. Size: Same as connected stack vent or vent stack.

D. Expansion Joints:

1. Standard: ASME A112.21.2M.
2. Body: Cast iron with bronze sleeve, packing, and gland.
3. End Connections: Matching connected piping.
4. Size: Same as connected soil, waste, or vent piping.

2.7 FLASHING MATERIALS

- A. Lead Sheet: ASTM B 749, Type L51121, copper bearing, with the following minimum weights and thicknesses, unless otherwise indicated:
 - 1. General Use: 4.0-lb/sq. ft., 0.0625-inch thickness.
 - 2. Vent Pipe Flashing: 3.0-lb/sq. ft., 0.0469-inch thickness.
 - 3. Burning: 6-lb/sq. ft., 0.0938-inch thickness.
- B. Copper Sheet: ASTM B 152/B 152M, of the following minimum weights and thicknesses, unless otherwise indicated:
 - 1. General Applications: 12 oz./sq. ft.
 - 2. Vent Pipe Flashing: 8 oz./sq. ft.
- C. Zinc-Coated Steel Sheet: ASTM A 653/A 653M, with 0.20 percent copper content and 0.04-inch minimum thickness, unless otherwise indicated. Include G90 hot-dip galvanized, mill-phosphatized finish for painting if indicated.
- D. Elastic Membrane Sheet: ASTM D 4068, flexible, chlorinated polyethylene, 40-mil minimum thickness.
- E. Fasteners: Metal compatible with material and substrate being fastened.
- F. Metal Accessories: Sheet metal strips, clamps, anchoring devices, and similar accessory units required for installation; matching or compatible with material being installed.
- G. Solder: ASTM B 32, lead-free alloy.
- H. Bituminous Coating: SSPC-Paint 12, solvent-type, bituminous mastic.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Refer to Division 20 Section "Basic Mechanical Materials and Methods" for piping joining materials, joint construction, and basic installation requirements.
- B. Install cleanouts in aboveground piping and building drain piping according to the following, unless otherwise indicated:
 - 1. Size same as drainage piping up to NPS 4. Use NPS 4 for larger drainage piping unless larger cleanout is indicated.
 - 2. Locate at each change in direction of piping greater than 45 degrees.
 - 3. Locate at minimum intervals of 50 feet for piping NPS 4 and smaller and 100 feet for larger piping.
 - 4. Locate at base of each vertical soil and waste stack.

- C. For floor cleanouts for piping below floors, install cleanout deck plates with top flush with finished floor.
- D. For cleanouts located in concealed piping, install cleanout wall access covers, of types indicated, with frame and cover flush with finished wall.
- E. Install floor drains at low points of surface areas to be drained. Set grates of drains flush with finished floor, unless otherwise indicated.
 - 1. Position floor drains for easy access and maintenance.
 - 2. Set floor drains below elevation of surrounding finished floor to allow floor drainage. Set with grates depressed according to the following drainage area radii:
 - a. Radius, 30 Inches or Less: Equivalent to 1 percent slope, but not less than 1/4-inch total depression.
 - b. Radius, 30 to 60 Inches: Equivalent to 1 percent slope.
 - c. Radius, 60 Inches or Larger: Equivalent to 1 percent slope, but not greater than 1-inch total depression.
 - 3. Install floor-drain flashing collar or flange so no leakage occurs between drain and adjoining flooring. Maintain integrity of waterproof membranes where penetrated.
 - 4. Install individual traps for floor drains connected to sanitary building drain, unless otherwise indicated.
- F. Install fixture air-admittance valves on fixture drain piping.
- G. Install air-admittance-valve wall boxes recessed in wall.
- H. Install roof flashing assemblies on sanitary stack vents and vent stacks that extend through roof.
- I. Install flashing fittings on sanitary stack vents and vent stacks that extend through roof.
- J. Assemble open drain fittings and install with top of hub 2 inches above floor.
- K. Install deep-seal traps on floor drains and other waste outlets, if indicated.
- L. Install floor-drain, trap-seal primer fittings on floor drains that require trap-seal primer connection.
- M. Install air-gap fittings on draining-type backflow preventers and on indirect-waste piping discharge into sanitary drainage system.
- N. Install sleeve flashing device with each riser and stack passing through floors with waterproof membrane.
- O. Install vent caps on each vent pipe passing through roof.
- P. Install frost-resistant vent terminals on each vent pipe passing through roof. Maintain 1-inch clearance between vent pipe and roof substrate.

- Q. Install expansion joints on vertical stacks and conductors. Position expansion joints for easy access and maintenance.
- R. Install frost-proof vent caps on each vent pipe passing through roof. Maintain 1-inch clearance between vent pipe and roof substrate.
- S. Install wood-blocking reinforcement for wall-mounting-type specialties.
- T. Install traps on plumbing specialty drain outlets. Omit traps on indirect wastes unless trap is indicated.
- U. Install escutcheons at wall, floor, and ceiling penetrations in exposed finished locations and within cabinets and millwork. Use deep-pattern escutcheons if required to conceal protruding pipe fittings.
- V. Install through-penetration firestop assemblies for penetrations of fire- and smoke-rated assemblies.
 - 1. Comply with requirements in Division 07 Section "Penetration Firestopping."

3.2 CONNECTIONS

- A. Piping installation requirements are specified in other Division 20 and 22 Sections. Drawings indicate general arrangement of piping, fittings, and specialties.
- B. Install piping adjacent to equipment to allow service and maintenance.

3.3 FLASHING INSTALLATION

- A. Fabricate flashing from single piece unless large pans, sumps, or other drainage shapes are required. Join flashing according to the following if required:
 - 1. Lead Sheets: Burn joints of lead sheets 6.0-lb/sq. ft., 0.0938-inch thickness or thicker. Solder joints of lead sheets 4.0-lb/sq. ft., 0.0625-inch thickness or thinner.
 - 2. Copper Sheets: Solder joints of copper sheets.
- B. Install sheet flashing on pipes, sleeves, and specialties passing through or embedded in floors and roofs with waterproof membrane.
 - 1. Pipe Flashing: Sleeve type, matching pipe size, with minimum length of 10 inches, and skirt or flange extending at least 8 inches around pipe.
 - 2. Sleeve Flashing: Flat sheet, with skirt or flange extending at least 8 inches around sleeve.
 - 3. Embedded Specialty Flashing: Flat sheet, with skirt or flange extending at least 8 inches around specialty.
- C. Set flashing on floors and roofs in solid coating of bituminous cement.
- D. Secure flashing into sleeve and specialty clamping ring or device.

- E. Install flashing for piping passing through roofs with counterflashing or commercially made flashing fittings, according to Division 07 Section "Sheet Metal Flashing and Trim."
- F. Extend flashing up vent pipe passing through roofs and turn down into pipe, or secure flashing into cast-iron sleeve having calking recess.
- G. Fabricate and install flashing and pans, sumps, and other drainage shapes.

3.4 LABELING AND IDENTIFYING

- A. Distinguish among multiple units, inform operator of operational requirements, indicate safety and emergency precautions, and warn of hazards and improper operations, in addition to identifying unit. Nameplates and signs are specified in Division 20 Section "Mechanical Identification."

3.5 PROTECTION

- A. Protect drains during remainder of construction period to avoid clogging with dirt or debris and to prevent damage from traffic or construction work.
- B. Place plugs in ends of uncompleted piping at end of each day or when work stops.

END OF SECTION 22 13 19

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PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- B. Related Sections include the following:
 - 1. Division 20 Section "Mechanical General Requirements."
 - 2. Division 20 Section "Basic Mechanical Materials and Methods."

1.2 ACTION SUBMITTALS

- A. Product Data: For each type and size of water heater indicated. Include rated capacities, operating characteristics, furnished specialties, and accessories.

1.3 INFORMATIONAL SUBMITTALS

- A. Shop Drawings: Detail water heater assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
 - 1. Wiring Diagrams: Power, signal, and control wiring. Differentiate between manufacturer-installed and field-installed wiring.

- B. Product Certificates: For each type of electric water heater, signed by product manufacturer.
- C. Source quality-control test reports.

1.4 CLOSEOUT SUBMITTALS

- A. Field quality-control test reports.
- B. Operation and Maintenance Data: For electric water heaters to include in operation and maintenance manuals.

1.5 QUALITY ASSURANCE

- A. Source Limitations: Obtain same type of electric water heaters through one source from a single manufacturer.
- B. Product Options: Drawings indicate size, profiles, and dimensional requirements of electric water heaters and are based on the specific system indicated. Refer to Division 1 Section "Product Requirements."
- C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a NRTL acceptable to authorities having jurisdiction, and marked for intended use.
- D. ASME Compliance: Where indicated, fabricate and label commercial water heater storage tanks to comply with ASME Boiler and Pressure Vessel Code: Section VIII, Division 1.
- E. ASHRAE Standards: Comply with performance efficiencies prescribed for the following:
 - 1. ASHRAE 90.1, "Energy Efficient Design of New Buildings except Low-Rise Residential Buildings," for commercial water heaters.
- F. Comply with NSF 61, "Drinking Water System Components - Health Effects; Sections 1 through 9," for all components that will be in contact with potable water.

1.6 COORDINATION

- A. Coordinate size and location of concrete bases with Architectural and Structural Drawings.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.

2.2 HOUSEHOLD ELECTRIC WATER HEATERS

A. Household, Short, Storage Electric Water Heaters: Comply with UL 174.

1. Manufacturers:

- a. Bock Water Heaters, Inc.
- b. Bradford White Corporation.
- c. Lochinvar Corporation.
- d. Smith, A. O. Water Products Company.

2. Storage-Tank Construction: Steel.

- a. Tappings: ASME B1.20.1 pipe thread.
- b. Pressure Rating: 150 psig.
- c. Interior Finish: Comply with NSF 61 barrier materials for potable-water tank linings, including extending lining material into tappings.

3. Factory-Installed Storage-Tank Appurtenances:

- a. Anode Rod: Replaceable magnesium.
- b. Dip Tube: Provide unless cold-water inlet is near bottom of tank.
- c. Drain Valve: ASSE 1005.
- d. Insulation: Comply with ASHRAE/IESNA 90.1 or ASHRAE 90.2.
- e. Jacket: Steel with enameled finish.

1) Short: Cylindrical shape.

- f. Heat Trap Fittings: Inlet type in cold-water inlet and outlet type in hot-water outlet.
- g. Heating Elements: Two; electric, screw-in immersion type with 12 kW or less total, and wired for non-simultaneous operation, unless otherwise indicated.
- h. Temperature Control: Adjustable thermostat for each element.
- i. Safety Control: High-temperature-limit cutoff device or system.
- j. Relief Valve: ASME rated and stamped and complying with ASME PTC 25.3 for combination temperature and pressure relief valves. Include relieving capacity at least as great as heat input, and include pressure setting less than water heater working-pressure rating. Select relief valve with sensing element that extends into storage tank.

4. Capacity and Characteristics: Refer to Schedule on Drawings.

2.3 EXPANSION TANKS

- A. Description: Steel pressure-rated tank constructed with welded joints and factory-installed butyl-rubber diaphragm. Include air pre-charge to minimum system-operating pressure at tank.
 - 1. Manufacturers:
 - a. AMTROL Inc.
 - b. Armstrong Pumps, Inc.
 - c. Bell & Gossett; Xylem Inc.
 - d. Taco, Inc.
 - e. Wessels Co.
 - 2. Construction:
 - a. Tappings: Factory-fabricated steel, welded to tank before testing and labeling. Include ASME B1.20.1, pipe thread.
 - b. Interior Finish: Comply with NSF 61 barrier materials for potable-water tank linings, including extending finish into and through tank fittings and outlets.
 - c. Air-Charging Valve: Factory installed.
 - 3. Capacity and Characteristics:
 - a. Refer to Schedule on Drawings.

2.4 WATER HEATER ACCESSORIES

- A. Combination Temperature and Pressure Relief Valves: ASME rated and stamped and complying with ASME PTC 25.3. Include relieving capacity at least as great as heat input, and include pressure setting less than water heater working-pressure rating. Select relief valves with sensing element that extends into storage tank.
- B. Water Heater Stand and Drain-Pan Units: High-density-polyethylene-plastic, 18-inch-high, enclosed-base stand complying with IAPMO PS 103 and IAS No. 2. Include integral or separate drain pan with raised edge and NPS 1 drain outlet with ASME B1.20.1 pipe thread.
- C. Water Heater Stands: Water heater manufacturer's factory-fabricated steel stand for floor mounting and capable of supporting water heater and water. Include dimension that will support bottom of water heater a minimum of 18 inches above the floor.
- D. Water Heater Mounting Brackets: Water heater manufacturer's factory-fabricated steel bracket for wall mounting and capable of supporting water heater and water.
- E. Drain Pans: Corrosion-resistant metal with raised edge. Include dimensions not less than base of water heater and include drain outlet not less than NPS 3/4.
- F. Piping-Type Heat Traps: Field-fabricated piping arrangement according to ASHRAE/IESNA 90.1 or ASHRAE 90.2.

- G. Water Regulators: ASSE 1003, water-pressure reducing valve. Set at 25-psig- maximum outlet pressure, unless otherwise indicated.
- H. Shock Absorbers: ASSE 1010 or PDI WH 201, Size A water hammer arrester.

2.5 SOURCE QUALITY CONTROL

- A. Test and inspect water heater storage tanks, specified to be ASME-code construction, according to ASME Boiler and Pressure Vessel Code.
- B. Hydrostatically test water heater storage tanks before shipment to minimum of one and one-half times pressure rating.
- C. Prepare test reports.

PART 3 - EXECUTION

3.1 WATER HEATER INSTALLATION

- A. Install water heaters level and plumb, according to layout drawings, original design, and referenced standards. Maintain manufacturer's recommended clearances. Arrange units so controls and devices needing service are accessible.
- B. Install combination temperature and pressure relief valves in top portion of storage tanks. Use relief valves with sensing elements that extend into tanks. Extend commercial-water-heater relief-valve outlet, with drain piping same as domestic water piping in continuous downward pitch, and discharge by positive air gap onto closest floor drain.
- C. Install combination temperature and pressure relief valves in water piping for water heaters without storage. Extend commercial-water-heater relief-valve outlet, with drain piping same as domestic water piping in continuous downward pitch, and discharge by positive air gap onto closest floor drain.
- D. Install water-heater drain piping as indirect waste to spill by positive air gap into open drains or over floor drains. Install hose-end drain valves at low points in water piping for water heaters that do not have tank drains. Refer to Division 20 Section "Valves" for hose-end drain valves.
- E. Install thermometer on outlet piping of water heaters. Refer to Division 20 Section "Meters and Gages" for thermometers.
- F. Install thermometers on inlet and outlet piping of household, collector-to-tank, solar-electric water heaters. Refer to Division 20 Section "Meters and Gages" for thermometers.
- G. Install pressure gage(s) on outlet of commercial electric water- heater piping. Refer to Division 20 Section "Meters and Gages" for pressure gages.

- H. Assemble and install inlet and outlet piping manifold kits for multiple water heaters. Fabricate, modify, or arrange manifolds for balanced water flow through each water heater. Include shutoff valve, thermometer in each water heater inlet and outlet, and throttling valve in each water heater outlet. Refer to Division 20 Section "Valves" for general-duty valves and to Division 20 Section "Meters and Gages" for thermometers.
- I. Install piping-type heat traps on inlet and outlet piping of water heater storage tanks without integral or fitting-type heat traps.
- J. Fill water heaters with water.
- K. Charge compression tanks with air.

3.2 CONNECTIONS

- A. Piping installation requirements are specified in other Division 20 and 22 Sections. Drawings indicate general arrangement of piping, fittings, and specialties.
- B. Install piping adjacent to water heaters to allow service and maintenance. Arrange piping for easy removal of water heaters.
- C. Ground equipment according to Division 26 Section "Grounding and Bonding."
- D. Connect wiring according to Division 26 Section "Conductors and Cables."

3.3 FIELD QUALITY CONTROL

- A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust field-assembled components and equipment installation, including connections, and to assist in field testing. Report results in writing.
- B. Perform the following field tests and inspections and prepare test reports:
 - 1. Leak Test: After installation, test for leaks. Repair leaks and retest until no leaks exist.
 - 2. Operational Test: After electrical circuitry has been energized, confirm proper operation.
 - 3. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- C. Remove water heaters that do not pass tests and inspections. Replace with water heaters meeting Contract requirements and retest as specified above.

3.4 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain electric water heaters.

END OF SECTION 22 33 00

SECTION 22 42 00 - PLUMBING FIXTURES

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PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- B. Related Sections include the following:
 - 1. Division 10 Section "Toilet and Bath Accessories."
 - 2. Division 20 Section "Mechanical General Requirements."
 - 3. Division 20 Section "Basic Mechanical Materials and Methods."
 - 4. Division 22 Section "Domestic Water Piping Specialties" for backflow preventers; individual-fixture, water tempering valves; and specialty fixtures not included in this Section.
 - 5. Division 22 Section "Drainage Piping Specialties" for floor drains, and specialty fixtures not included in this Section.

1.2 DEFINITIONS

- A. ABS: Acrylonitrile-butadiene-styrene plastic.
- B. Accessible Fixture: Plumbing fixture that can be approached, entered, and used by people with disabilities.
- C. Cast Polymer: Cast-filled-polymer-plastic material. This material includes cultured-marble and solid-surface materials.
- D. Cultured Marble: Cast-filled-polymer-plastic material with surface coating.
- E. Fitting: Device that controls the flow of water into or out of the plumbing fixture. Fittings specified in this Section include supplies and stops, faucets and spouts, shower heads and tub spouts, drains and tailpieces, and traps and waste pipes. Piping and general-duty valves are included where indicated.
- F. FRP: Fiberglass-reinforced plastic.
- G. PMMA: Polymethyl methacrylate (acrylic) plastic.
- H. PVC: Polyvinyl chloride plastic.
- I. Solid Surface: Nonporous, homogeneous, cast-polymer-plastic material with heat-, impact-, scratch-, and stain-resistance qualities.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of plumbing fixture indicated. Include selected fixture and trim, fittings, accessories, appliances, appurtenances, equipment, and supports. Indicate materials and finishes, dimensions, construction details, and flow-control rates.

1.4 INFORMATIONAL SUBMITTALS

- A. Shop Drawings: Diagram power, signal, and control wiring.
- B. Coordination Drawings: Counter cutout templates for mounting of counter-mounted plumbing fixtures.

1.5 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For plumbing fixtures and trim to include in operation and maintenance manuals.

1.6 QUALITY ASSURANCE

- A. Source Limitations: Obtain plumbing fixtures, faucets, and other components of each category through one source from a single manufacturer.

1. Exception: If fixtures, faucets, or other components are not available from a single manufacturer, obtain similar products from other manufacturers specified for that category.
 - B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by an NRTL acceptable to authorities having jurisdiction, and marked for intended use.
 - C. Regulatory Requirements: Comply with requirements in ICC A117.1, "Accessible and Usable Buildings and Facilities"; Public Law 90-480, "Architectural Barriers Act"; and Public Law 101-336, "Americans with Disabilities Act"; for plumbing fixtures for people with disabilities.
 - D. Regulatory Requirements: Comply with requirements in Public Law 102-486, "Energy Policy Act," about water flow and consumption rates for plumbing fixtures.
 - E. Regulatory Requirements: Comply with requirements in Public Law 111-380, "Reduction of Lead in Drinking Water Act," about lead content in materials that will be in contact with potable water for human consumption.
 - F. Comply with NSF 61, "Drinking Water System Components - Health Effects; Sections 1 through 9," and NSF 372 Drinking Water System Components – Lead Content for potable domestic water piping and components.
 - G. Select combinations of fixtures and trim, faucets, fittings, and other components that are compatible.
 - H. Comply with applicable ANSI, ASME, ASSE, ASTM, ICC, NSF, and UL standards and other requirements specified for plumbing fixtures, trim, fittings, components, and features.
- 1.7 EXTRA MATERIALS
- A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

PART 2 - PRODUCTS

2.1 WATER CLOSETS

A. Water Closets, WC-1:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Basis of Design: Kohler Co.; K-25077-0 Kingston Comfort Height.

- b. American Standard Companies, Inc.
 - c. Sloan Valve Company.
 - d. Zurn Plumbing Products Group.
2. Description: Accessible, floor-mounting, floor-outlet, vitreous-china fixture designed for gravity-type tank operation.
- a. Style: Close coupled.
 - 1) Bowl Type: Elongated with siphon-jet design. Include bolt caps matching fixture.
 - 2) Height: Accessible.
 - 3) Design Consumption: 1.28 gal./flush.
 - 4) Tank: Gravity type with trim. Include cover.
 - 5) Trip Mechanism: Lever-handle actuator.
 - 6) Color: White.
 - b. Supply: NPS 3/8 or NPS 1/2 chrome-plated brass or copper with screwdriver or loose-key stop.
 - c. Toilet Seat: TS-1.

2.2 TOILET SEATS

A. Toilet Seats, TS-1:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
- a. Bemis Manufacturing Company; 1955SSC/1955SSCT.
 - b. Centoco Manufacturing Corp.
 - c. Church Seats; 295SSC/295SSCT.
 - d. Comfort Seats; a Jones Stephens Brand; Model Number C106SSC.
 - e. Ferguson Enterprises, Inc.; ProFlo PFTSCOF2000WH.
 - f. Olsonite Seat Company; Model 10SSC/10SSCT.
 - g. Plumbtech; Plumbing Technologies, LLC.
 - h. Sanderson Plumbing Products, Inc.; Beneke Div.
 - i. Zurn Plumbing Products Group; 5955STS-WH.
2. Description: Toilet seat for water-closet-type fixture.
- a. Material: Molded, solid plastic.
 - b. Configuration: Open front without cover.
 - c. Size: Elongated.
 - d. Hinge Type: SC, self-sustaining, check.
 - e. Class: Standard commercial.
 - f. Color: White.

2.3 LAVATORIES

A. Lavatories, LAV-1:

- a. Bowl provided by Architectural Trades.
- b. Faucet: LF-1.
- c. Water Temperature Limiting Device: Required.
- d. Drain Piping: NPS 1-1/4 chrome-plated, cast-brass P-trap; NPS 1-1/4, 17 gage tubular brass waste to wall; and wall escutcheon.

2.4 LAVATORY FAUCETS

A. Lavatory Faucets, LF-1:

- 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Basis of Design: Kohler Co.; Parallel K-23472-4.
 - b. American Standard Companies, Inc.
 - c. Chicago Faucets.
 - d. Delta Faucet Company.
 - e. Moen Commercial.
 - f. Speakman Company.
 - g. T & S Brass and Bronze Works, Inc.
 - h. Zurn Plumbing Products Group.
- 2. Description: Single handle mixing faucet, vandal resistant, 1 hole, with metal grid strainer, lift rod hole, high temperature limit stop.
 - a. Body Material: Commercial, all metal construction meeting NSF 61.
 - b. Finish: Polished chrome plate.
 - c. Centers: 4 inches.
 - d. Mounting: Deck, concealed.
 - e. Inlet(s): NPS 1/2.
 - f. Spout Outlet:
 - 1) Vandal resistant aerator.
 - 2) Laminar flow or plain end for patient care areas.
 - g. Maximum Flow Rate:
 - 1) 0.5 gpm for faucets in public restrooms.

2.5 COUNTER-MOUNTING SINKS

A. Sinks, SK-1:

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

- a. Basis of Design: Elkay Manufacturing Co.; ELUHAD191655PD.
 - b. Franke Consumer Products, Inc., Commercial Div.
 - c. Just Manufacturing Company.
 - d. Moen Commercial.
2. Description: Single-bowl, counter-mounting, lay-in stainless-steel sink.
- a. Overall Dimensions: 21-1/2 inches left to right by 18-1/2 inches front to back.
 - b. Metal Thickness: 18 gage, with sound dampened underside.
 - c. Bowl:
 - 1) Dimensions: 19 inches by 16 inches by 5-3/8 inches deep.
 - 2) Drain: 3-1/2-inch grid with offset waste.
 - d. Sink Faucet: SF-1.
 - e. Water Temperature Limiting Device: Required.
 - f. Drain Piping: NPS 1-1/2 chrome-plated, cast-brass P-trap; 17 gage tubular brass waste to wall; and wall escutcheon(s).
 - g. Disposer: Required.
 - h. Dishwasher Air-Gap Fitting: Not required.
 - i. Hot-Water Dispenser: Not required.

2.6 SINK FAUCETS

A. Sink Faucets, SF-1:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Basis of Design: Kohler Co.; Simplice.
 - b. American Standard Companies, Inc.
 - c. Chicago Faucets.
 - d. Delta Faucet Company.
 - e. Elkay Manufacturing Co.
 - f. Moen Commercial.
 - g. Speakman Company.
 - h. T & S Brass and Bronze Works, Inc.
 - i. Zurn Plumbing Products Group.
2. Description: Commercial/Industrial sink faucet. Include hot- and cold-water indicators; coordinate faucet inlets with supplies and fixture holes; coordinate outlet with spout and fixture receptor.
 - a. Body Material: Commercial, solid brass.
 - b. Finish: Vibrant Stainless.
 - c. Mixing Valve: Single handle.
 - d. Mounting: Counter
 - e. Handle(s): Wrist blade.
 - f. Operation: Noncompression, manual.
 - g. Inlet(s): NPS 1/2.

- h. Spout Type: Swivel spout with pull-down spray head.
- i. Spout Outlet: Aerator.
- j. Maximum Flow Rate:
 - 1) 1.5 gpm.

2.7 FIXTURE SUPPLIES

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. BrassCraft; a Masco Company.
 - 2. McGuire Mfg. Co., Inc.
 - 3. Any of the approved plumbing fixture manufacturers.
- B. Description: Chrome-plated brass, loose-key or screwdriver angle stops with brass stems; rigid, chrome-plated copper risers; and chrome-plated wall flanges.

2.8 PROTECTIVE SHIELDING GUARDS

- A. Protective Shielding Pipe Covers (PSG-1):
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Engineered Brass Co.
 - b. Insul-Tect Products Co.; a Subsidiary of MVG Molded Products.
 - c. McGuire Manufacturing Co., Inc.
 - d. Oatey; Dearborn Safety Series.
 - e. Plumberex Specialty Products Inc.
 - f. TCI Products; SG-200BV.
 - g. TRUEBRO, Inc.
 - h. Zurn Plumbing Products Group; Z8946-3-NT.
 - 2. Description: Manufactured plastic wraps for covering plumbing fixture hot- and cold-water supplies and trap and drain piping. Comply with Americans with Disabilities Act (ADA) requirements.
- B. Protective Shielding Piping Enclosures (PSG-2):
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Sloan Valve Co.
 - b. TRUEBRO, Inc.
 - c. Zurn Plumbing Products Group; Z6900-VG
 - 2. Description: Manufactured plastic enclosure for covering plumbing fixture hot- and cold-water supplies and trap and drain piping. Comply with ADA requirements.

2.9 DISPOSERS

A. Disposers, D-1:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. In-Sink-Erator; a div. of Emerson Electric Co.; Badger 5XP.
2. Description: Continuous-feed, household type food-waste disposer. Include reset button; wall switch; corrosion-resistant chamber with jam-resistant, cutlery- or stainless-steel grinder or shredder; NPS 1-1/2 outlet; quick-mounting, stainless-steel sink flange; antisplash guard; and combination cover/stopper. Include cord with grounded plug.
 - a. Motor: 115-V ac, 1725 rpm, 3/4 hp with overload protection.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine roughing-in of water supply and sanitary drainage and vent piping systems to verify actual locations of piping connections before plumbing fixture installation.
- B. Examine cabinets, counters, floors, and walls for suitable conditions where fixtures will be installed.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Assemble plumbing fixtures, trim, fittings, and other components according to manufacturers' written instructions.
- B. Install floor-mounting fixtures on closet flanges or other attachments to piping or building substrate.
- C. Install counter-mounting fixtures in and attached to casework.
- D. Install fixtures level and plumb according to roughing-in drawings. Install accessible fixtures at heights required by local codes.
- E. Install water-supply piping with stop on each supply to each fixture to be connected to water distribution piping. Attach supplies to supports or substrate within pipe spaces behind fixtures. Install stops in locations where they can be easily reached for operation.
 1. Exception: Fixtures with flushometer valves, and faucets or valves with integral stops.

- F. Install ASSE 1070 water-temperature limiting devices on supplies for lavatories and sinks that will be used for handwashing, and where specified. Refer to Division 20 Section "Domestic Water Piping Specialties."
- G. Install trap and tubular waste piping on drain outlet of each fixture to be directly connected to sanitary drainage system.
- H. Install tubular waste piping on drain outlet of each fixture to be indirectly connected to drainage system.
- I. Install protective shielding guards PSG-1 on exposed traps and supplies of lavatories, and sinks used for hand washing.
- J. Install tanks for accessible, tank-type water closets with lever handle mounted on wide side of compartment.
- K. Install toilet seats on water closets.
- L. Install faucet-spout fittings with specified flow rates and patterns in faucet spouts if faucets are not available with required rates and patterns. Include adapters if required.
- M. Install water-supply flow-control fittings with specified flow rates in fixture supplies at stop valves.
- N. Install faucet flow-control fittings with specified flow rates and patterns in faucet spouts if faucets are not available with required rates and patterns. Include adapters if required.
- O. Install shower flow-control fittings with specified maximum flow rates in shower arms.
- P. Install traps on fixture outlets.
 - 1. Exception: Omit trap on fixtures with integral traps.
 - 2. Exception: Omit trap on indirect wastes, unless otherwise indicated.
- Q. Install escutcheons at piping wall ceiling penetrations in exposed, finished locations and within cabinets and millwork. Use deep-pattern escutcheons if required to conceal protruding fittings. Escutcheons are specified in Division 20 Section "Basic Mechanical Materials and Methods."
- R. Seal joints between fixtures and walls, floors, and countertops using sanitary-type, one-part, mildew-resistant silicone sealant. Match sealant color to fixture color. Sealants are specified in Division 07 Section "Joint Sealants."

3.3 CONNECTIONS

- A. Piping installation requirements are specified in other Division 20 and 22 Sections. Drawings indicate general arrangement of piping, fittings, and specialties.
- B. Connect fixtures with water supplies, stops, and risers, and with traps, soil, waste, and vent piping. Use size fittings required to match fixtures.

- C. Individual water line branches, waste lines, vents, and traps for connection to individual fixtures, fixture fittings and specialties shall be in accordance with the schedule on the Drawings.
- D. Ground equipment according to Division 26 Section "Grounding and Bonding."
- E. Connect wiring according to Division 26 Section "Conductors and Cables."

3.4 FIELD QUALITY CONTROL

- A. Verify that installed plumbing fixtures are categories and types specified for locations where installed.
- B. Check that plumbing fixtures are complete with trim, faucets, fittings, and other specified components.
- C. Inspect installed plumbing fixtures for damage. Replace damaged fixtures and components.
- D. Test installed fixtures after water systems are pressurized for proper operation. Replace malfunctioning fixtures and components, then retest. Repeat procedure until units operate properly.

3.5 ADJUSTING

- A. Operate and adjust faucets and controls. Replace damaged and malfunctioning fixtures, fittings, and controls.
- B. Adjust water pressure at faucets to produce proper flow and stream.
- C. Replace washers and seals, or cartridges of leaking and dripping faucets and stops.
- D. Install fresh batteries in sensor-operated mechanisms.

3.6 CLEANING

- A. Clean fixtures, faucets, and other fittings with manufacturers' recommended cleaning methods and materials. Do the following:
 - 1. Remove faucet spouts and strainers, remove sediment and debris, and reinstall strainers and spouts.
 - 2. Remove sediment and debris from drains.
- B. After completing installation of exposed, factory-finished fixtures, faucets, and fittings, inspect exposed finishes and repair damaged finishes.

3.7 PROTECTION

- A. Provide protective covering for installed fixtures and fittings.
- B. Do not allow use of plumbing fixtures for temporary facilities unless approved in writing by Owner.

END OF SECTION 22 42 00

SECTION 23 05 00 - COMMON WORK RESULTS FOR HVAC

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PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- B. Related Sections include the following:
 - 1. Division 20 Section "Mechanical General Requirements."
 - 2. Division 20 Section "Basic Mechanical Materials and Methods."
 - 3. Division 23 Section "Testing, Adjusting, and Balancing."

1.2 SUMMARY

- A. This Section includes common requirements for fans and air moving equipment.

1.3 ACTION SUBMITTALS

- A. Product Data: For the following:
 - 1. Fan bearings.
 - 2. V-belt fan drives.
 - 3. Direct drive couplings.

1.4 QUALITY ASSURANCE

- A. Electrical Characteristics for HVAC Equipment: Equipment of higher electrical characteristics may be furnished provided such proposed equipment is approved in writing and connecting electrical services, circuit breakers, and conduit sizes are appropriately modified. If minimum energy ratings or efficiencies are specified, equipment shall comply with requirements.
- B. Fan Performance Data: AMCA Standard 210.
- C. Sound Power Level Ratings:
 - 1. Ducted Fans - Rated per AMCA 301, when tested per AMCA 300.
 - 2. Nonducted Fans - Rated in Zones at 5 feet from acoustic center of fan rated per AMCA 301, tested per AMCA 300 and converted per AMCA 302.

1.5 ENVIRONMENTAL REQUIREMENTS

- A. Do not operate equipment for any purpose, temporary or permanent, until ductwork is clean, filters are in place, bearings lubricated, and fan has been test run under observation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

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

2.2 FAN SHAFTS

- A. Fan Shafts: Ground from solid cold rolled steel, and proportioned to run at least 25 percent below the first critical speed.

2.3 FAN POWER TRANSMISSION

- A. V-Belt Type Fan Drives: In accordance with Engineering Standard Specification for Drives Using Multiple V-Belts, sponsored by the Mechanical Power Transmission Association and the Rubber Manufacturer's Association.
- B. A given manufacturer's V-belt drive, as applied to specific equipment provided under the Contract, shall conform to the equipment manufacturer's published recommendations, except as otherwise specified.
- C. Base horsepower rating of drive on minimum pitch diameter of small sheave.
- D. Locate belt drives outboard of bearings. Align drive and driven shafts by the four-point method.
- E. Adjust belt tension in accordance with the manufacturer's recommendations.
- F. Perform alignment and final belt tensioning in the presence of the Architect.

2.4 SHEAVES

- A. Furnish sheaves of machined cast iron or carbon steel, bushing type of fixed bore, secured to the shaft by key and keyway.
- B. For all constant speed fans at or above 2 inches of total static pressure, Contractor shall provide and install two sets of fixed sheaves. First set shall be installed for initial start-up and shall be based on scheduled data. The second set shall be installed after system balance is complete and shall be based on actual field conditions.
- C. For all constant speed fans below 2 inches total static pressure, Contractor shall provide and install two sets of adjustable sheaves. First set shall be installed for initial start-up and shall be based on scheduled data. The second set shall be installed after the balance is complete and shall be based on actual field conditions, and selected at mid-range of the sheave.
- D. Set pitch diameters of fixed pitch and adjustable or variable pitch sheaves when adjusted as specified, at not less than that recommended by NEMA Standard MG1-14.42.
- E. For companion sheaves for adjustable or variable pitch drives, furnish wide groove spacing to match driving sheaves.
- F. For all variable frequency controller (VFC) operated fans, contractor shall provide and install one set of fixed sheaves sized to allow full utilization of fan motor horsepower provided, with VFC at 100 percent of fan motor RPM.

2.5 V-BELT FAN DRIVES

- A. Fan Drives: Multiple V-belt style with adjustable pitch driver sheaves for fans up to 2 inches of total static pressure and fixed pitch driver sheaves for fans at or above 2 inches

of total static pressure and up. Sheaves shall have split, taper style bushings. Drives shall be selected for a 150 percent service factor and shall provide for adjustment of both belt tension and alignment.

- B. Manufacturers:
 - 1. Emerson Power Transmission; Browning.
 - 2. Rockwell Automation; Dodge.
 - 3. T.B. Wood's Incorporated.

2.6 FAN DRIVE, SHAFT, AND COUPLING GUARDS

- A. Safety Provisions: Include guards and screens for power transmission equipment, but do not negate vibration isolation provision.
- B. Furnish ANSI and OSHA compliant mechanical power transmission apparatus guards except where superseded by other governing codes, and except as modified and supplemented. Requirements specified apply to all types of fans.
- C. Fabricate mechanical power transmission device guards such that the completed structure is capable of withstanding a load of at least 200 pounds applied in any direction.
- D. Furnish a guard enclosure for each V-belt drive, coupling, shaft, and rotating component. Secure guards in place, easily removable for maintenance. Guard fasteners used for maintenance access shall be "captive type." Locate holes on each guard for tachometer readings on both the motor and fan shafts. Fabricate guard of minimum 16 gage sheet metal with hemmed edges at openings for shafts. Weld four mounting lugs or feet of 10 gage material to the guard. Fabricate guards for couplings five inches in diameter and larger of 12 gage sheet metal. Furnish holes in mounting feet sized for suitable machine screws.
- E. Centrifugal exhaust fans shall be provided with shaft seals.

2.7 BELT DRIVE GUARDS

- A. Belt Guards: ANSI and OSHA compliant with provision for readily viewing belt tension and measuring shaft speeds. Guards shall be installed with quick release pins, so that removal of three to five clip pins, will allow the guard to be removed from fan housing.
- B. Fabricate guards which completely enclose moving parts of the particular drive. Design and construct guards of such rigidity as to contain a belt which breaks during operation. Minimum material thickness, 16 gage sheet metal. Where ventilation is required, perforated metal shall be used for the sides. Fabricate top of solid sheet metal.

2.8 V-BELTS

- A. Notched or cogged style, endless type, of Dacron reinforced elastomer construction, with cross-section to suit sheave grooves. Determine the number of V-belts from the motor

horsepower to which apply the service factor to obtain the design horsepower. Determine the corrected horsepower per belt by multiplying the nominal horsepower per belt by an arc of contact factor not greater than 0.85. Divide the design horsepower by the corrected horsepower per belt to obtain the number of belts required. In any case, furnish not less than two belts for each drive.

- B. Furnish belts that have been factory or factory-authorized distributor matched and measured on a belt-matching machine. Selection by "code numbers," "sag numbers" or "match numbers" is not acceptable. Bind each belt set with wire and tag with equipment identification.
- C. Manufacturers:
 - 1. Emerson Power Transmission; Browning; AX, BX, and CX Series and 3VX and 5VX Series.
 - 2. Rockwell Automation; Dodge; Classic Cog and Narrow Cog V-Belts.
 - 3. T.B. Wood's Incorporated; Classical Cog and Narrow Cog V-Belts.

2.9 V-BELT DRIVE MOTOR BASES

- A. Furnish fan motors with slide or adjustable pivoted bases wherever equipment configuration permits proper installation.
- B. Provide for adjustment of both belt tension and alignment.

2.10 AIR HANDLING SYSTEM BALANCING PROVISIONS

- A. Provide extra sheaves, sized as recommended by the Balancing Agent, for the adjustment of fan speed for each air handling system during air quantity balancing operations. Furnish sheaves as specified in this Section.
- B. Provide sheaves, sized as recommended by the Balancing Agent, for the adjustment of fan speed for each existing air handling system requiring rebalancing during air quantity balancing operations. Furnish sheaves as specified in this Section.

2.11 FLEXIBLE COUPLINGS (DIRECT DRIVE)

- A. Fan shaft shall be connected to the motor shaft through a flexible coupling. The flexible member shall be a tire shape, in shear, or a solid mass serrated edge disc shape, made of chloroprene materials and retained by fixed flanges. Flexible coupling shall act as a dielectric connector and shall not transmit sound, vibration or end thrust.
- B. Manufacturer:
 - 1. Falk Corporation (The).

2.12 MOTOR REQUIREMENTS

- A. Furnish motors in accordance with Division 20 Section "Motors."

2.13 FAN BEARINGS

- A. Bearings: Anti-friction ball or roller type with provision for self-alignment and thrust load. Made in U.S.A. with ABMA L₁₀ minimum life of 200,000 hours. Use cast iron housings and dust-tight seals suitable for lubricant pressures.
 - 1. Lubrication Provisions - Use surface ball check type supply fittings. Provide extension tubes to allow safe maintenance while equipment is operating. Provide manual or automatic pressure relief fittings to prevent overheating or seal blow-out due to excess lubricant or pressure. Arrange relief fittings opposite supply but visible for normal maintenance observation.
 - 2. Bearings on Equipment with less than 1/2 horsepower rating or on shafts smaller than 1-3/4 inch in diameter: Permanently sealed, pre-lubricated anti-friction bearings per specified materials and ABMA L₁₀ life requirements.

2.14 IDENTIFICATION

- A. Nameplate: Affix metallic, corrosion-resistant data plate for each fan in a conspicuous location. Include selection point capacity conditions.

2.15 ACCESSORIES

- A. Bird Screens: Of material to match adjacent contact construction, 1/2 inch mesh or equal expanded metal. Use on inlet or outlet of each nonducted fan.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Field Rigging: Do not negate balancing. Do not bend shaft. Use lifting eyes.
- B. Install sheaves where recommended by Testing, Adjusting, and Balancing agency.
- C. Refer to individual Division 23 HVAC equipment Sections for additional requirements.

END OF SECTION 23 05 00

SECTION 23 05 93 - TESTING, ADJUSTING, AND BALANCING

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PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
- B. Related Sections include the following:
 - 1. Division 20 Section "Mechanical General Requirements."
 - 2. Division 20 Section "Basic Mechanical Materials and Methods."
 - 3. Division 23 Section "Common Work Results for HVAC."

1.2 SUMMARY

- A. This Section includes testing, adjusting, and balancing to produce design objectives for the following:

1. Air Systems:
 - a. Variable-air-volume systems.
 2. Existing systems TAB.
 3. Verifying that automatic control devices are functioning properly.
 4. Reporting results of activities and procedures specified in this Section.
- B. Include rebalancing of air systems, or system portions affected by recommended sheave changes.

1.3 DEFINITIONS

- A. Adjust: To regulate fluid flow rate and air patterns at the terminal equipment, such as to reduce fan speed or adjust a damper.
- B. AHJ: Authority having jurisdiction.
- C. Balance: To proportion flows within the distribution system, including submains, branches, and terminals, according to indicated quantities.
- D. Barrier or Boundary: Construction, either vertical or horizontal, such as walls, floors, and ceilings that are designed and constructed to restrict the movement of airflow, smoke, odors, and other pollutants.
- E. Draft: A current of air, when referring to localized effect caused by one or more factors of high air velocity, low ambient temperature, or direction of airflow, whereby more heat is withdrawn from a person's skin than is normally dissipated.
- F. NC: Noise criteria.
- G. Procedure: An approach to and execution of a sequence of work operations to yield repeatable results.
- H. RC: Room criteria.
- I. Report Forms: Test data sheets for recording test data in logical order.
- J. Smoke-Control System: An engineered system that uses fans to produce airflow and pressure differences across barriers to limit smoke movement.
- K. Smoke-Control Zone: A space within a building that is enclosed by smoke barriers and is a part of a zoned smoke-control system.
- L. Stair Pressurization System: A type of smoke-control system that is intended to positively pressurize stair towers with outdoor air by using fans to keep smoke from contaminating the stair towers during an alarm condition.
- M. Static Head: The pressure due to the weight of the fluid above the point of measurement. In a closed system, static head is equal on both sides of the pump.

- N. Suction Head: The height of fluid surface above the centerline of the pump on the suction side.
- O. System Effect: A phenomenon that can create undesired or unpredicted conditions that cause reduced capacities in all or part of a system.
- P. System Effect Factors: Allowances used to calculate a reduction of the performance ratings of a fan when installed under conditions different from those presented when the fan was performance tested.
- Q. TAB: Testing, adjusting, and balancing.
- R. Terminal: A point where the controlled medium, such as fluid or energy, enters or leaves the distribution system.
- S. Test: A procedure to determine quantitative performance of systems or equipment.
- T. Testing, Adjusting, and Balancing (TAB) Firm: The entity responsible for performing and reporting TAB procedures.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: Within 30 days from Contractor's Notice to Proceed, submit 2 copies of evidence that TAB firm and this Project's TAB team members meet the qualifications specified in "Quality Assurance" Article.
- B. Contract Documents Examination Report: Within 30 days from Contractor's Notice to Proceed, submit 2 copies of the Contract Documents review report as specified in Part 3.
- C. Strategies and Procedures Plan: Within 30 days from Contractor's Notice to Proceed, submit 2 copies of TAB strategies and step-by-step procedures as specified in Part 3 "Preparation" Article. Include a complete set of report forms intended for use on this Project.
- D. Sample Report Forms: Submit two sets of sample TAB report forms.

1.5 CLOSEOUT SUBMITTALS

- A. Certified TAB Reports: Submit two copies of reports prepared, as specified in this Section, on approved forms certified by TAB firm.
- B. Warranties specified in this Section.

1.6 QUALITY ASSURANCE

- A. TAB Firm Qualifications: Engage a TAB firm certified by either AABC or NEBB.
- B. Approved Balancing Agencies.

1. The TAB firm selected shall be from the following list:
 - a. Airflow Testing Inc.; Lincoln Park, MI.
 - b. Barmatic Inspecting Co., Inc.; Lincoln Park, MI.
 - c. Ener-Tech Testing; Holly, MI.
 - d. Enviro-Aire/Total Balance Co.; St. Clair Shores, MI.
 - e. International Test & Balance Inc.; Southfield, MI.
 - f. Quality Air Service; Portage, MI.
 - g. Pro-MEC Engineering Services, Inc.; Grand Ledge, MI.

- C. TAB Conference: Meet with Owner's and Architect's representatives on approval of TAB strategies and procedures plan to develop a mutual understanding of the details. Ensure the participation of TAB team members, equipment manufacturers' authorized service representatives, HVAC controls installers, and other support personnel. Provide seven days' advance notice of scheduled meeting time and location.
 1. Agenda Items: Include at least the following:
 - a. Submittal distribution requirements.
 - b. The Contract Documents examination report.
 - c. TAB plan.
 - d. Work schedule and Project-site access requirements.
 - e. Coordination and cooperation of trades and subcontractors.
 - f. Coordination of documentation and communication flow.

- D. Certification of TAB Reports: Certify TAB field data reports. This certification includes the following:
 1. Review field data reports to validate accuracy of data and to prepare certified TAB reports.
 2. Certify that TAB team complied with approved TAB plan and the procedures specified and referenced in this Specification.

- E. TAB Report Forms: Use standard forms from AABC's "National Standards for Testing and Balancing Heating, Ventilating, and Air Conditioning Systems" or NEBB's "Procedural Standards for Testing, Adjusting, and Balancing of Environmental Systems." TAB firm's forms approved by Architect.

- F. Instrumentation Type, Quantity, and Accuracy: As described in AABC's "National Standards for Testing and Balancing Heating, Ventilating, and Air Conditioning Systems" or NEBB's "Procedural Standards for Testing, Adjusting, and Balancing of Environmental Systems," Section II, "Required Instrumentation for NEBB Certification."

- G. Instrumentation Calibration: Calibrate instruments at least every six months or more frequently if required by instrument manufacturer.
 1. Keep an updated record of instrument calibration that indicates date of calibration and the name of party performing instrument calibration.

1.7 PROJECT CONDITIONS

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

1.8 COORDINATION

- A. Coordinate the efforts of factory-authorized service representatives for systems and equipment, HVAC controls installers, and other mechanics to operate HVAC systems and equipment to support and assist TAB activities.
- B. Notice: Provide seven days advance notice for each test. Include scheduled test dates and times.
- C. Perform TAB after leakage and pressure tests on air and water distribution systems have been satisfactorily completed.

1.9 WARRANTY

- A. National Project Performance Guarantee: If AABC standards are used, provide a guarantee on AABC's "National Standards for Testing and Balancing Heating, Ventilating, and Air Conditioning Systems" forms stating that AABC will assist in completing requirements of the Contract Documents if TAB firm fails to comply with the Contract Documents. Guarantee includes the following provisions:
 - 1. The certified TAB firm has tested and balanced systems according to the Contract Documents.
 - 2. Systems are balanced to optimum performance capabilities within design and installation limits.
- B. Special Guarantee: If NEBB standards are used, provide a guarantee on NEBB forms stating that NEBB will assist in completing requirements of the Contract Documents if TAB firm fails to comply with the Contract Documents. Guarantee shall include the following provisions:
 - 1. The certified TAB firm has tested and balanced systems according to the Contract Documents.
 - 2. Systems are balanced to optimum performance capabilities within design and installation limits.

PART 2 - PRODUCTS (NOT APPLICABLE)

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine system and equipment installations to verify that they are complete and that testing, cleaning, adjusting, and commissioning specified in individual Sections have been performed.
- B. Examine system and equipment test reports.
- C. Examine HVAC system and equipment installations to verify that indicated balancing devices, such as test ports, gage cocks, thermometer wells, flow-control devices, balancing valves and fittings, and manual volume dampers, are properly installed, and that their locations are accessible and appropriate for effective balancing and for efficient system and equipment operation.
- D. Examine HVAC equipment to ensure that clean filters have been installed, bearings are greased, belts are aligned and tight, and equipment with functioning controls is ready for operation.
- E. Examine terminal units, such as variable-air-volume boxes, to verify that they are accessible and their controls are connected and functioning.
- F. Examine plenum ceilings used for supply air to verify that they are airtight. Verify that pipe penetrations and other holes are sealed.
- G. Examine strainers for clean screens and proper perforations.
- H. Examine three-way valves for proper installation for their intended function of diverting or mixing fluid flows.
- I. Examine heat-transfer coils for correct piping connections and for clean and straight fins.
- J. Examine system pumps to ensure absence of entrained air in the suction piping.
- K. Examine equipment for installation and for properly operating safety interlocks and controls.
- L. Examine automatic temperature system components to verify the following:
 - 1. Dampers, valves, and other controlled devices are operated by the intended controller.
 - 2. Dampers and valves are in the position indicated by the controller.
 - 3. Integrity of valves and dampers for free and full operation and for tightness of fully closed and fully open positions. This includes dampers in multizone units, mixing boxes, and variable-air-volume terminals.
 - 4. Automatic modulating and shutoff valves, including two-way valves and three-way mixing and diverting valves, are properly connected.
 - 5. Thermostats and humidistats are located to avoid adverse effects of sunlight, drafts, and cold walls.
 - 6. Sensors are located to sense only the intended conditions.
 - 7. Sequence of operation for control modes is according to the Contract Documents.
 - 8. Controller set points are set at indicated values.

9. Interlocked systems are operating.
10. Changeover from heating to cooling mode occurs according to indicated values.

M. Report deficiencies discovered before and during performance of TAB procedures. Observe and record system reactions to changes in conditions. Record default set points if different from indicated values.

3.2 PREPARATION

- A. Prepare a TAB plan that includes strategies and step-by-step procedures.
- B. Perform the following field tests and inspections to new and renovated portions of duct systems according to SMACNA's "HVAC Air Duct Leakage Test Manual" and prepare test reports:
 1. Conduct tests at static pressures equal to maximum design pressure of system or section being tested. If pressure classes are not indicated, test entire system at maximum system design pressure. Do not pressurize systems above maximum design operating pressure. Give seven days' advance notice for testing.
 2. Maximum Allowable Leakage: Leakage rates are scheduled on the Drawings.
- C. Complete system readiness checks and prepare system readiness reports. Verify the following:
 1. Permanent electrical power wiring is complete.
 2. Hydronic systems are filled, clean, and free of air.
 3. Automatic temperature-control systems are operational.
 4. Equipment and duct access doors are securely closed.
 5. Balance, smoke, and fire dampers are open.
 6. Isolating and balancing valves are open and control valves are operational.
 7. Ceilings are installed in critical areas where air-pattern adjustments are required and access to balancing devices is provided.
 8. Windows and doors can be closed so indicated conditions for system operations can be met.

3.3 GENERAL PROCEDURES FOR TESTING AND BALANCING

- A. Perform testing and balancing procedures on each system according to the procedures contained in AABC's "National Standards for Testing and Balancing Heating, Ventilating, and Air Conditioning Systems" or NEBB's "Procedural Standards for Testing, Adjusting, and Balancing of Environmental Systems" and this Section.
- B. Mark equipment and balancing device settings with paint or other suitable, permanent identification material, including damper-control positions, valve position indicators, fan-speed-control levers, and similar controls and devices, to show final settings.
- C. Take and report testing and balancing measurements in inch-pound (IP) units.

3.4 GENERAL PROCEDURES FOR BALANCING AIR SYSTEMS

- A. Prepare test reports for both fans and outlets. Obtain manufacturer's outlet factors and recommended testing procedures. Crosscheck the summation of required outlet volumes with required fan volumes.
- B. Prepare schematic diagrams of systems' "as-built" duct layouts, or use reduced scale contract documents with notations.
- C. For variable-air-volume systems, develop a plan to simulate diversity.
- D. Determine the best locations in main and branch ducts for accurate duct airflow measurements.
- E. Cut insulation, and drill ducts for installation of test probes to the minimum extent necessary to allow adequate performance of procedures. After testing and balancing, close probe holes with neat patches, neoprene plugs, threaded plugs, or threaded twist-on metal caps, and patch insulation with new materials identical to those removed. Restore vapor barrier and finish according to insulation Specifications for this Project.
- F. Check air flow within intake plenums and mixing boxes of air handling units for uneven flow and temperature stratification and prepare a report with profile elevations (temperature and velocity) on each coil or filter face for Architect.
- G. Locate start-stop and disconnect switches, electrical interlocks, and motor starters.
- H. Verify that motor starters are equipped with properly sized thermal protection.
- I. Check dampers for proper position to achieve desired airflow path.
- J. Check for airflow blockages.
- K. Check condensate drains for proper connections and functioning.
- L. Check for proper sealing of air-handling unit components.
- M. Check for proper sealing of air duct system.

3.5 PROCEDURES FOR VARIABLE-AIR-VOLUME SYSTEMS

- A. **Compensating for Diversity:** When the total airflow of all terminal units is more than the indicated airflow of the fan, place a selected number of terminal units at a maximum set-point airflow condition until the total airflow of the terminal units equals the indicated airflow of the fan. Select the reduced airflow terminal units so they are distributed evenly among the branch ducts.
- B. **Pressure-Independent, Variable-Air-Volume Systems:** After the fan systems have been adjusted, adjust the variable-air-volume systems as follows:

1. Set outside-air dampers at minimum, and return- and exhaust-air dampers at a position that simulates full-cooling load.
2. Select the terminal unit that is most critical to the supply-fan airflow and static pressure. Measure static pressure. Adjust system static pressure so the entering static pressure for the critical terminal unit is not less than the sum of terminal-unit manufacturer's recommended minimum inlet static pressure plus the static pressure needed to overcome terminal-unit discharge system losses.
3. Measure total system airflow. Adjust to within indicated airflow.
4. Set terminal units at maximum airflow and adjust controller or regulator to deliver the designed maximum airflow. Use terminal-unit manufacturer's written instructions to make this adjustment. When total airflow is correct, balance the air outlets downstream from terminal units as described for constant-volume air systems.
5. Set terminal units at minimum airflow and adjust controller or regulator to deliver the designed minimum airflow.
 - a. If air outlets are out of balance at minimum airflow, report the condition but leave outlets balanced for maximum airflow.
6. Remeasure the return airflow to the fan while operating at maximum return airflow and minimum outside airflow. Adjust the fan and balance the return-air ducts and inlets as described for constant-volume air systems.
7. Measure static pressure at the most critical terminal unit and adjust the static-pressure controller at the main supply-air sensing station to ensure that adequate static pressure is maintained at the most critical unit.
8. Record the final fan performance data.

3.6 PROCEDURES FOR MOTORS

- A. Motors, 1/2 HP and Larger: Test at final balanced conditions and record the following data:
 1. Manufacturer, model, and serial numbers.
 2. Motor horsepower rating.
 3. Motor rpm.
 4. Efficiency rating.
 5. Power factor.
 6. Nameplate and measured voltage, each phase.
 7. Nameplate and measured amperage, each phase.
 8. Starter size.
 9. Starter thermal-protection-element rating.
 10. Fuse number and size.
- B. Motors Driven by Variable-Frequency Controllers: Test for proper operation at speeds varying from minimum to maximum. Test the manual bypass for the controller to prove proper operation. Record observations, including controller manufacturer, model and serial numbers, and nameplate data.

3.7 PROCEDURES FOR HEAT-TRANSFER COILS

- A. Electric-Heating Coils: Measure the following data for each coil:
 - 1. Nameplate data.
 - 2. Airflow.
 - 3. Entering- and leaving-air temperature at full load.
 - 4. Voltage and amperage input of each phase at full load and at each incremental stage.
 - 5. Calculated kilowatt at full load.
 - 6. Fuse or circuit-breaker rating for overload protection.

3.8 PROCEDURES FOR TEMPERATURE MEASUREMENTS

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

3.9 PROCEDURES FOR TESTING, ADJUSTING, AND BALANCING EXISTING SYSTEMS

- A. Perform a preconstruction inspection of existing equipment that is to remain and be reused.
 - 1. Measure and record the operating speed, airflow, and static pressure of each fan.
 - 2. Measure motor voltage and amperage. Compare the values to motor nameplate information.
 - 3. Check the condition of filters.
 - 4. Check the condition of coils.
 - 5. Check the operation of the drain pan and condensate drain trap.
 - 6. Check bearings and other lubricated parts for proper lubrication.
 - 7. Report on the operating condition of the equipment and the results of the measurements taken. Report deficiencies.
- B. Before performing testing and balancing of existing systems, inspect existing equipment that is to remain and be reused to verify that existing equipment has been cleaned and refurbished.
 - 1. New filters are installed.
 - 2. Coils are clean and fins combed.
 - 3. Drain pans are clean.
 - 4. Fans are clean.
 - 5. Bearings and other parts are properly lubricated.
 - 6. Deficiencies noted in the preconstruction report are corrected.

- C. Perform testing and balancing of existing systems to the extent that existing systems are affected by the renovation work.
 - 1. Compare the indicated airflow of the renovated work to the measured fan airflows and determine the new fan, speed, filter, and coil face velocity.
 - 2. If calculations increase or decrease the airflow and water flow rates by more than 5 percent, make equipment adjustments to achieve the calculated airflow and water flow rates. If 5 percent or less, equipment adjustments are not required.
 - 3. Air balance each air outlet.

3.10 TOLERANCES

- A. Set HVAC system airflow and water flow rates within the following tolerances:
 - 1. Air handling equipment and outlets: Plus or minus 5 percent.
 - a. Where terminal units serve 6 or more outlets within a common room, individual outlets may vary up to plus or minus 10 percent of design flow rates if overall room supply is within plus or minus 5 percent.

3.11 REPORTING

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

3.12 FINAL REPORT

- A. General: Typewritten, or computer printout in letter-quality font, on standard bond paper, in three-ring binder, tabulated and divided into sections by tested and balanced systems.
- B. Include a certification sheet in front of binder signed and sealed by the certified testing and balancing engineer.
 - 1. Include a list of instruments used for procedures, along with proof of calibration.
- C. Final Report Contents: In addition to certified field report data, include the following:
 - 1. Pump curves.
 - 2. Fan curves.

3. Manufacturers' test data.
 4. Field test reports prepared by system and equipment installers.
 5. Other information relative to equipment performance, but do not include Shop Drawings and Product Data.
- D. General Report Data: In addition to form titles and entries, include the following data in the final report, as applicable:
1. Title page.
 2. Name and address of TAB firm.
 3. Project name.
 4. Project location.
 5. Architect's name and address.
 6. Engineer's name and address.
 7. Contractor's name and address.
 8. Report date.
 9. Signature of TAB firm who certifies the report.
 10. Table of Contents with the total number of pages defined for each section of the report. Number each page in the report.
 11. Summary of contents including the following:
 - a. Indicated versus final performance.
 - b. Notable characteristics of systems.
 - c. Description of system operation sequence if it varies from the Contract Documents.
 12. Nomenclature sheets for each item of equipment.
 13. Notes to explain why certain final data in the body of reports varies from indicated values.
 14. Test conditions for fans and pump performance forms including the following:
 - a. Settings for outside-, return-, and exhaust-air dampers.
 - b. Conditions of filters.
 - c. Cooling coil, wet- and dry-bulb conditions.
 - d. Face and bypass damper settings at coils.
 - e. Fan drive settings including settings and percentage of maximum pitch diameter.
 - f. Inlet vane settings for variable-air-volume systems.
 - g. Settings for supply-air, static-pressure controller.
 - h. Other system operating conditions that affect performance.
- E. System Diagrams: Include schematic layouts of air and hydronic distribution systems. Present each system with single-line diagram and include the following:
1. Quantities of outside, supply, return, and exhaust airflows.
 2. Water flow rates.
 3. Terminal units.
 4. Balancing stations.
- F. Air-Handling Unit Test Reports: For air-handling units with coils, include the following:

1. Unit Data: Include the following:
 - a. Unit identification.
 - b. Location.
 - c. Make and type.
 - d. Model number and unit size.
 - e. Manufacturer's serial number.
 - f. Unit arrangement and class.
 - g. Discharge arrangement.
 - h. Sheave make, size in inches, and bore.
 - i. Sheave dimensions, center-to-center, and amount of adjustments in inches.
 - j. Number of belts, make, and size.
 - k. Number of filters, type, and size.

2. Motor Data:
 - a. Make and frame type and size.
 - b. Horsepower and rpm.
 - c. Volts, phase, and hertz.
 - d. Full-load amperage and service factor.
 - e. Sheave make, size in inches, and bore.
 - f. Sheave dimensions, center-to-center, and amount of adjustments in inches.
 - g. Power factor efficiency.

3. Test Data (Indicated and Actual Values):
 - a. Total airflow rate in cfm.
 - b. Total system static pressure in inches wg.
 - c. Fan rpm.
 - d. Discharge static pressure in inches wg.
 - e. Filter static-pressure differential in inches wg.
 - f. Preheat coil static-pressure differential in inches wg.
 - g. Cooling coil static-pressure differential in inches wg.
 - h. Heating coil static-pressure differential in inches wg.
 - i. Outside airflow in cfm.
 - j. Return airflow in cfm.
 - k. Outside-air damper position.
 - l. Return-air damper position.
 - m. Vortex damper position.

G. Fan Test Reports: For supply, return, and exhaust fans, include the following:

1. Fan Data:
 - a. System identification.
 - b. Location.
 - c. Make and type.
 - d. Model number and size.
 - e. Manufacturer's serial number.
 - f. Arrangement and class.
 - g. Sheave make, size in inches, and bore.

- h. Sheave dimensions, center-to-center, and amount of adjustments in inches.
- 2. Motor Data:
 - a. Make and frame type and size.
 - b. Horsepower and rpm.
 - c. Volts, phase, and hertz.
 - d. Full-load amperage and service factor.
 - e. Sheave make, size in inches, and bore.
 - f. Sheave dimensions, center-to-center, and amount of adjustments in inches.
 - g. Number of belts, make, and size.
- 3. Test Data (Indicated and Actual Values):
 - a. Total airflow rate in cfm.
 - b. Total system static pressure in inches wg.
 - c. Fan rpm.
 - d. Discharge static pressure in inches wg.
 - e. Suction static pressure in inches wg.
- H. Round, Flat-Oval, and Rectangular Duct Traverse Reports: Include a diagram with a grid representing the duct cross-section and record the following:
 - 1. Report Data:
 - a. System and air-handling unit number.
 - b. Location and zone.
 - c. Traverse air temperature in deg F.
 - d. Duct static pressure in inches wg.
 - e. Duct size in inches.
 - f. Duct area in sq. ft.
 - g. Indicated airflow rate in cfm.
 - h. Indicated velocity in fpm.
 - i. Actual airflow rate in cfm.
 - j. Actual average velocity in fpm.
 - k. Barometric pressure in psig.
 - I. Air-Terminal-Device Reports:
 - 1. Unit Data:
 - a. System and air-handling unit identification.
 - b. Location and zone.
 - c. Test apparatus used.
 - d. Area served.
 - e. Air-terminal-device make.
 - f. Air-terminal-device number from system diagram.
 - g. Air-terminal-device type and model number.
 - h. Air-terminal-device size.
 - i. Air-terminal-device effective area in sq. ft.

2. Test Data (Indicated and Actual Values):

- a. Airflow rate in cfm.
- b. Air velocity in fpm.
- c. Preliminary airflow rate as needed in cfm.
- d. Preliminary velocity as needed in fpm.
- e. Final airflow rate in cfm.
- f. Final velocity in fpm.
- g. Space temperature in deg F.

J. System-Coil Reports: For reheat coils and water coils of terminal units, include the following:

1. Unit Data:

- a. System and air-handling unit identification.
- b. Location and zone.
- c. Room or riser served.
- d. Coil make and size.
- e. Flowmeter type.

2. Test Data (Indicated and Actual Values):

- a. Airflow rate in cfm.
- b. Entering-water temperature in deg F.
- c. Leaving-water temperature in deg F.
- d. Water pressure drop in feet of head or psig.
- e. Entering-air temperature in deg F.
- f. Leaving-air temperature in deg F.

K. Instrument Calibration Reports:

1. Report Data:

- a. Instrument type and make.
- b. Serial number.
- c. Application.
- d. Dates of use.
- e. Dates of calibration.

3.13 INSPECTIONS

A. Initial Inspection:

1. After testing and balancing are complete, operate each system and randomly check measurements to verify that the system is operating according to the final test and balance readings documented in the Final Report.
2. Randomly check the following for each system:
 - a. Measure airflow of at least 10 percent of air outlets.

- b. Measure water flow of at least 5 percent of terminals.
- c. Measure room temperature at each thermostat/temperature sensor. Compare the reading to the set point.
- d. Measure sound levels at two locations.
- e. Measure space pressure of at least 10 percent of locations.
- f. Verify that balancing devices are marked with final balance position.
- g. Note deviations to the Contract Documents in the Final Report.

B. Final Inspection:

1. After initial inspection is complete and evidence by random checks verifies that testing and balancing are complete and accurately documented in the final report, request that a final inspection be made by Owner.
2. TAB firm test and balance engineer shall conduct the inspection in the presence of Owner.
3. Owner shall randomly select measurements documented in the final report to be rechecked. The rechecking shall be limited to either 10 percent of the total measurements recorded, or the extent of measurements that can be accomplished in a normal 8-hour business day.
4. If the rechecks yield measurements that differ from the measurements documented in the final report by more than the tolerances allowed, the measurements shall be noted as "FAILED."
5. If the number of "FAILED" measurements is greater than 10 percent of the total measurements checked during the final inspection, the testing and balancing shall be considered incomplete and shall be rejected.
6. TAB firm shall recheck all measurements and make adjustments. Revise the final report and balancing device settings to include all changes and resubmit the final report.
7. Request a second final inspection. If the second final inspection also fails, Owner shall contract the services of another TAB firm to complete the testing and balancing in accordance with the Contract Documents and deduct the cost of the services from the final payment.

3.14 ADDITIONAL TESTS

- A. Within 90 days of completing TAB, perform additional testing and balancing to verify that balanced conditions are being maintained throughout and to correct unusual conditions.
- B. Seasonal Periods: If initial TAB procedures were not performed during near-peak summer and winter conditions, perform additional testing, inspecting, and adjusting during near-peak summer and winter conditions.

END OF SECTION 23 05 93

SECTION 23 09 33 - TEMPERATURE CONTROLS

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PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and General Provisions of the Contract, including General and Supplementary Conditions and Division 1 specification sections, apply to work of this section.
- B. Related Sections include the following:
 - 1. Division 20 Section "Mechanical General Requirements."
 - 2. Division 20 Section "Basic Mechanical Materials and Methods."
 - 3. Division 23 Section "Testing, Adjusting, and Balancing."

1.2 SUMMARY

- A. This Section includes control equipment for HVAC systems and components, including control components for terminal heating and cooling units not supplied with factory-wired controls.

1.3 DEFINITIONS

- A. BACnet: Communications open protocol for building automation system networks and control (developed by ASHRAE and documented per ANSI/ASHRAE Standard 135-2012).
- B. BAS: Building Automation System
- C. CAD: Computer Aided Design.
- D. DDC: Direct-digital controls.
- E. LonWorks (aka LonTalk): Communications open protocol as developed by Echelon Corporation that is utilized with building automation system networks and control.
- F. TC: Temperature Control.

1.4 SYSTEM DESCRIPTION

- A. Temperature control building automation system consisting of direct digital control system controllers, sensors, transducers, relays, switches, data communication network, etc. and all associated control wiring and raceway systems.
- B. BAS/DDC system programming, database generation. Graphic display generation accessible through Building Network Supervisory Controller or at the remote operator workstation (when applicable for project).
- C. Electric thermostats, control valves, dampers, operators, control wiring, etc.

- D. Indicating devices, electric and electronic control accessories, and other control system devices.

1.5 SEQUENCE OF OPERATION

- A. Control sequences for HVAC systems, subsystems, and equipment are indicated on project drawings.

1.6 SUBMITTALS

- A. Submit under Division 20 and 23 provisions of respective project and as supplemented in this section.

- B. All control submittal requirements shall be submitted at one time with exception to control valves, automated dampers, and initial phases of work associated with fast-track projects (when required). Early submittals of control valves and automated dampers shall be incorporated with the complete temperature controls submittal.

- C. Product Data: Include manufacturer's technical literature for each control device. Indicate dimensions, capacities, performance characteristics, electrical characteristics, finishes for materials, and installation and startup instructions for each type of product indicated.

- 1. Each control device labeled with setting or adjustable range of control

- D. Shop Drawings: Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.

- E. Shop Drawings:

- 1. Shop drawings shall be done on CAD. Minimum size 11" x 17".
 - 2. Schematic flow diagrams showing fans, pumps, coils, dampers, valves, and control devices.
 - 3. Wiring Diagrams: Power, signal, and control wiring. Differentiate between manufacturer-installed and field-installed wiring.
 - 4. Details of control enclosure including panel faces and interior, including controls, instruments, terminations blocks and component labeling.
 - 5. Written sequence of operation for each controlled system.
 - 6. Schedule of dampers including size, leakage, and flow characteristics (Refer to Design Data).
 - 7. Schedule of valves including leakage and flow characteristics (Refer to Design Data).
 - 8. Complete bill of materials to identify and quantify all control components.
 - 9. Overall system schematic showing communication trunk cabling from Building Network Supervisory Controller(s) to BAS field level controllers including component locations and wire termination details.
 - 10. DDC controller layouts showing connected data points and LAN connections. DDC controller terminations including power supply and remote-control component termination details shall be provided.

11. Point list for each DDC controller including point descriptions and addresses. This information may be incorporated with DDC controller layouts.
 12. List of system graphics to be provided with proposed tree diagram of graphics organization. Items to include: Each system, floor plan.
- F. Graphic Displays: One month after TC Shop Drawing submittal, TC Contractor shall submit graphical display backgrounds for preliminary Engineer review. Concept for each floor plan, each system, each terminal unit template. Engineer understands that final representation of graphics may not be available until BAS database is established during course of construction. Thorough graphics review will be conducted by Engineer as part of the TC/BAS acceptance procedure.
- G. Design Data: Provide indicated component selection and sizing criteria for the following component categories:
1. Control valves:
 - a. Component tag.
 - b. Equipment served/function.
 - c. Media type.
 - d. Design flow rate (GPM or lbs./hr.)
 - e. Design pressure drop (ft. head) or (psi), where applicable.
 - f. Calculated valve Cv, where applicable.
 - g. Selected valve Cv, where applicable.
 - h. Resultant pressure drop (ft. head) or (psi) with selected valve.
 - i. Valve size.
 - j. Line size to valve connection (excluding reducers).
 - k. Type (ball, butterfly, globe, etc.)
 - l. Configuration (2-way, 3-way mixing, 3-way diverting).
 - m. Normal position (normally open, normally closed, floating).
 - n. Actuator spring range (where applicable).
 - o. Actuator power requirement.
 - p. Valve shut-off rating (ft. head) of (psi)
 - q. Valve body pressure/temperature rating.
 - r. Valve manufacturer/model number.
 - s. Actuator manufacturer/model number.
 2. Dampers:
 - a. Component tag.
 - b. Equipment served/function.
 - c. Overall damper size (inch width x inch height).
 - d. Quantity of damper sections with respective size(s).
 - e. Material and gauge of thickness.
 - f. Mounting orientation (horizontal or vertical).
 - g. Blade configuration (parallel or opposed)
 - h. Pressure drop (in. w.g.)
 - i. Shut-off rating/differential pressure rating (in. w.g.)
 - j. Leakage rating (CFM/sq. ft. at 4 in. w.g.)
 - k. Normal position (normally open, normally closed, floating).
 - l. Actuator spring range (where applicable).

- m. Actuator power requirement.
 - n. Actuator torque requirement.
 - o. Actuator quantity.
 - p. Damper manufacturer/model number.
 - q. Actuator manufacturer/model number.
- H. Wall mounted temperature sensor, thermostat and/or other temperature control device cover color shall be coordinated to match color of wall mounted electrical device components and cover plates – coordinate with electrical contractor. Provide samples of available temperature control device cover colors to Architect upon request or if available temperature control device colors do not match electrical device colors so a desired color selection may be determined. Provide sample of temperature sensor / thermostat guard upon request of Architect, Engineer, or Owner.
- I. Qualification Data: For firms and persons specified in "Quality Assurance" Article.
- J. Submit field reports indicating operating conditions after detailed check out of systems at Date of Substantial Completion.
- K. Project Record Documents: Include the following:
- 1. Revise Shop Drawings to reflect actual installation and operating sequences.
 - 2. Record actual locations of control components, including control units, thermostats, and sensors.
 - 3. Submit the electronic files for all as-built shop drawings in pdf format on USB Flash Drives (3 Total).
- L. Software and Firmware Operational Documentation: Include the following:
- 1. DDC controller keypad operating instructions and DDC controller override features, where applicable.
 - 2. Device address list.
 - 3. Program Software Backup: On a magnetic media or compact disc, complete with data files.
- M. Maintenance Manuals: Include the following:
- 1. Product data with installation details, maintenance instructions and lists of spare parts for each type of control device.
 - 2. Keypad illustrations and step-by-step procedures indexed for each operator function, where applicable.
 - 3. Inspection period, cleaning methods, cleaning materials recommended, and calibration tolerances.
 - 4. Calibration records and list of set points.
- 1.7 REFERENCES
- A. AMCA 500 - Test Methods for Louvers, Dampers and Shutters.
 - B. ANSI/ASME B16.22 - Wrought Copper and Copper Alloy Solder Joint Pressure fittings.

- C. ANSI/ASTM B32 - Solder Metal.
- D. ANSI/NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum).
- E. ASTM B280 - Seamless Copper Tube for Air Conditioning and Refrigeration Field Service.
- F. ASTM B75 - Seamless Copper Tube for General Engineering Purposes.
- G. ASTM D1693 - Environmental Stress - Cracking of Ethylene Plastics.
- H. ASTM E1 - Specification for ASTM Thermometers.
- I. MMC – Michigan Mechanical Code, version applicable for project.
- J. NEMA DC 3 - Low-Voltage Room Thermostats.
- K. UL 1820 - Fire Test of Pneumatic Tubing for Flame and Smoke Characteristics Only.

1.8 QUALITY ASSURANCE

- A. Installer Qualifications: An experienced installer who is a certified and approved installer of the automatic control system manufacturer for both installation and maintenance of units required for this Project.
- B. Manufacturer Qualifications: A firm experienced in manufacturing automatic temperature-control systems similar to those indicated for this Project and with a record of successful in-service performance.
- C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- D. Comply with all applicable code requirements for project.

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Factory-Mounted Components: Where control devices specified in this Section are indicated or optional to be factory mounted on equipment, arrange for shipping of control devices to unit manufacturer.

1.10 COORDINATION

- A. Coordinate work under Division 20 and 23 provisions and as supplemented in this section.
- B. Coordinate location of space temperature sensors, space humidity sensor, thermostats, humidistats, and other exposed control sensors with plans and room details before installation.

- C. Coordinate installation of system components with installation of mechanical systems and equipment to achieve compatibility.
- D. Ensure installation of components is complementary to installation of similar components in other systems.
- E. Coordinate control wiring requirements, including actual terminal block numbers, with mechanical equipment manufacturers or suppliers.
- F. Coordinate equipment with Division 26 Section "Lighting Controls" to achieve compatibility with equipment that interfaces with that system.
- G. Coordinate equipment with Division 28 Section "Fire Alarm" to achieve compatibility with equipment that interfaces with that system.
- H. Ensure control system installation is complete, checked, tested and functioning properly prior to system balancing and Owner/Engineer system checkout.
- I. Cooperate fully with the Test and Balance Contractor and provide labor to operate the temperature control system as required to meet the scope of work defined in Division 23 Section "Testing, Adjusting and Balancing."

1.11 WARRANTY

- A. Provide warranty per Division 20 Section "Mechanical General Requirements" and as supplemented in this section.
- B. Provide 24 hour per day emergency service during warranty period, with maximum response period of four (4) hours. Provide phone number(s) for quick assistance by a Service Engineer regarding hardware or software problems.
- C. Provide scheduled maintenance service during warranty period to inspect, calibrate, and adjust controls. Make a minimum of one eight-hour service call every three months. Notify Owner prior to each scheduled inspection trip. Submit written reports upon completion of service.
- D. Provide any software or firmware revisions which are released by the DDC system manufacturer during the warranty period, at no additional cost to the Owner.

1.12 POSTED OPERATING INSTRUCTIONS

- A. Provide DDC controller related as-built documents in protective binder or clear plastic display envelope for each control enclosure panel. These instructions shall include such items as as-built control diagrams and sequence of operation, simplified narrative instructions and materials necessary to aid in the operation of the equipment at the local control panels.

1.13 SPECIAL TOOLS

- A. Deliver two sets of any special tools required for operation, adjustment, resetting or maintenance, excluding PC laptop.

1.14 PROTECTION OF PROPRIETARY INFORMATION

- A. Non-disclosure agreement(s) that may be subject to proprietary manuals and software shall be submitted by the proprietary equipment manufacturer to the Owner for approval and signature during the warranty period.

PART 2 - PRODUCTS

2.1 DESCRIPTION OF THE BUILDING AUTOMATION SYSTEM (BAS)

- A. The building automation system (BAS) shall be fully integrated, distributed data processing system incorporating direct digital control (DDC) for the control and monitoring of heating, ventilating and air conditioning (HVAC) equipment and other related systems. Microprocessor based BAS field level DDC controllers shall be directly connected to HVAC equipment sensors and actuators. A data communication network shall allow data exchange between the BAS field level DDC controllers and the Building Network Supervisory Controller. The Building Network Supervisory Controller shall be the primary operator BAS interface point for the building either through web-browser direct or through server application software (when applicable) or through local or remote Operator Workstation (when applicable to project).
- B. Approved Manufacturer – System as listed:
 - 1. Trane U.S. Inc., – Trane ICS Products.
- C. Approved Installer (Location) as listed:
 - 1. Trane U.S. Inc., Southeast Michigan (Livonia, MI) – Trane ICS Products.
 - 2. Engineered Comfort Systems (Taylor, MI) - Trane ICS Products.

2.2 BAS BUILDING NETWORK SUPERVISORY CONTROLLER (EXISTING)

- A. The Building Network Supervisory Controller is existing and shall be utilized to provide the communication interface between the Owner's Ethernet and the field control devices.
- B. Provide updated and upgraded software and hardwire to support the additional controller addresses in this project.

2.3 DIRECT DIGITAL CONTROL (DDC) FIELD LEVEL CONTROLLERS

- A. Modular in design and consisting of stand-alone microprocessor board with ROM and fully custom programmable RAM, EPROM, and/or EEPROM memory, integral interface

equipment and power surge protection. DDC controllers shall be connected directly to sensors, controlled devices, and the communication network.

- B. Powerfail Restart and Battery Backup: Minimum of 72-hour battery backup for complete system RAM memory and clock, with automatic battery charger or 48-hour low voltage alarm warning. Upon full system power recovery, all clocks shall be automatically synchronized, and all controlled equipment shall be automatically re-started based on correct clock time and sequence of operation.
- C. Provide fully functional communication interface ports for communication between processor, other processors, portable programmer's terminal, portable operator's unit, or the remote Operator Workstation when applicable for project.
- D. Panel enclosure for controller, associated power supply and other ancillary control components shall be finished steel or rigid plastic with hinged door and keyed lock. Electronics shall be removable for protection during mounting of panel.

2.4 DDC CONTROLLER SOFTWARE

- A. Operating system shall work in real time, provide prioritized task scheduling, control time programs, monitor DDC controller communications, scan inputs and outputs, and contain built-in diagnostics.
- B. Input/Output point processing shall include the following:
 - 1. Continuous update of input and output values and/or conditions. All connected points are to be updated at least once per second.
 - 2. Assignment of proper engineering units and status condition identifiers to all points.
 - 3. In addition to physical or "hardware" points required, "software" points shall be provided where required for command access and meaningful displays, where required by the "execution" portion of this section or where required on the DDC Input/Output points lists. "Software" points shall appear identical to physical points in output displays and shall be assignable to text descriptors, logical groups, reports, etc. in the same manner as physical points. "Software" points shall be assigned alarm limits in the same manner as physical points.
- C. Command control software shall manage the receipt of commands from control panels, portable programmer's terminal, portable operator's unit or the remote Operator Workstation when applicable for project.
 - 1. Command delay, programmable from 0 to 2 minutes, shall be provided to prevent simultaneous energizing of large loads. Command delays shall be honored throughout the BAS DDC network, not just within the DDC controller. Delays shall be assignable on an individual per point basis.
 - 2. Each command shall be assigned a command and residual priority to manage contentions created by multiple programs having access to the same command point. Only commands with a higher command priority than the existing residual priority shall be permitted to execute. Whenever a command is allowed to execute, its assigned residual priority shall replace the existing residual priority.

3. A "fixed mode" option shall be supported to allow inputs to, and outputs from DDC control programs to be set to a fixed state or value. When in the "fixed mode," inputs and outputs shall be so noted in all reports.
 4. A "last user" record is to be maintained to positively identify which program or manual command is in control of a given point. The last user information shall be displayed and printed along with other point data of logical groups.
- D. Provide self-test procedure. Notify remote Operator Workstation (when applicable for project) for maintenance, performance, software, cable break, or data transmission problems. Identify variables as reliable or unreliable. Variables identified as unreliable shall use default in calculation.
- E. Alarm Processing
1. High/Low Alarm: Analog input alarm comparison with the ability to assign two individual sets of high and low limits (warning and actual alarm) to an input. Each alarm shall be assigned a unique differential to prevent a point from oscillating into and out of alarm. Alarm comparisons are to be made each scan cycle.
 2. Floating Alarm: Where analog controlled values are automatically varied by software (such as hot water temperature reset), a single set of alarm limits shall be provided for those varying values. These alarm limits shall then "float" a user definable differential above and below the varying setpoint value.
 3. Abnormal Alarm: When a digital input is not in agreement with the commanded state of its associated output point, or when a digital input is not in its normal state, an abnormal alarm shall be generated. Abnormal "on" shall cause an alarm, as well as abnormal "off." Alarm time delay for digital inputs to prevent nuisance alarms shall be provided. Each digital input alarm time delay shall be adjustable from zero to two minutes in one-second increments.
 4. Alarm lockout shall be provided to positively lock out alarms when equipment is turned off or when a true alarm is dependent on the condition of an associated point. Lockout points and lockout initiators shall be operator programmable. On initial startup of air handler and other mechanical equipment, a "timed lockout" period shall be assigned to analog points to allow them to reach a stable condition before activating alarm comparison logic. Timed lockout period shall be programmable on a per point basis from 0 to 90 minutes in one-minute increments.
 5. The capability of automatically initiating commands upon the occurrence of an alarm.
- F. Totalization
1. Run time shall be accumulated based on the status of digital input points. It shall be possible to totalize either on time or off time up to 10,000 hours with one-minute resolution. Run time counts shall be resident in memory and have DDC controller resident run time limits assignable through portable programmer's terminal, portable operator's unit or the remote Operator Workstation when applicable for project.
 2. A transition counter shall be provided to accumulate the number of times a device has been cycled on or off. Counter shall be capable of accumulating 600,000 switching cycles. Limits shall be assignable to counts to provide maintenance alarm printouts.

3. Analog totalization capability shall be provided to allow the totalization of electricity, air, water and steam flow, etc. These flows shall be totalized with respect to time and converted to the appropriate energy unit. It shall be possible to automatically set time intervals for totalization, adjustable from one second to 365 days. The totalization program shall keep track of the maximum and minimum instantaneous analog value measured during the period, including the date and time at which each occurred.

G. DDC Controller Programming / Configuration

1. All DDC controllers shall be fully programmable or configurable per required controller application type. DDC controllers which require remote or factory programming or configuration are not acceptable. DDC controllers with custom programs which may not be modified by the user are not acceptable. "Custom" programming shall mean allowing the alteration of actual control logic, and shall not be limited to allowing only the alteration of setpoints, gains, parameters, time constants, etc.
2. DDC controllers shall be provided to meet the control strategies as called for in the sequences of operation on the drawings. If a configurable application specific DDC controller cannot meet this requirement, a DDC fully programmable controller shall be provided.
3. All DDC controller setpoints, gains, parameters, time constants, etc., associated with DDC controller programs shall be available to the operator for display and modification via portable programmer's terminal, portable operator's unit or the remote Operator Workstation when applicable for project.
4. Each DDC controller shall have resident in its memory and available to the programs a full library of DDC algorithms, intrinsic control operators, and arithmetic, logic and relational operators for implementation of control sequences. Functions to be provided shall include, but not be limited to, the following:
 - a. Mathematical: Absolute value, calculate, square root, power, sign, average, totalize.
 - b. Logic: OR, AND, compare, negate.
 - c. Fixed Formula: High and low select, span, rate, ramp, enthalpy, wet bulb, dew point, relative humidity, humidity ratio, and filter.
 - d. Data Manipulation: Store, file and set.
 - e. Control Routines: Real-time based functions, proportional control, proportional-integral control, proportional-integral-derivative control, adaptive control (self-tuning), direct-acting, reverse acting, feedforward, fixed setpoint, calculated setpoint, adjustable setpoint, lead lag, hysteresis correction, event initiation/ software interlock.

H. Building Automation System program applications (as required for controllers)

1. Time of day scheduling: Allow the creation and maintenance of operating schedules for selected points based on time of day and holiday scheduling. At least two independent start and stop times per day for each system shall be allowed. Each point shall be allowed to have a unique time program, or points shall be able to be grouped and assigned to a common time program. Both digital and analog output points shall be able to be assigned to a time program. This software shall work in conjunction with the time of day scheduler software at the remote Operator

- Workstation (when applicable for project). This program shall also work in conjunction with the optimum start and optimum stop application software.
2. Optimum Start: Start equipment based on outdoor temperature, space temperature, and system response to minimize energy usage and to assure that comfort conditions are reached exactly at scheduled occupancy time (occupancy schedules are defined under "Time Of Day Scheduling"). This program shall operate in both the heating and cooling cycles. An adaptive algorithm shall be employed which automatically adjusts the start time according to previous performance and shall automatically assign longer lead times for weekend and holiday shutdowns.
 3. Enthalpy Optimization: Using standard psychrometric calculations, automatically determine which air source, outdoor air or return air, presents the least total heat load, and automatically adjust mixed air damper position. When outside enthalpy exceeds return air enthalpy, the outside air damper shall go to its minimum position. Typically, the outside air damper must be in its minimum position before the cooling coil valve is allowed to open.
 4. Duty Cycle: Periodically cycle electrical equipment to reduce energy consumption and/or energy demand. Each load shall be assigned a cycle interval and an off period. A load leveling algorithm shall be utilized to assure that cycle periods do not coincide.
 5. Demand Limiting: Distributed power demand program shall be based on a sliding window instantaneous demand algorithm. The DDC controller(s) connected to the demand meter shall calculate the demand, forecast the demand trend, compare it to established demand limits, and initiate load shedding action or reestablishment of loads as required. Shedding shall be on a sequential basis with least important loads shed first and restored last. Restoration cycle shall add the most important loads first. DDC controllers on the network shall each have a four-tier shed table for assignment of sheddable loads. When a request is issued to the network to shed a specific number of kilowatts, each DDC controller shall shed Tier 1 loads, Tier 2 loads, etc. until the shed requirement is met. The program shall have the capability to sum the readings from multiple meters connected to multiple DDC controllers on the network, and to shed various loads from multiple DDC controllers on the network.
 6. Warm-Up: Position the outside air dampers in an adjustable (minimum) position, and trigger a digital output(s) normally used to signal air terminal units to move to their maximum flow settings. When the desired space temperature is reached, as determined by feedback from space temperature sensor(s), the digital output shall return the air terminal units to their normal operation. When occupancy time is reached, the outside air dampers shall be controlled by the normal occupied mode control sequence. During the warm-up cycle, the outside air damper shall be set at the position which minimizes outside air intake while preventing over/under pressurizing of ductwork. This program shall work in conjunction with the time scheduling program and/or the optimum start program as required.
 7. Night Cycle: Cycle HVAC equipment on and off as required to maintain an operator selectable unoccupied space temperature. During the equipment "on" time, the outside air damper shall be maintained in an adjustable position which minimizes outside air intake while preventing over/under pressurization of ductwork. The equipment shall be cycled such that energy reduction during unoccupied periods is uniform.
 8. Night Purge: Night Purge program shall apply to cooling cycle only. Night Purge shall introduce 100% outdoor air any time the outdoor air is above 50 degrees F,

the space temperature is above 75 degrees F, the outdoor air temperature is below space temperature and the outdoor air dew point is less than 60 deg F. Purging shall stop when outdoor air is below 50 deg F, or space temperature is below 75 deg F, or outdoor temperature is less than 5 deg F cooler than space temperature, or outdoor air dew point is greater than 60 deg F.

9. Reset Optimization: Adjust equipment discharge setpoints based on one of the following criteria:
 - a. By sensing the worst case requirements (e.g., the zone requiring the most heating or cooling and providing only the minimum energy required to meet the load.
 - b. Adjusting the setpoint in direct proportion to another sensed variable (e.g., reset supply water temperature based on outside temperature).

2.5 DDC AIR TERMINAL UNIT CONTROLLERS

- A. Microprocessor based controllers capable of stand-alone operation for control of pressure independent air terminal units. Controllers shall be networked together and connected to the building's BAS/DDC network.
- B. Controllers shall have separate adjustable minimum and maximum airflow setpoints. Controllers shall work in conjunction with the air handling unit's DDC panel to provide the sequence of operation as indicated on the drawings. Setpoints shall be adjustable through the portable programmer terminal.
- C. Provide electronic type air terminal unit damper operators compatible with the controller and the air terminal units provided.
- D. Each controller shall have an internal differential pressure transducer capable of utilizing the total and static pressure signals from the air terminal unit's velocity sensor. Velocity sensor shall be furnished by air terminal unit manufacturer.
- E. Each controller shall have electronic outputs compatible with the electronically operated air terminal unit tempering coil control valve and perimeter radiation control valve where applicable
- F. TC contractor shall provide 24 VAC power requirements including transformers.
- G. If coordinated with mechanical contractor. Controllers and damper operators shall be furnished to the air terminal unit manufacturer for factory mounting by the air terminal unit manufacturer; otherwise, controls shall be field installed.
- H. Room temperature sensors for the DDC air terminal unit controllers:
 1. Sensing Element: Thermistor or resistance temperature detector (RTD) type. Accuracy shall be +/- 0.5 degrees F over the range of 55 degrees F to 95 degrees F, including calibration error, repeatability, hysteresis, and yearly drift.
 2. Cover: with tamper-proof fasteners.
 3. Provide with exposed setpoint adjustment dial and exposed temperature reading.

4. Provide with exposed override switch to allow an occupant to reset the space to occupied control during the unoccupied cycle for a predetermined time period.
5. Provide with portable operator unit plug-in port.

2.6 DDC INPUT/OUTPUT SENSORS

A. Current Switches:

1. Split-core or donut type transformer for monitoring AC current, with digital output signal. Current switches used on motor side of variable frequency drives shall have low frequency detection capability.
2. For Electronically Commutated Motor (ECM) applications: Current switch shall be rated for ECM operation with amperage trip setting higher than trickle/idle/standby amperage with ECM off and amperage trip setting lower than minimum speed setting. Verify minimum amperage expectation for equipment with equipment suppliers to select appropriate current switch from list of approved manufacturers as their minimum trip settings vary from 0.15A to 0.5A.
3. For induction motor applications (as applicable): Current switch shall have adjustable trip setting to accommodate VFC minimum speed settings, to detect fan belt loss, or to detect pump coupling detachment. Set trip setting at approximately 90% of normal motor operating amperage.
4. Manufacturers:
 - a. ACI.
 - b. Johnson Controls.
 - c. Senva.
 - d. Veris Industries.

B. Outside Air Temperature/Humidity Combination Transmitters:

1. Dual transmitters housed in a single hinged enclosure with integral probes configured for exterior wall mount application with PVC sun shield. Unit shall provide separate 4-20 mA signals for temperature and humidity measurement.
2. Temperature sensor: Refer to Temperature Sensors specifications. Range of operation shall be -25 degrees F to 125 degrees F.
3. Humidity sensor: Refer to Humidity Sensors specifications. Range of operation shall be 0-100% RH.
4. Manufacturer:
 - a. Belimo.
 - b. Vaisala.
 - c. Veris.

C. Temperature Sensors:

1. Resistance temperature detectors (RTD) with 1000 ohm, thin-filmed platinum, nickel or Balco element having 0.000385 temperature coefficient meeting the input requirements of the DDC controller.
2. Thermally sensitive resistors (thermistor) shall be 10k-type, epoxy or glass coated, having NTC characteristic, meeting the input requirements of the DDC controller.

3. Initial calibration accuracy shall be +/- 0.5 deg F over the entire range. Range shall be as indicated below, or as appropriate to the application.
4. Additional error such as repeatability, stability, tolerance, linearity and hysteresis shall not exceed an additional +/- 0.5 deg F additive (using RMS method) throughout the selected operating range for the application.
5. Temperature sensors shall be resistant to chlorine and other cleaning agents
6. Single point duct mounted sensors shall have 18" rigid probe and calibrated span of 20 - 120°F.
7. Averaging duct mounted sensors shall have 25' long averaging element and calibrated span of 20 - 120°F.
8. Liquid immersion sensors shall have welded stainless steel thermowells for ferrous pipe and brass thermowells for copper pipe. Length of sensor and thermowell shall be selected based on the diameter of the pipe to provide accurate, reliable and homogeneous sensing of the liquid temperature. Thermowell pressure rating shall meet or exceed the system minimum pressure rating. Sensors for chilled water application shall have calibrated span of 20 - 120°F. Sensors for hot water applications shall have calibrated span of 40 - 240°F
9. Room sensors shall have locking cover and a minimum span of 40 - 90°F.
10. Outside air temperature (only) sensors shall have watertight inlet fitting and shall be shielded from direct rays of sun and wind.
11. Manufacturers:
 - a. Specified BAS product where available that meets the requirements herein.
 - b. ACI – except PT1000 averaging sensor.
 - c. BAPI – Basys Series.
 - d. Belimo.
 - e. MAMAC
 - f. Minco.
 - g. TCS.

2.7 DDC DATA COMMUNICATIONS NETWORK

- A. Data communication network shall be provided to allow data exchange between the BAS field level DDC controllers and the Building Network Supervisory Controller.
- B. The BAS/DDC system-wide communication network shall consist of a primary peer-to-peer network, and at the Contractor's option, secondary sub-networks linked to the primary network. The primary network shall support peer-to-peer communications between primary network BAS field level DDC controllers. The Building Network Supervisory Controller shall be connected to the primary network. Secondary sub-networks when used shall interface with the primary network through the primary network BAS field level DDC controllers. At least one DDC controller connected to the primary peer-to-peer network shall be provided in each mechanical room, or as indicated on the drawings.
- C. Data communications media shall be twisted pair wires.
- D. The communications network shall allow shared point and control information between BAS field level DDC controllers. All required repeaters, hubs, active links, gateways, etc.

and associated power supplies shall be provided as required to provide shared point and control information between BAS field level DDC controllers.

- E. Failure of any individual BAS field level DDC controller shall not cause the loss of communications between peer BAS field level DDC controllers.
- F. All data transmitted must be positively acknowledged as received or negatively acknowledged as not received. Negative acknowledgments shall cause a retransmission of the data. Network connected devices must send a "functioning" message each network cycle. Lack of a "functioning" message after successive retries shall constitute a device failure and shall be recognized as such by the network.
- G. Error recovery and communication initialization routines shall be resident in each network connected device.

2.8 CONTROL AND INSTRUMENTATION TUBING

- A. Copper Tubing: ASTM B280 or ASTM B75, seamless, hard drawn or annealed.
 - 1. Fittings: ANSI/ASME B16.22, wrought copper.
 - 2. Joints: ANSI/ASTM B32, 95-5 tin antimony.
- B. Copper Tubing: ASTM B280 or ASTM B75, seamless, hard drawn or annealed.
 - 1. Fittings: UL approved rod or forged brass rated to 200 psig at 100 degrees F.
 - 2. Joints: Ball Sleeve compression type.
- C. Polyethylene Tubing: Black, UL 1820 flame and smoke retardant where exposed in an air plenum, virgin polyethylene, conforming to modified ASTM D1693 test. All non-metallic tubing shall be minimum 1/4" O.D.; micro-sleeve is not acceptable.
 - 1. Fittings: UL approved rod or forged brass rated to 200 psig at 100 degrees F.
 - 2. Joints: Compression or barbed type.

2.9 CONTROL VALVES AND VALVE OPERATORS

- A. Pressure Independent Control Valves (2-way):
 - 1. Up to 2 inches: Characterized ball valve or Globe valve style with integral pressure compensating cartridge which maintains a constant pressure drop across valve seat while providing equal percentage flow control. Ball valve construction shall include bronze or brass-nickel plated body with screwed ends, stainless steel or chrome plated brass ball, characterizing disc, stainless steel or brass stem, and resilient reinforced Teflon seats. Globe valve construction shall include bronze or AMETAL (a dezincification alloy of TA), stainless steel or brass stem and EPDM type seats.
 - 2. Over 2 inches: Control valve with integral pressure compensating spring and diaphragm which maintains a constant pressure drop across the valve seat, iron body with flanged ends, stainless steel trim.

3. Accuracy: Control valves shall accurately control flow from 0 to 100% of the full rated flow. Flow through the valve shall not vary more than +/- 5% due to system pressure fluctuations when the pressure drop across the valve is within the range of 5 psid to 35 psid.
4. Manufacturers:
 - a. Belimo.
 - b. Bray / Delta Control Products.
 - c. Danfoss Nexus Valve.
 - d. Griswold.
 - e. Honeywell.
 - f. Johnson Controls.
 - g. Siemens.
 - h. Tour Anderson.

B. Pressure Dependent Characterized Ball Valves (2-way & 3-way):

1. Up to 2 inches: Bronze body with screwed ends, stainless steel or chrome plated brass ball, characterizing disc, stainless steel or brass stem, and resilient reinforced Teflon seats.
2. Manufacturers:
 - a. Belimo.
 - b. Bray / Delta Control Products.
 - c. Honeywell.
 - d. Schneider Electric Controls.
 - e. Johnson Controls.
 - f. Siemens

C. Globe Valves (2-way & 3-way):

1. Up to 2 inches: Bronze body, bronze trim, rising stem, renewable composition disc, single seated, screwed ends with backseating capability, repackable under pressure.
2. Over 2 inches: Iron body, bronze trim, rising stem, plug-type disc, flanged ends, renewable seat and disc, repackable under pressure.
3. Valve stem packing shall be tetrafluorethylene, spring loaded and self-adjusting. Packless construction is acceptable.
4. Manufacturers:
 - a. Belimo.
 - b. Bray / Delta Control Products.
 - c. Dodge Engineering & Controls, Inc.
 - d. Honeywell.
 - e. Schneider Electric Controls.
 - f. Johnson Controls.
 - g. Siemens.

D. Electric Operators:

1. Operators shall be electronic type to accept signals from direct digital controller or modulating thermostat for proportional control.
2. Valves shall spring return to normal position as indicated. Terminal unit tempering coil control valve operators are not required to be spring return.
3. Select with sufficient shut-off power for system pressure and highest operating torque, and torque requirements of valves which may stick because of infrequent use.
4. Select to provide smooth proportioning control under operating conditions normal to the system.
5. Electric Butterfly Control Valve Actuators: Permanent split capacitor, reversible electric motor which drives a compound epicyclic gear, thermal overload protection, factory tested, factory lubricated, localized mechanical position indicator readable at 25 feet, 0-90 degree reversible operation, bolt directly to valve top plate. Housing shall be weatherproof and suitable for outdoor location. Provide thermostatically controlled heater for prevention of condensation at low temperatures, 120 VAC. Actuator ambient temperature range shall be -20 degrees F to +140 degrees F. Provide separate limit switches which close at the full open and full closed position, respectively. Actuator shall include a manually operated handwheel for manual override of the valve position.

E. Hydronic Systems:

1. Valve minimum pressure rating shall meet or exceed the system minimum pressure rating as noted for each system in Division 20 Section "Valves," and in Division 23 Section "Hydronic Piping."
2. Valve minimum temperature ratings shall be 250 deg F.
3. For globe valves: Replaceable plugs and seats of stainless steel or brass, selected for maximum lift under application conditions.
4. Two-way and three-way valves shall have equal percentage characteristics. Size two-way valve operators to close valves against pump shut off head.
5. Pressure independent control valves shall be used for 2-way applications unless otherwise indicated. Select to achieve scheduled flow rate of the associated heat transfer device. If the scheduled flow rate is too high to achieve with one valve, provide multiple valves sized at flow divided equally of the scheduled flow rate and control all valves in unison - coordinate control valve quantity and the need for parallel piping of control valves with mechanical contractor.
6. Pressure Drop for pressure dependent characterized ball and globe valves: Select Control valves that result in a pressure drop at or as close as possible to scheduled information. If not scheduled, primary HVAC equipment and terminal equipment control valves shall be selected for a pressure drop close as possible to 11.5 feet of head (5 psig). TC Contractor shall use control valves that meet the pressure drop requirements from manufacturers listed above.

2.10 DAMPERS - AUTOMATED

- A. Performance: Test in accordance with AMCA 500.
- B. Frames: Galvanized steel, minimum 16 gauge, minimum 2 inches in width, welded or riveted with corner reinforcement for 12 gage structural equivalence.

- C. Blades: Galvanized steel, minimum 14-gauge, maximum blade size 8 inches wide, 60 inches long, attached to minimum 1/2-inch shafts. Dampers which are required to have a static pressure rating over 4-inch W.G. shall have minimum 3/4-inch solid shafts.
 - D. Blade Seals: Synthetic elastomeric or Neoprene, mechanically attached, field replaceable.
 - E. Jackshafts (where required): Minimum 1/2-inch galvanized steel.
 - F. Jamb Seals: Stainless steel.
 - G. Bearings: Oil impregnated sintered bronze or lubricant free, solid stainless steel. Provide thrust washers at bearings for all dampers which are to be mounted with blades in the vertical position.
 - H. Linkages: Accessible for maintenance. Linkages may be located in airstream. Linkages located in damper frame shall be external to the duct, accessible for maintenance. Linkages located in the airstream shall be zinc plated.
 - I. Leakage: Less than 8 CFM per square foot based on 4 inches W.G. pressure differential.
 - J. Static Pressure Rating: As scheduled on the drawings, or if not scheduled, minimum 4" W.G.
 - K. Maximum Velocity: As scheduled on the drawings, or design for maximum velocity to be encountered in location where installed.
 - L. Temperature Limits: -40 to 200 deg F.
 - M. Manufacturers:
 - 1. American Warming & Ventilating.
 - 2. Arrow United Industries.
 - 3. Greenheck.
 - 4. Honeywell.
 - 5. Johnson Controls.
 - 6. Louvers & Dampers, Inc.
 - 7. Ruskin.
 - 8. Tamco.
 - 9. Vent Products.
- 2.11 DAMPERS, INSULATED OUTDOOR AIR / RELIEF AIR / EXHAUST AIR - AUTOMATED
- A. Performance: AMCA certified for Air Performance and Air Leakage.
 - B. Frames: Extruded aluminum, .080-inch thickness minimum, 4 inches deep minimum, thermally broken, and insulated with polystyrene or polyurethane foam insulation.

- C. Blades: Extruded aluminum, internally insulated, and thermally broken. Maximum blade size 8 inches wide, 60 inches long.
- D. Shafts: Minimum 7/16 inch hexagonal or square corrosion resistant zinc plated steel.
- E. Blade Seals: Extruded EPDM, silicone, or synthetic elastomeric, mechanically attached.
- F. Jamb Seals: Silicone, or synthetic elastomeric, mechanically attached.
- G. Bearings: Dual bearing assembly of durable synthetic polymer resulting in no metal-to-metal contact. Provide thrust washers at bearings for all dampers which are to be mounted with blades in the vertical position.
- H. Linkage: Linkage shall be installed in the frame side and shall be constructed of aluminum and/or corrosion resistant zinc plated steel.
- I. Leakage: Less than 3 CFM per square foot at 1-inch w.g. pressure differential at minus 40 deg F.
- J. Static Pressure Rating: As scheduled on the drawings, or if not scheduled, minimum 4 inches W.G.
- K. Maximum Velocity: As scheduled on the drawings, or design for maximum velocity to be encountered in location where installed.
- L. Temperature Limits: Minus 40 to 155 deg F.
- M. Manufacturers:
 - 1. Greenheck ICD-45.
 - 2. Ruskin TED50 Series.
 - 3. Tamco Series 9000 BF.

2.12 DAMPER OPERATORS - ELECTRIC

- A. Electric damper motor shall be 24 or 120 volt two-position or modulating as required with spring return type and sized to operate the damper with sufficient reserve power for smooth operation from full close to full open and tight shut-off. Damper motor shall have "O ring" gaskets for weatherproof operation.
- B. Number: Sufficient to achieve unrestricted movement throughout damper range. Provide sufficient number of operators such that one operator does not operate more than the maximum square footage of damper area as recommended in standard catalog of manufacturer.
- C. Manufacturers:
 - 1. Belimo.
 - 2. Delta Control Products.
 - 3. Honeywell.

4. Schneider Electric Controls.
5. Johnson Controls.
6. Siemens.

2.13 ELECTRICAL REQUIREMENTS FOR CONTROLS WORK

- A. Electrical accessories such as relays, switches, contactors and control transformers shall meet the requirements of the Division 26 Specifications of respective project.
- B. Electrical wiring and conduit shall meet the requirements of the Division 26 Specifications.
- C. All control wiring in mechanical rooms and any other exposed areas shall be run in conduit. Low voltage temperature control wiring in concealed accessible locations (i.e. above lay-in ceilings), as well as low voltage temperature control wiring within partitions, may be run using plenum rated cable, neatly tie-wrapped and fastened to the building structure (not to ceiling or ceiling support wires).
- D. Conduits carrying control wiring shall be sized for a maximum fill of 40% of capacity.
- E. Where raceway is required, two separate raceway systems shall be provided; one for A.C. wiring and the other for D.C. wiring.
- F. Data transmission cabling and equipment grounding procedures shall meet the latest FCC guidelines for electromagnetic field generation.
- G. All control wiring sizes and types shall meet or exceed the equipment manufacturer's recommendations.
- H. TC Contractor shall provide 24V power supply transformers for TC Contractor provided controllers. Maximum Transformer circuit for controls shall be 100VA serving controllers within mechanical room control panels or for remote terminal unit controllers served from common 24V power supply circuit. Transformers shall be located within enclosures provided by TC Contractor.

2.14 LIMIT SWITCHES

- A. Oil tight type with operator as required providing required function. Limit switches used on dampers should be set at approximately 75% of full stroke.
- B. Manufacturers:
 1. Allen-Bradley.
 2. General Electric.
 3. Square D.
 4. Westinghouse.
 5. Micro-switch.

2.15 LOCAL AND AUXILIARY CONTROL COMPONENT ENCLOSURE PANELS

- A. Unitized cabinet type for each system under automatic control with relays and controls mounted in cabinet and temperature indicators, pressure gauges, pilot lights, pushbuttons and switches flush on cabinet panel face, or as detailed on drawings. Provide panel with locking door.
- B. ANSI/NEMA 250, general purpose utility enclosures with enameled finished face panel, or as indicated on the drawings.
- C. Panels shall be sized for a maximum fill of 50% capacity and shall not be smaller than 24" X 24".

PART 3 - EXECUTION

3.1 INSTALLATION - CONTROL SYSTEMS

- A. Install in accordance with manufacturer's instructions.
- B. Check and verify location of temperature sensors, thermostats and other exposed control sensors with plans and room details before installation. Locate room temperature sensors and thermostats 48 inches above floor unless noted otherwise.
- C. The location of all control-related items to be mounted on the exterior of the building must be approved by the Architect prior to installation. Indicate proposed locations on the shop drawings.
- D. Caulk both sides of damper frames to duct walls to prevent leakage between damper frame and duct.
- E. Mount control panels adjacent to associated equipment on vibration free walls or free standing angle iron supports. Sensors used for closed loop control must be connected to the same DDC controller as the associated output signal.
- F. Provide conduit and electrical wiring where required.
- G. All wiring in altered and unaltered areas shall be run concealed. "Wiremold" in finished areas shall be allowed when wiring cannot be run concealed in walls or partitions. Minimize "wiremold" routing.
- H. Splicing of DDC sensor cabling at junction boxes shall not be acceptable.
- I. All equipment which has moving parts and is remotely started by the control system shall be provided with warning labels no less than 2 inches in height, and in bright warning color, stating that the equipment is remotely started by automatic controls. Such labels shall be posted clearly in the area of any moving parts, such as belts, fans, pumps, etc.

- J. Coil and conceal excess capillary on remote element instruments.
- K. Install thermometers in air duct systems on flanges.
- L. Locate all control components and accessories such that they are easily accessible for adjustment, service and replacement.
- M. Locate, size and support sensing elements in airstreams so that they properly sense the representative condition. Controlling, transmitting and indicating elements shall be located to sense the average condition. Safety elements shall be located to sense the extreme condition.
- N. Install pressure sensing elements in ducts and casings with clean, sharp taps to accurately read true static pressure, avoiding velocity influence and turbulence.
- O. Locate, support and install all control components and accessories so that they will not be subject to vibration, excessive temperatures, dirt, moisture or other harmful conditions beyond their rated limitations.
- P. Where insulation is penetrated due to the installation of sensing elements or tubing, reseal the openings air and vapor tight. Provide brackets for devices to be located on insulated surfaces so as to clear the finished surface of the insulation and to avoid puncturing the vapor seal.
- Q. Provide all necessary relays, switches, linkages, control devices, accessories and connections as required for a complete and operational control system as specified herein and shown.
- R. All electric valve and damper operators shall be capable of moving from full closed to full open, or vice versa, within 120 seconds.

3.2 TC CONTRACTOR DESIGN & INSTALLATION COORDINATION MEETINGS

- A. Temperature Controls Shop Drawing Pre-Submittal Meeting: TC Contractor's option to schedule a meeting at the Engineer's Office to review project design documentation for clarification purposes to aide in the TC Contractor development of TC/BAS shop drawings. For simple clarification items, TC Contractor may contact Engineer via telephone to discuss. For project scope questioning items, TC Contractor shall utilize the formal Request of Information (RFI) process.
- B. Temperature Controls Shop Drawing Submittal Meeting: Project Design Engineer's option to schedule a meeting at the Engineer's Office to review the TC Contractor's formally submitted drawings to address Engineer's comments and concerns that indicate TC Contractor's shop drawings vary from project design intent. This meeting can be avoided if TC Contractor's shop drawing submittal is complete, and Engineer is confident that documents are going to lead to an installation that meets project design intent.

- C. Temperature Controls Installation Technician Meeting: Project Design Engineer's option to schedule a meeting at the project site to meet and discuss project expectations with the TC Contractor's field installation technician and/or project manager. Discussion may include
 - 1. Shop drawing review comments to ensure installation technician has the most up-to-date TC submittal.
 - 2. Graphics generation requirements including special Owner requirements and schedule for completion.
 - 3. Owner training agenda and scheduling.
 - 4. TC/BAS system acceptance procedures.

3.3 IDENTIFICATION AND MARKING

- A. All sensors, relays, switches, etc. shall be marked with the same identification number as used on the as-built shop drawings. Use Brother P-touch label maker or similar with black text on clear or white super adhesive tape. If label applied in wet environment, spray label with clear enamel for waterproofing.
- B. Wire shall be color coded according to functional use. Identify color coding format on record drawings.
- C. Identify each wire as to ID number at each controller termination, field device termination or on the field device.
- D. All control panels and auxiliary enclosures shall be supplied with engraved phenolic nameplate permanently attached on the front exterior with panel identification to match details of temperature control submittals and include system(s) served and area(s) served on the labeling. Include labeling near 120VAC terminations within panel identifying power source panel ID and specific circuit breaker used.

3.4 GRAPHIC DISPLAY GENERATION

- A. Provide the following graphic displays as a minimum at the operator interface, arranged in logical penetration paths:
 - 1. Overall campus layout which shows all of the buildings on the Owner's campus.
 - 2. Individual building layout or isometric for each building connected to the system.
 - 3. Floor plans for each floor within each building, with display of present values of space conditions sensed by connected space sensors, display of the name of the air handler associated with each space sensor, display of the room number in which the sensor is located and color coding to indicate whether the sensed space condition is within the acceptable range, is too high, or is too low. TC Contractor shall confirm Owner desired room names prior to graphics generation which may differ from the room names indicated on construction documents.

4. Schematic diagram for each HVAC system. Each system schematic display shall include at least the following:
 - a. Schematic arrangement of ductwork, fans, dampers, coils, valves, piping, pumps, equipment etc.
 - b. System name.
 - c. Area served.
 - d. Present value or status of all inputs, along with present setpoint.
 - e. Present percent open for each damper, valve, etc. based on commanded position.
 - f. Reset schedule parameters for all points, where applicable.
 - g. Present occupancy mode.
 - h. Present economizer mode, where applicable.
 - i. Present outside air temperature.
 - j. Associated space conditions and setpoints, where applicable.
 - k. Status of application programs (e.g., warm-up, night cycle, duty cycle, etc.)
 - l. Color coding to indicate normal and abnormal values, alarms, etc.
5. Manual override capability for each on/off or open/closed controlled digital output (for fans, pumps, 2-position dampers and valves, etc.) and each modulating analog output (for dampers, valves, VFD speed modulation type points, etc) shall be provided. Graphic display of output point auto or manual override status shall be provided.
6. Sequence of operation in written (text) format for each HVAC system.
7. Overall BAS system schematic.
8. System management graphic for each network device and/or DDC controller.

3.5 OWNER INSTRUCTION AND TRAINING

- A. Provide sixteen 8 (eight) hours of combined on-site and classroom instruction and training to the Owner on the operation of the control systems for the initial installation.
- B. Instruction and training shall be performed by a competent Contractor representative familiar with the control systems operation, maintenance, and calibration.
- C. Training shall take place after check, test, start-up of temperature controls system at a time mutually agreed upon by the Owner and Contractor.
- D. Provide 5 sets of computer training & tutorial material on USB Flash Drives 5 total describing operator's BAS graphical interface capabilities and functions.
- E. Provide 5 sets of literature pertaining to the operation and maintenance of the DDC system components provided.

3.6 CALIBRATION AND START-UP

- A. After installation and connection of control components, test, adjust and re-adjust as required all control components in terms of function, design, systems balance and performance. Make systems ready for environmental equipment acceptance tests.
- B. After environmental equipment has been accepted and after the systems have operated in normal service for two weeks, check the adjustment on control components and recalibrate where required. Components not in calibration shall be recalibrated to function as required or shall be replaced. Control devices, linkages, and other control components shall be calibrated and adjusted for stable and accurate operation in accordance with the design intent and to obtain optimum performance from the equipment controlled. Cause every device to automatically operate as intended to ensure its proper functionality.

3.7 ACCEPTANCE PROCEDURE

- A. Upon successful completion of start-up and recalibration as indicated in this section, the Architect shall be requested in writing to inspect the satisfactory operation of the control systems.
- B. Demonstrate operation of all control systems, including each individual component, to the Owner and Architect.
- C. After correcting all items appearing on the punch list, make a second written request to the Owner and Architect for inspection and approval.
- D. After all items on the punch list are corrected and formal approval of the control systems is provided by the Architect, the Contractor shall indicate to the Owner in writing the commencement of the warranty period.

END OF SECTION 23 09 33

SECTION 23 31 13 - METAL DUCTS

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PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- B. Related Sections include the following:
 - 1. Division 20 Section "Mechanical General Requirements."
 - 2. Division 23 Section "HVAC Casings" for factory- and field-fabricated casings for mechanical equipment.
 - 3. Division 23 Section "Duct Accessories" for dampers, sound-control devices, duct-mounting access doors and panels, turning vanes, and flexible ducts.

1.2 SUMMARY

- A. This Section includes metal ducts for supply, return, outside, relief air, and exhaust air-distribution systems.

1.3 DEFINITIONS

- A. Duct Sizes: Inside clear dimensions. For lined ducts, maintain sizes inside lining.
- B. Low Pressure: Up to and including 2 inch WG and velocities less than 1,500 fpm.
- C. Medium Pressure: Greater than 2 inch WG to 6 inch WG and velocities greater than 1,500 fpm and less than 2,500 fpm.
- D. High Pressure: Greater than 6 inch WG to 12 inch WG and velocities greater than 2,500 fpm.
- E. PVC: Polyvinyl Chloride.

1.4 SYSTEM DESCRIPTION

- A. Duct system design, as indicated, has been used to select size and type of air-moving and -distribution equipment and other air system components. Changes to layout or configuration of duct system must be specifically approved in writing by Architect. Accompany requests for layout modifications with calculations showing that proposed layout will provide original design results without increasing system total pressure.

1.5 PERFORMANCE REQUIREMENTS

- A. Delegated Duct Design: Duct construction, including sheet metal thicknesses, seam and joint construction, reinforcements, and hangers and supports, shall comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" and performance requirements and design criteria indicated in "Duct Application Schedule" Article.

1.6 ACTION SUBMITTALS

- A. Shop Drawings: Drawn to scale. Show fabrication and installation details for metal ducts. Shop drawings shall be reviewed and approved by the Architect prior to any fabrication.
 - 1. Fabrication, assembly, and installation, including plans, elevations, sections, components, and attachments to other work.
 - 2. Duct layout indicating sizes and pressure classes.
 - 3. Elevations of top and bottom of ducts.
 - 4. Dimensions of main duct runs from building grid lines.
 - 5. Fittings.
 - 6. Reinforcement and spacing.
 - 7. Seam and joint construction.

8. Penetrations through fire-rated and other partitions.
9. Equipment installation based on equipment being used on Project.
10. Duct accessories, including access doors and panels.
11. Hangers and supports, including methods for duct and building attachment, vibration isolation.

1.7 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: Reflected ceiling plans, drawn to scale, on which the following items are shown and coordinated with each other, based on input from installers of the items involved:
 1. Ceiling suspension assembly members.
 2. Other systems installed in same space as ducts.
 3. Ceiling- and wall-mounting access doors and panels required to provide access to dampers and other operating devices.
 4. Ceiling-mounting items, including lighting fixtures, diffusers, grilles, speakers, sprinklers, access panels, and special moldings.

1.8 CLOSEOUT SUBMITTALS

- A. Field quality-control test reports.

1.9 QUALITY ASSURANCE

- A. NFPA Compliance:
 1. NFPA 90A, "Installation of Air Conditioning and Ventilating Systems."
 2. NFPA 90B, "Installation of Warm Air Heating and Air Conditioning Systems."
- B. Duct Liner Maximum Temperature Limits: Based on ASTM C 411 test procedures.

1.10 COORDINATION

- A. Sheet metal trades shall cooperate fully with the Test and Balance Contractor and provide all miscellaneous caps and any other materials required for structural integrity and leakage testing of the complete duct system in whole or in part. Refer to Division 23 Section "Testing, Adjusting and Balancing."
 1. Disassemble, reassemble, and seal segments of systems to accommodate leakage testing and for compliance with test requirements.
- B. Sheet metal trades shall participate in the above ceiling coordination program. Refer to Division 01 requirements.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

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

2.2 SHEET METAL MATERIALS

- A. Comply with SMACNA's "HVAC Duct Construction Standards--Metal and Flexible" for acceptable materials, material thicknesses, and duct construction methods, unless otherwise indicated. Sheet metal materials shall be free of pitting, seam marks, roller marks, stains, discolorations, and other imperfections.
- B. Galvanized Sheet Steel: Lock-forming quality; complying with ASTM A 653/A 653M and having G90 coating designation.
- C. Carbon-Steel Sheets: ASTM A 366/A 366M, cold-rolled sheets; commercial quality; with oiled, matte finish for exposed ducts.
- D. Stainless Steel: ASTM A 480/A 480M, Type 316, and having a No. 2D finish for concealed ducts and No. 4 for exposed ducts.
- E. Aluminum Sheets: ASTM B 209, alloy 3003, temper H14; with mill finish for concealed ducts and standard, 1-side bright finish for exposed ducts.
- F. Reinforcement Shapes and Plates:
 - 1. Galvanized-steel reinforcement where installed on galvanized sheet metal ducts.
 - 2. Compatible materials for aluminum and stainless-steel ducts.
- G. Tie Rods:
 - 1. Galvanized Steel Duct: Galvanized steel, 3/8-inch minimum diameter.
 - 2. Ducts in Humid or Corrosive Atmospheres: Stainless steel, 1/4-inch diameter for lengths 36 inches or less; 3/8-inch diameter for lengths longer than 36 inches.

2.3 DUCT LINER

- A. Fibrous-Glass Liner: Comply with NFPA 90A or NFPA 90B and with NAIMA AH124.
 - 1. Manufacturers:
 - a. CertainTeed Corp.; Insulation Group.
 - b. Johns Manville International, Inc.
 - c. Knauf Fiber Glass GmbH.

2. Materials: ASTM C 1071, Type I, flexible; surfaces exposed to airstream shall be coated to prevent erosion of glass fibers.
 - a. Thickness: 1 inch.
 - b. Density: 1-1/2 pounds per cubic foot.
 - c. Thermal Conductivity (k-Value): 0.26 at 75 deg F mean temperature.
 - d. Fire-Hazard Classification: Maximum flame-spread index of 25 and smoke-developed index of 50 when tested according to ASTM E 84.
 - e. Maximum Operating Temperature: 250 deg F when tested according to ASTM C 411.
 - f. Liner Adhesive: Comply with NFPA 90A or NFPA 90B and with ASTM C 916.
 - g. Mechanical Fasteners: Galvanized steel suitable for adhesive attachment, mechanical attachment, or welding attachment to duct without damaging liner when applied as recommended by manufacturer and without causing leakage in duct.
 - 1) Tensile Strength: Indefinitely sustain a 50-lb- tensile, dead-load test perpendicular to duct wall.
 - 2) Fastener Pin Length: As required for thickness of insulation and without projecting more than 1/8 inch into airstream.
 - 3) Adhesive for Attaching Mechanical Fasteners: Comply with fire-hazard classification of duct liner system.

3. Noise reduction coefficient (NRC): Sound absorption coefficients shall not be less than those in the table below as tested by ASTM C423 using an ASTM E795 Type A mounting.

Thickness Inches	Sound absorption coefficients at octave band center frequencies, Hz						NRC
	125	250	500	1000	2000	4000	
1	.08	.31	.59	.84	.91	.90	.70

2.4 SEALANTS AND GASKETS

- A. General Sealant and Gasket Requirements: Surface-burning characteristics for sealants and gaskets shall be a maximum flame-spread index of 25 and a maximum smoke-developed index of 50 when tested according to UL 723; certified by an NRTL.

- B. Elastomeric Sealant Tape: 3 inches wide; modified butyl adhesive backed.
 1. Manufacturers:
 - a. Hardcast; Foil-Grip 1402 and Foil-Grip 1402-181BFX.

- C. Water-Based Joint and Seam Sealant:
 1. Manufacturers:
 - a. Design Polymerics; DP1010 Water Based Duct Sealant.
 - b. Hardcast; Flex-Grip 550 and Versa-Grip 181.

- c. Polymer Adhesives; No. 11.
 - d. United McGill.

 - 2. Application Method: Brush on.
 - 3. Solids Content: Minimum 63 percent.
 - 4. Shore A Hardness: Minimum 20.
 - 5. Water resistant.
 - 6. Mold and mildew resistant.
 - 7. VOC: Maximum 75 g/L (less water).
 - 8. Maximum Static-Pressure Class: 10-inch wg, positive and negative.
 - 9. Service: Indoor or outdoor.
 - 10. Substrate: Compatible with galvanized sheet steel (both PVC coated and bare), stainless steel, or aluminum sheets.
- D. Solvent-Based Joint and Seam Sealant:
- 1. Manufacturers:
 - a. Hardcast; Sure-Grip 404.
 - b. United McGill.

 - 2. Application Method: Brush on.
 - 3. Base: Synthetic rubber resin.
 - 4. Solvent: Toluene and heptane.
 - 5. Solids Content: Minimum 60 percent.
 - 6. Shore A Hardness: Minimum 60.
 - 7. Water resistant.
 - 8. Mold and mildew resistant.
 - 9. VOC: Maximum 395 g/L.
 - 10. Maximum Static-Pressure Class: 10-inch wg, positive or negative.
 - 11. Service: Indoor or outdoor.
 - 12. Substrate: Compatible with galvanized sheet steel, stainless steel, or aluminum sheets.
- E. Flanged Joint Sealant: Comply with ASTM C 920.
- 1. General: Single-component, acid-curing, silicone, elastomeric.
 - 2. Type: S.
 - 3. Grade: NS.
 - 4. Class: 25.
 - 5. Use: O.
- F. Gaskets: Chloroprene elastomer, 40 durometer, 1/8 inch thick, full face, one piece vulcanized or dovetailed at joints.
- G. Round Duct Joint O-Ring Seals:
- 1. Seal shall provide maximum leakage class of 3 cfm/100 sq. ft. at 1-inch wg and shall be rated for 10-inch wg static-pressure class, positive or negative.
 - 2. EPDM O-ring to seal in concave bead in coupling or fitting spigot.

3. Double-lipped, EPDM O-ring seal, mechanically fastened to factory-fabricated couplings and fitting spigots.

2.5 HANGERS AND SUPPORTS

- A. Building Attachments: Concrete inserts, or structural-steel fasteners appropriate for construction materials to which hangers are being attached.
- B. Hanger Materials: Galvanized sheet steel or threaded steel rod.
 1. Hanger Rods for Noncorrosive Environments: Cadmium-plated steel rods and nuts.
 2. Strap and Rod Sizes: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Table 4-1, "Rectangular Duct Hangers Minimum Size," and Table 4-2, "Minimum Hanger Sizes for Round Duct."
 3. Galvanized-steel straps attached to aluminum ducts shall have contact surfaces painted with zinc-chromate primer.
- C. Duct Attachments: Sheet metal screws, blind rivets, or self-tapping metal screws; compatible with duct materials. Attachments for stainless steel and PVC-coated duct shall be stainless steel.
- D. Trapeze and Riser Supports: Steel shapes complying with ASTM A 36/A 36M.
 1. Supports for Galvanized-Steel Ducts: Galvanized-steel shapes and plates.
 2. Supports for Stainless-Steel Ducts: Stainless-steel support materials.
 3. Supports for Aluminum Ducts: Aluminum support materials unless materials are electrolytically separated from ducts.
- E. Load Rated Cable Suspension System for Noncorrosive Environments: Tested to five times the Safe Working Loads and verified by the SMACNA Testing and Research Institute.
 1. Cable: Aircraft quality 7 x 7 and 7 x 19 wire rope.
 - a. Cables for Galvanized-Steel Ducts: Galvanized steel complying with ASTM A 603.
 - b. Cables for Stainless-Steel Ducts: Stainless steel complying with ASTM A 492.
 2. Fastener: One-piece, die-cast zinc housing with Type 302 S26 stainless steel hardened and tempered springs, and oil impregnated, sintered, hardened and tempered steel locking wedges.
 3. End Fixings: Loop, stud or toggle; or plain end suitable for wire rope beam clamp.
 4. Manufacturers:
 - a. B-Line by Eaton; KwikWire.
 - b. Ductmate Industries, Inc.; Clutcher and EZ-Lock.
 - c. Duro Dyne Corp.; Dyna-Tite System.
 - d. Gripple Inc.; Hang-Fast System.

- F. Stainless Steel Load Rated Cable Suspension System for Corrosive Environments: Tested to five times the Safe Working Loads and verified by the SMACNA Testing and Research Institute.
1. Cable: Aircraft quality stainless steel 7 x 7 and 7 x 19 wire rope.
 - a. Stainless steel complying with ASTM A 492.
 2. Fastener: One-piece, stainless steel housing with Type 302 S26 stainless steel hardened and tempered springs, and ceramic locking wedges.
 3. End Fixings:
 - a. Loop End: Type 316L/A4 stainless steel.
 - b. Stud or Toggle End: Type 304L/A2 stainless steel.
 - c. Plain end suitable for stainless steel wire rope beam clamp.
 4. Manufacturers:
 - a. B-Line by Eaton; KwikWire.
 - b. Ductmate Industries, Inc.; Clutcher and EZ-Lock.
 - c. Duro Dyne Corp.; Dyna-Tite System.
 - d. Gripple Inc.; Hang-Fast System.
- G. Welded Supports: Structural steel shapes with zinc rich paint. Equivalent, proprietary design, rolled steel structural support systems may be used in lieu of mill rolled structural steel.

2.6 RECTANGULAR DUCT FABRICATION

- A. Fabricate ducts, elbows, transitions, offsets, branch connections, and other construction according to SMACNA's "HVAC Duct Construction Standards--Metal and Flexible" and complying with requirements for metal thickness, reinforcing types and intervals, tie-rod applications, and joint types and intervals.
1. Lengths: Fabricate rectangular ducts in lengths appropriate to reinforcement and rigidity class required for pressure class.
 2. Deflection: Duct systems shall not exceed deflection limits according to SMACNA's "HVAC Duct Construction Standards--Metal and Flexible."
 3. Internal Tie Rods: As allowed by SMACNA's "HVAC Duct Construction Standards--Metal and Flexible."
- B. Transverse Joints: Prefabricated slide-on joints and components constructed using manufacturer's and SMACNA guidelines for material thickness, reinforcement size and spacing, and joint reinforcement.
1. Manufacturers:
 - a. Ductmate Industries, Inc.
 - b. Nexus Inc.
 - c. Ward Industries, Inc.

- C. Cross Breaking or Cross Beading: Cross break or cross bead duct sides 19 inches and larger and 0.0359 inch thick or less, with more than 10 sq. ft. of nonbraced panel area unless ducts are lined.

2.7 APPLICATION OF LINER IN RECTANGULAR DUCTS

- A. Adhere a single layer of indicated thickness of duct liner with at least 90 percent adhesive coverage at liner contact surface area. Attaining indicated thickness with multiple layers of duct liner is prohibited.
- B. Apply adhesive to transverse edges of liner facing upstream that do not receive metal nosing.
- C. Butt transverse joints without gaps and coat joint with adhesive.
- D. Fold and compress liner in corners of rectangular ducts or cut and fit to ensure butted-edge overlapping.
- E. Do not apply liner in rectangular ducts with longitudinal joints, except at corners of ducts, unless duct size and standard liner product dimensions make longitudinal joints necessary.
- F. Apply adhesive coating on longitudinal seams in ducts with air velocity of 2500 fpm or greater.
- G. Secure liner with mechanical fasteners 4 inches from corners and at intervals not exceeding 12 inches transversely; at 3 inches from transverse joints and at intervals not exceeding 18 inches longitudinally.
- H. Secure transversely oriented liner edges facing the airstream with metal nosings that have either channel or "Z" profiles or are integrally formed from duct wall. Fabricate edge facings at the following locations:
 - 1. Fan discharges.
 - 2. Intervals of lined duct preceding unlined duct.
 - 3. Upstream edges of transverse joints in ducts where air velocities are greater than 2500 fpm or where indicated.

2.8 ROUND AND FLAT-OVAL DUCT AND FITTING FABRICATION

- A. Diameter as applied to flat-oval ducts in this Article is the diameter of a round duct with a circumference equal to the perimeter of a given size of flat-oval duct.
- B. Round, Spiral Lock-Seam Ducts: Fabricate supply ducts of galvanized steel according to SMACNA's "HVAC Duct Construction Standards--Metal and Flexible" or SMACNA "Industrial Duct Construction Standards" as required based on pressure class.

1. Round fittings shall be factory fabricated welded design. Use of field fabricated fittings (welded design) shall only be permitted when factory fabricated fittings are unavailable.
- C. Flat-Oval, Spiral Lock-Seam Ducts: Fabricate supply ducts according to SMACNA's "HVAC Duct Construction Standards--Metal and Flexible" or SMACNA "Industrial Duct Construction Standards" as required based on pressure class.
1. Flat-oval fittings shall be factory fabricated welded design. Use of field fabricated fittings (welded design) shall only be permitted when factory fabricated fittings are unavailable.
- D. Duct Joints:
1. Ducts up to 20 Inches in Diameter: Interior, center-beaded slip coupling, sealed before and after fastening, attached with sheet metal screws.
 2. Ducts 21 to 72 Inches in Diameter: Three-piece, gasketed, flanged joint consisting of two internal flanges with sealant and one external closure band with gasket.
 3. Ducts Larger Than 72 Inches in Diameter: Companion angle flanged joints per SMACNA "HVAC Duct Construction Standards--Metal and Flexible," Figure 3-2.
 4. Bolts and fasteners for galvanized steel duct shall be carbon steel, zinc coated per ASTM A153. Bolts and fasteners for stainless steel and polyvinyl chloride coated steel duct shall be stainless steel.
 5. Round Ducts: Prefabricated connection system consisting of double-lipped, EPDM rubber gasket. Manufacture ducts according to connection system manufacturer's tolerances.
 6. Flat-Oval Ducts: Prefabricated connection system consisting of two flanges and one synthetic rubber gasket.
- E. Low Pressure Ductwork (plus or minus 2 inches W.G. Static Pressure Class)
1. Construct T's, bends, and elbows with radius of not less than 1-1/2 times width of duct on centerline. Where not possible provide single thickness turning vanes.
 2. Increase duct sizes gradually, not exceeding 15 degrees divergence wherever possible. Divergence upstream of equipment shall not exceed 30 degrees; convergence downstream shall not exceed 45 degrees.
- F. Medium and High Pressure Ductwork (For Static Pressure Class Greater than plus or minus 2 inches W.G.)
1. Construct T's, bends, and elbows with radius of not less than 1-1/2 times width of duct on centerline. Where not possible provide single thickness turning vanes.
 2. Transform duct sizes gradually, not exceeding 15 degrees divergence and 30 degrees convergence.
 3. Fabricate continuously welded medium and high pressure round and oval duct fittings two gauges heavier than duct gauges indicated in SMACNA Standard. Joints shall be minimum 4 inch cemented slip joint, brazed or electric welded. Prime coat welded joints.
 4. Provide standard 45 degree lateral wye takeoffs unless otherwise indicated where 90 degree conical tee connections may be used.

- G. 90-Degree Tees and Laterals and Conical Tees: Fabricate to comply with SMACNA's "HVAC Duct Construction Standards--Metal and Flexible," with metal thicknesses specified for longitudinal-seam straight ducts.
- H. Diverging-Flow Fittings: Fabricate with reduced entrance to branch taps and with no excess material projecting from fitting onto branch tap entrance.
- I. Fabricate elbows using die-formed, gored, pleated, or mitered construction. Bend radius of die-formed, gored, and pleated elbows shall be 1-1/2 times duct diameter. Unless elbow construction type is indicated, fabricate elbows as follows:
 - 1. Mitered-Elbow Radius and Number of Pieces: Welded construction complying with SMACNA's "HVAC Duct Construction Standards--Metal and Flexible," unless otherwise indicated.
 - 2. Round Mitered Elbows: Welded construction with the following metal thickness for pressure classes from minus 2- to plus 2-inch wg:
 - a. Ducts 3 to 36 Inches in Diameter: 0.034 inch.
 - b. Ducts 37 to 50 Inches in Diameter: 0.040 inch.
 - c. Ducts 52 to 60 Inches in Diameter: 0.052 inch.
 - d. Ducts 62 to 84 Inches in Diameter: 0.064 inch.
 - 3. Round Mitered Elbows: Welded construction with the following metal thickness for pressure classes from 2- to 10-inch wg:
 - a. Ducts 3 to 26 Inches in Diameter: 0.034 inch.
 - b. Ducts 27 to 50 Inches in Diameter: 0.040 inch.
 - c. Ducts 52 to 60 Inches in Diameter: 0.052 inch.
 - d. Ducts 62 to 84 Inches in Diameter: 0.064 inch.
 - 4. Flat-Oval Mitered Elbows: Welded construction with same metal thickness as longitudinal-seam flat-oval duct.
 - 5. 90-Degree, 2-Piece, Mitered Elbows: Use only for supply systems or for material-handling Class A or B exhaust systems and only where space restrictions do not permit using radius elbows. Fabricate with single-thickness turning vanes.
 - 6. Round Elbows 8 Inches and Less in Diameter: Fabricate die-formed elbows for 45- and 90-degree elbows and pleated elbows for 30, 45, 60, and 90 degrees only. Fabricate nonstandard bend-angle configurations or nonstandard diameter elbows with gored construction.
 - 7. Round Elbows 9 through 14 Inches in Diameter: Fabricate gored or pleated elbows for 30, 45, 60, and 90 degrees unless space restrictions require mitered elbows. Fabricate nonstandard bend-angle configurations or nonstandard diameter elbows with gored construction.
 - 8. Round Elbows Larger Than 14 Inches in Diameter and All Flat-Oval Elbows: Fabricate gored elbows unless space restrictions require mitered elbows.
 - 9. Die-Formed Elbows for Sizes through 8 Inches in Diameter and All Pressures 0.040 inch thick with 2-piece welded construction.
 - 10. Round Gored-Elbow Metal Thickness: Same as non-elbow fittings specified above.
 - 11. Flat-Oval Elbow Metal Thickness: Same as longitudinal-seam flat-oval duct specified above.

12. Pleated Elbows for Sizes through 14 Inches in Diameter and Pressures through 10-Inch wg: 0.022 inch.

PART 3 - EXECUTION

3.1 DUCTWORK APPLICATION SCHEDULE

- A. Ductwork materials and performance requirements are scheduled on the Drawing.

3.2 DUCT INSTALLATION

- A. Construct and install ducts according to SMACNA's "HVAC Duct Construction Standards--Metal and Flexible," unless otherwise indicated.
- B. Install round and flat-oval ducts in lengths not less than 12 feet unless interrupted by fittings.
- C. Install ducts with fewest possible joints.
- D. Install fabricated fittings for changes in directions, size, and shape and for connections.
- E. Install couplings tight to duct wall surface with a minimum of projections into duct. Secure couplings with sheet metal screws. Install screws at intervals of 12 inches, with a minimum of 3 screws in each coupling.
- F. Install ducts, unless otherwise indicated, vertically and horizontally and parallel and perpendicular to building lines; avoid diagonal runs.
- G. Install ducts close to walls, overhead construction, columns, and other structural and permanent enclosure elements of building.
- H. Install ducts with a clearance of 1 inch, plus allowance for insulation thickness.
- I. Conceal ducts from view in finished spaces. Do not encase horizontal runs in solid partitions unless specifically indicated.
- J. Coordinate layout with suspended ceiling, fire- and smoke-control dampers, lighting layouts, and similar finished work.
- K. Seal all joints and seams. Apply sealant to male end connectors before insertion, and afterward to cover entire joint and sheet metal screws.
- L. Electrical Equipment Spaces: Route ducts to avoid passing through transformer vaults and electrical equipment spaces and enclosures.
- M. Non-Fire-Rated Partition Penetrations: Where ducts pass through interior partitions and exterior walls and are exposed to view, conceal spaces between construction openings and ducts or duct insulation with sheet metal flanges of same metal thickness as ducts. Overlap openings on 4 sides by at least 1-1/2 inches.

- N. Fire-Rated Partition Penetrations: Where ducts pass through interior partitions and exterior walls, install appropriately rated fire dampers, and sleeves. Fire and smoke dampers are specified in Division 23 Section "Duct Accessories."
 - 1. Where ducts not having fire dampers, smoke dampers, or combination fire and smoke dampers pass through fire-rated partitions, maintain indicated fire rating. Seal penetrations with firestop materials. Refer to Division 07 Specification Sections for materials and UL classified firestop systems.
- O. Protect duct interiors from moisture, construction debris and dust, and other foreign materials.
- P. Comply with SMACNA's "IAQ Guidelines for Occupied Buildings Under Construction," Appendix G, "Duct Cleanliness for New Construction Guidelines."
 - 1. Intermediate level.

3.3 DUCT SEALING

- A. Seal duct seams and joints according to SMACNA's "HVAC Duct Construction Standards--Metal and Flexible" for duct pressure class indicated. Ducts must be properly cleaned and sealed in strict accordance with sealant manufacturer's instructions.
 - 1. Seal Class: Refer to Application Schedule on the Drawings.
 - 2. Seal ducts before external insulation is applied.
 - 3. After pressure testing, remake leaking joints until leakage is equal to or less than maximum allowable. Refer to Application Schedule on the Drawings for allowable leakage rates.

3.4 HANGER AND SUPPORT INSTALLATION

- A. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Chapter 5, "Hangers and Supports."
- B. Hanger Spacing: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Table 5-1, "Rectangular Duct Hangers Minimum Size," and Table 5-2, "Minimum Hanger Sizes for Round Duct," for maximum hanger spacing; install hangers and supports within 24 inches of each elbow and within 48 inches of each branch intersection.
- C. Support vertical ducts with steel angles or channel secured to the sides of the duct with welds, bolts, sheet metal screws, or blind rivets; support at each floor and at a maximum intervals of 16 feet.
- D. Install concrete inserts before placing concrete.
- E. Support ductwork from building structure, not from roof deck, floor slab, pipe, other ducts, or equipment.

- F. Install upper attachments to structures with an allowable load not exceeding one-fourth of failure (proof-test) load.
- G. Install roof mounted duct supports in accordance with manufacturer's instructions. Provide additional membrane layer or walkpads under support bases as required.
- H. Use load rated cable suspension system for round duct in exposed locations.

3.5 CONNECTIONS

- A. Make connections to equipment with flexible connectors according to Division 23 Section "Duct Accessories."
- B. Comply with SMACNA's "HVAC Duct Construction Standards--Metal and Flexible" for branch, outlet and inlet, and terminal unit connections.

3.6 PAINTING

- A. Paint interior of metal ducts that are visible through registers and grilles and that do not have duct liner. Apply one coat of flat, black, latex paint over a compatible galvanized-steel primer. Paint materials and application requirements are specified in Division 09 painting Sections.

3.7 FIELD QUALITY CONTROL

- A. Duct System Cleanliness Tests:
 - 1. Visually inspect duct system to ensure that no visible contaminants are present.
- B. Duct system will be considered defective if it does not pass tests and inspections.
- C. Prepare test and inspection reports.

3.8 START UP

- A. Air Balance: Comply with requirements in Division 23 Section "Testing, Adjusting, and Balancing."

END OF SECTION 23 31 13

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PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- B. Related Sections include the following:
 - 1. Division 20 Section "Mechanical General Requirements."
 - 2. Division 23 Section "Testing, Adjusting, and Balancing" for duct test holes.
 - 3. Division 23 Section "Temperature Controls" for motorized control dampers.
 - 4. Division 28 Section "Fire Alarm" for duct-mounting fire and smoke detectors.

1.2 DEFINITIONS

- A. NVLAP: National Voluntary Laboratory Accreditation Program.

- B. Low Pressure: Up to 2 inch WG and velocities less than 1,500 fpm. Construct for 2 inch WG positive or negative static pressure.
- C. Medium Pressure: Greater than 2 inch WG to 6 inch WG and velocities greater than 1,500 fpm and less than 2,500 fpm. Construct for 6 inch WG positive or negative static pressure.
- D. High Pressure: Greater than 6 inch WG to 12 inch WG and velocities greater than 2,500 fpm. Construct for 12 inch WG positive or negative static pressure.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
 - 1. For turning vanes, include data for pressure loss generated sound power levels.
 - 2. For duct silencers, include pressure drop and dynamic insertion loss data.

1.4 INFORMATIONAL SUBMITTALS

- A. Shop Drawings: For duct accessories. Include plans, elevations, sections, details and attachments to other work.
 - 1. Detail duct accessories fabrication and installation in ducts and other construction. Include dimensions, weights, loads, and required clearances; and method of field assembly into duct systems and other construction. Include the following:
 - a. Special fittings.
 - b. Manual volume damper installations.
 - c. Control damper installations.
 - d. Fire-damper, smoke-damper, combination fire- and smoke-damper, ceiling, and corridor damper installations, including sleeves; and duct-mounted access doors and remote damper operators.
 - e. Duct security bars.
- B. Coordination Drawings: Reflected ceiling plans, drawn to scale and coordinating penetrations and ceiling-mounting items. Show ceiling-mounting access panels and access doors required for access to duct accessories.

1.5 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For air duct accessories to include in operation and maintenance manuals.

1.6 QUALITY ASSURANCE

- A. Comply with NFPA 90A, "Installation of Air Conditioning and Ventilating Systems," and NFPA 90B, "Installation of Warm Air Heating and Air Conditioning Systems."

1.7 EXTRA MATERIALS

- A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Fusible Links: Furnish quantity equal to 10 percent of amount installed for each temperature rating.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

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

2.2 SHEET METAL MATERIALS

- A. Comply with SMACNA's "HVAC Duct Construction Standards--Metal and Flexible" for acceptable materials, material thicknesses, and duct construction methods, unless otherwise indicated.
- B. Galvanized Sheet Steel: Lock-forming quality; complying with ASTM A 653/A 653M and having G90 coating designation.
- C. Stainless Steel: ASTM A 480/A 480M, Types 304 and 316 as indicated.
- D. Extruded Aluminum: ASTM B 221, alloy 6063, temper T6.
- E. Bird Screens: No. 2 mesh, 0.063 inch diameter galvanized wire screen with open area of not less than 72 percent. Conceal sharp edges by adding metal edging consisting of rod, flat or angle iron, or 16 gage galvanized sheet steel turned over at least 3/4 inch on both sides.

2.3 BACKDRAFT DAMPERS

- A. Manufacturers:
 - 1. American Warming and Ventilating; Mestek, Inc.
 - 2. Greenheck Fan Corporation.
 - 3. Ruskin Company.
- B. Description: Multiple-blade, parallel action counterbalanced, with blades of maximum 6-inch width, with sealed edges, assembled in rattle-free manner with 90-degree stop, steel

ball bearings, and axles; adjustment device to permit setting for varying differential static pressure.

- C. Performance: Based on tests in accordance with AMCA Standard 500:
 - 1. Pressure drop not to exceed 0.15 inch wg at face velocity of 2500 fpm.
 - 2. Leakage not to exceed 9.2 cfm per square foot at 1 inch wg differential and temperature of 70 deg F.
- D. Frame: 0.052-inch- thick, galvanized sheet steel or 0.063-inch- thick extruded aluminum, with welded corners and mounting flange.
- E. Blades: 0.025-inch- thick, roll-formed aluminum or 0.050-inch- thick aluminum sheet.
- F. Blade Seals: Manufacturer's standard seal material.
- G. Blade Axles: Nonferrous or galvanized steel.
- H. Tie Bars and Brackets: Aluminum or galvanized steel.

2.4 LOW PRESSURE MANUAL VOLUME DAMPERS

- A. Manufacturers:
 - 1. American Warming and Ventilating; Mestek, Inc.
 - 2. Arrow United Industries; Mestek, Inc.
 - 3. Greenheck Fan Corporation.
 - 4. Krueger-HVAC; Air Distribution Technologies, Inc.; a JCI Company.
 - 5. Louvers and Dampers, Inc.; Mestek, Inc.
 - 6. Nailor Industries Inc.
 - 7. Ruskin Company.
 - 8. Vent Products Co., Inc.
 - 9. Young Regulator Co.
- B. General Description: Factory fabricated, with required hardware and accessories. Stiffen damper blades for stability. Include locking device to hold single-blade dampers in a fixed position without vibration. Close duct penetrations for damper components to seal duct consistent with pressure class.
 - 1. Except for dampers in round ductwork sized 12 inches and smaller, provide end bearings.
- C. Rectangular Volume Dampers: Multiple-opposed-blade design, AMCA certified for maximum leakage of 2 percent of total fan volume at shutoff, and suitable for horizontal or vertical applications.
- D. Round Volume Dampers 16-inch Diameter and Smaller: Single-blade design, AMCA certified for maximum leakage of 2 percent of total fan volume at shutoff, and suitable for horizontal or vertical applications.

- E. Round Volume Dampers Larger than 16-inch Diameter: Multiple-opposed-blade design AMCA certified for maximum leakage of 2 percent of total fan volume at shutoff, and suitable for horizontal or vertical applications.
- F. Damper Materials:
 - 1. Steel Frames: Hat-shaped, galvanized sheet steel channels, minimum of 0.064 inch thick, with mitered and welded corners; frames with flanges where indicated for attaching to walls and flangeless frames where indicated for installing in ducts.
 - 2. Roll-Formed Steel Blades: 0.064-inch- thick, galvanized sheet steel.
 - 3. Blade Axles: Galvanized steel.
 - 4. Bearings: Oil-impregnated bronze, molded synthetic, or stainless-steel sleeve type.
 - 5. Tie Bars and Brackets: Galvanized steel.
- G. Jackshaft: 1-inch- diameter, galvanized-steel pipe rotating within pipe-bearing assembly mounted on supports at each mullion and at each end of multiple-damper assemblies.
 - 1. Length and Number of Mountings: Appropriate to connect linkage of each damper in multiple-damper assembly.
- H. Damper Hardware: Zinc-plated, die-cast core with dial and handle made of 3/32-inch-thick zinc-plated steel, and a 3/4-inch hexagon locking nut. Include center hole to suit damper operating-rod size. Include elevated platform for insulated duct mounting.

2.5 MEDIUM OR HIGH PRESSURE MANUAL VOLUME DAMPERS

- A. Manufacturers:
 - 1. American Warming and Ventilating; Mestek, Inc.
 - 2. Greenheck Fan Corporation.
 - 3. Louvers and Dampers, Inc.; Mestek, Inc.
 - 4. Nailor Industries Inc.
 - 5. Ruskin Company.
 - 6. Vent Products Co., Inc.
- B. General Description: Factory fabricated, galvanized steel or extruded aluminum construction, with required hardware and accessories. Stiffen damper blades for stability. Include locking device to hold single-blade dampers in a fixed position without vibration. Close duct penetrations for damper components to seal duct consistent with pressure class.
- C. Rectangular Volume Dampers: Multiple-opposed-blade design, AMCA certified for maximum leakage of 2 percent of total fan volume at shutoff, and suitable for horizontal or vertical applications. Construction and assembly such that no noise producing blade vibration occurs at velocities 20 percent greater than maximum system design velocity.
- D. Round Volume Dampers 16-inch Diameter and Smaller: Single-blade, or multiple-opposed-blade design, AMCA certified for maximum leakage of 2 percent of total fan volume at shutoff, and suitable for horizontal or vertical applications. Construction and

assembly such that no noise producing blade vibration occurs at velocities 20 percent greater than maximum system design velocity.

- E. Round Volume Dampers Larger than 16-inch Diameter: Multiple-opposed-blade design, AMCA certified for maximum leakage of 2 percent of total fan volume at shutoff, and suitable for horizontal or vertical applications. Construction and assembly such that no noise producing blade vibration occurs at velocities 20 percent greater than maximum system design velocity.
- F. Damper Materials:
 - 1. Steel Frames: Hat-shaped, galvanized sheet steel channels, minimum of 0.064 inch thick, with mitered and welded corners; frames with flanges where indicated for attaching to walls and flangeless frames where indicated for installing in ducts.
 - 2. Roll-Formed Steel Blades: 0.064-inch- thick, galvanized sheet steel.
 - 3. Aluminum Frames: Hat-shaped, 0.10-inch- thick, aluminum sheet channels; frames with flanges where indicated for attaching to walls; and flangeless frames where indicated for installing in ducts.
 - 4. Extruded-Aluminum Blades: 0.050-inch- thick extruded aluminum.
 - 5. Blade Axles: Galvanized steel or stainless steel.
 - 6. Bearings: Oil-impregnated bronze, molded synthetic, or stainless-steel sleeve type.
 - 7. Tie Bars and Brackets: Aluminum or galvanized steel.
- G. Jackshaft: 1-inch- diameter, galvanized-steel pipe rotating within pipe-bearing assembly mounted on supports at each mullion and at each end of multiple-damper assemblies.
 - 1. Length and Number of Mountings: Appropriate to connect linkage of each damper in multiple-damper assembly.
- H. Damper Hardware: Zinc-plated, die-cast core with dial and handle made of 3/32-inch-thick zinc-plated steel, and a 3/4-inch hexagon locking nut. Include center hole to suit damper operating-rod size. Include elevated platform for insulated duct mounting.

2.6 MOTORIZED CONTROL DAMPERS

- A. Refer to Division 23 Section "Temperature Controls."

2.7 TURNING VANES

- A. Manufactured Turning Vanes:
 - 1. Comply with SMACNA's "HVAC Duct Construction Standards--Metal and Flexible" for vanes and vane runners. Vane runners shall automatically align vanes.
 - 2. Double-vane or airfoil-shaped, curved blades of galvanized sheet steel set into vane runners suitable for duct mounting.
 - 3. Generated sound power level shall not exceed 54 decibels in octave band 4 at 2000 fpm in a 24-inch by 24-inch duct.

4. Manufacturers:
 - a. Aero-Dyne Sound Control; H-E-P Turning Vanes & Rail.
 - b. Ductmate Industries, Inc.
 - c. Duro Dyne Corporation.
 - d. Ward Industries, Inc.; a JCI Company.

B. Manufactured Acoustic Turning Vanes:

1. Comply with SMACNA's "HVAC Duct Construction Standards--Metal and Flexible" for vanes and vane runners. Vane runners shall automatically align vanes.
2. Double-vane curved blades of galvanized sheet steel with perforated faces and fibrous-glass fill set into vane runners suitable for duct mounting.
3. Manufacturers:
 - a. Ductmate Industries, Inc.
 - b. Ward Industries, Inc.; a JCI Company.

2.8 DUCT-MOUNTING ACCESS DOORS

A. General Description: Fabricate doors airtight and suitable for duct pressure class. Doors may be field fabricated in accordance with SMACNA Standards, or commercially produced.

B. Door: Double wall, duct mounting, and rectangular; fabricated of galvanized sheet metal with insulation fill and thickness as indicated for duct pressure class. Include vision panel where indicated. Include 1-by-1-inch butt or piano hinge and cam latches.

1. Manufacturers:
 - a. Air Balance, Inc.; Mestek, Inc.
 - b. Greenheck Gan Corporation.
 - c. Nailor Industries Inc.
 - d. Ruskin Company.
2. Frame: Galvanized sheet steel, with bend-over tabs and foam gaskets.
3. Provide number of hinges and locks as follows:
 - a. Less Than 12 Inches Square: Secure with two sash locks.
 - b. Up to 18 Inches Square: Two hinges and two compression locks.
 - c. Up to 24 by 48 Inches: Three hinges and two compression latches with outside and inside handles.
 - d. Sizes 24 by 48 Inches and Larger: One additional hinge.

C. Door: Double wall, duct mounting, and round; fabricated of galvanized sheet metal with insulation fill and 1-inch thickness. Include cam latches.

1. Manufacturers:
 - a. Ductmate Industries, Inc.

- b. Flexmaster U.S.A.; a Masterduct Company.
- 2. Frame: Galvanized sheet steel, with spin-in notched frame.
- D. Seal around frame attachment to duct and door to frame with neoprene or foam rubber.
- E. Insulation: 1-inch-thick, fibrous-glass or polystyrene-foam board.

2.9 FLEXIBLE CONNECTORS

- A. Manufacturers:
 - 1. ADSCO Manufacturing LLC.
 - 2. Duro Dyne Corp.
 - 3. Senior Flexonics Pathway.
 - 4. Ventfabrics, Inc.
- B. General Description: Flame-retardant or noncombustible fabrics, coatings, and adhesives complying with UL 181, Class 1.
- C. Metal-Edged Connectors: Factory fabricated with a fabric strip minimum 3-1/2 inches wide attached to two strips of 2-3/4-inch- wide, 0.028-inch- thick, galvanized sheet steel or 0.032-inch- thick aluminum sheets. Select metal compatible with ducts.
- D. Indoor System, Flexible Connector Fabric: Glass fabric double coated with neoprene.
 - 1. Minimum Weight: 26 oz./sq. yd.
 - 2. Tensile Strength: 480 lbf/inch in the warp and 360 lbf/inch in the filling.
 - 3. Service Temperature: Minus 20 to plus 200 deg F.

2.10 FLEXIBLE DUCTS, LOW AND MEDIUM PRESSURE

- A. Manufacturers:
 - 1. Flexmaster U.S.A.; a Masterduct Company; Type 1M Acoustical.
 - 2. Hart & Cooley.
 - 3. Thermaflex; part of the Flexible Technologies Group.
- B. Flexible Ducts: Interlocking spiral of galvanized steel or aluminum construction or fabric supported by helically wound spring steel wire or flat steel bands; rated to 6 inches WG positive and 4 inches WG negative for low and medium pressure ducts.
- C. Insulated Flexible Ducts: UL 181, Class 1, flexible duct wrapped with flexible glass fiber insulation, enclosed by a fire retardant polyethylene vapor barrier jacket; maximum 0.23 K value at 75 deg F.

- D. Acoustical performance tested in accordance with the Air Diffusion Council's *Flexible Air Duct Test Code FD 72-R1, Section 3.0, Sound Properties* shall be as follows:

The insertion loss (dB) of a 10 foot length of straight duct when tested in accordance with ASTM E477, at a velocity of 2500 feet per minute, shall be minimum:

Octave Band Hz.	2	3	4	5	6	7
6" diameter	8	32	38	35	39	25
8" diameter	13	32	36	35	36	21
12" diameter	15	29	28	33	26	14

The radiated noise reduction (dB) of a 10 foot length of straight duct when tested in accordance with ASTM E477, at a velocity of 2500 feet per minute, shall be minimum:

Octave Band Hz.	2	3	4	5	6	7
6" diameter	6	8	7	8	9	13
8" diameter	9	6	6	7	8	10
12" diameter	9	7	6	6	8	11

The self-generated sound power levels (LW) dB are 10-12 Watt of a 10 foot length of straight duct for an empty sheet metal duct when tested in accordance with ASTM E477, at a velocity of 1000 feet per minute, shall not exceed:

Octave Band Hz.	2	3	4	5	6	7
6" diameter	42	31	23	18	17	21
8" diameter	41	34	27	19	18	21
12" diameter	53	44	36	27	21	22

- E. Flexible Duct Fittings: Galvanized steel, twist-in design with damper. Size as indicated.
- F. Flexible Duct Clamps: Stainless-steel band with cadmium-plated hex screw to tighten band with a worm-gear action, in sizes 3 through 18 inches to suit duct size.

2.11 FLEXIBLE DUCTS HIGH PRESSURE

- A. Manufacturers:
1. Flexmaster U.S.A.; a Masterduct Company; Type 3M.
 2. Hart & Cooley.
 3. Thermaflex; part of the Flexible Technologies Group.
- B. Flexible Ducts: Interlocking spiral of galvanized steel or aluminum construction or fabric supported by helically wound spring steel wire or flat steel bands; rated to 12 inches WG positive and 4 inches WG negative for medium and high pressure ducts.
- C. Insulated Flexible Ducts: UL 181, Class 1, flexible duct wrapped with flexible glass fiber insulation, enclosed by seamless aluminum pigmented plastic vapor barrier jacket; maximum 0.23 K value at 75 deg F.
- D. Flexible Duct Fittings: Galvanized steel, twisted-in design with damper. Size as indicated.

- E. Flexible Duct Clamps: Stainless-steel band with cadmium-plated hex screw to tighten band with a worm-gear action, in sizes 3 through 18 inches to suit duct size.

2.12 FLEXIBLE DUCT ELBOW SUPPORTS

- A. Manufacturer:
 - 1. Titus; Air Distribution Technologies, Inc.; a JCI Company; FlexRight.
 - 2. Thermaflex; part of the Flexible Technologies Group; FlexFlow Elbow.
 - 3. Hart and Cooley, Inc.; Smart Flow Elbow.
- B. Elbow supports shall be constructed of durable composite material and be fully adjustable to support flexible duct diameters 6 inches through 16 inches.
- C. Elbow supports shall be UL listed for use in return air plenum spaces.

2.13 DUCT ACCESSORY HARDWARE

- A. Adhesives: High strength, quick setting, neoprene based, waterproof, and resistant to gasoline and grease.

2.14 FINISHES

- A. Chemical Resistant Coating: P-403 manufactured by Heresite Chemical Company.

PART 3 - EXECUTION

3.1 APPLICATION AND INSTALLATION

- A. Install duct accessories according to applicable details in SMACNA's "HVAC Duct Construction Standards--Metal and Flexible" for metal ducts and in NAIMA AH116, "Fibrous Glass Duct Construction Standards," for fibrous-glass ducts.
- B. Provide duct accessories of materials suited to duct materials; use galvanized-steel accessories in galvanized-steel and fibrous-glass ducts, stainless-steel accessories in stainless-steel ducts and PVC coated ducts; and aluminum accessories in aluminum ducts.
- C. Install control dampers at inlet of exhaust fans or exhaust ducts as close as possible to exhaust fan unless otherwise indicated.
- D. Install volume dampers at points on supply, return, and exhaust systems where branches extend from larger ducts. Where dampers are installed in ducts having duct liner, install dampers with hat channels of same depth as liner, and terminate liner with nosing at hat channel.
 - 1. Install steel volume dampers in steel ducts.

- E. Set dampers to fully open position before testing, adjusting, and balancing.
- F. Install duct access doors on ducts to allow for inspecting, adjusting, and maintaining accessories and equipment at the following locations:
 - 1. On upstream side of duct coils.
 - 2. At drain pans.
 - 3. Downstream from control dampers, backdraft dampers, and duct mounted equipment.
 - 4. Adjacent to and close enough to fire or smoke dampers, to reset or reinstall fusible links.
 - 5. Control devices requiring inspection, including airflow measuring devices. Size access doors appropriately to facilitate service of each device.
 - 6. Elsewhere as indicated.
- G. Install access doors with swing against duct static pressure.
- H. Install duct-mounting, rectangular access doors with long dimension at right angles to direction of airflow and of largest standard size which can be accommodated in duct. Maximum size: 21 by 14 inches.
- I. Label access doors according to Division 20 Section "Mechanical Identification."
- J. Install flexible connectors immediately adjacent to equipment in ducts associated with fans and motorized equipment supported by vibration isolators.
- K. For fans developing static pressures of 5-inch wg and higher, cover flexible connectors with loaded vinyl sheet held in place with metal straps.
- L. Connect terminal units to supply ducts directly or with maximum 12-inch lengths of flexible duct. Do not use flexible ducts to change directions.
- M. Connect diffusers or light troffer boots to low pressure ducts flexible duct clamped or strapped in place.
- N. Connect flexible ducts to metal ducts with plenum-rated draw bands.
- O. Install flexible duct elbow supports at each diffuser, grille, or register, and elsewhere as indicated.
- P. Install turning vanes in rectangular duct elbows in excess of 45 degrees, and where indicated:
 - 1. Use manufactured double-vane turning vanes unless otherwise specified.
 - 2. Seat outboard-most vane in heel of duct elbow.
 - 3. Provide vanes for all runner punchings. Practice of eliminating every other vane is prohibited.
 - 4. Use single-vane turning vanes in low pressure square elbows.

3.2 FIELD QUALITY CONTROL

A. Tests and Inspections:

1. Operate dampers to verify full range of movement.
2. Inspect locations of access doors and verify that purpose of access door can be performed.
3. Inspect turning vanes for proper and secure installation.
4. Operate remote damper operators to verify full range of movement of operator and damper.

3.3 ADJUSTING

A. Adjust duct accessories for proper settings.

B. Final positioning of manual-volume dampers is specified in Division 23 Section "Testing, Adjusting, and Balancing."

END OF SECTION 23 33 00

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PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- B. Related Sections include the following:
 - 1. Division 20 Section "Mechanical General Requirements."
 - 2. Division 20 Section "Motors."
 - 3. Division 23 Section "Common Work Results for HVAC" for common mechanical drive requirements for fans and air moving equipment.

1.2 PERFORMANCE REQUIREMENTS

- A. Classify according to AMCA 99.

1.3 ACTION SUBMITTALS

- A. Product Data: Include rated capacities, furnished specialties, and accessories for each type of product indicated and include the following:

1. Certified fan performance curves with system operating conditions indicated.
2. Certified fan sound-power ratings.
3. Motor ratings and electrical characteristics, plus motor and electrical accessories.
4. Material thickness.
5. Dampers, including housings, linkages, and operators.
6. Roof curbs.
7. Fan speed controllers.

1.4 INFORMATIONAL SUBMITTALS

- A. Shop Drawings: Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
 1. Wiring Diagrams: Power, signal, and control wiring.
 2. Design Calculations: Calculate requirements for selecting vibration isolators and for designing vibration isolation bases.
 3. Vibration Isolation Base Details: Detail fabrication, including anchorages and attachments to structure and to supported equipment. Include auxiliary motor slides and rails, and base weights.
- B. Coordination Drawings: Reflected ceiling plans and other details, drawn to scale, on which the following items are shown and coordinated with each other, based on input from installers of the items involved:
 1. Roof framing and support members relative to duct penetrations.
 2. Ceiling suspension assembly members.
 3. Size and location of initial access modules for acoustical tile.
 4. Ceiling-mounted items including light fixtures, diffusers, grilles, speakers, sprinklers, access panels, and special moldings.

1.5 CLOSEOUT SUBMITTALS

- A. Field quality-control test reports.
- B. Operation and Maintenance Data: For power ventilators to include in operation and maintenance manuals.

1.6 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by an NRTL acceptable to authorities having jurisdiction, and marked for intended use.
- B. AMCA Compliance: Products shall comply with performance requirements and shall be licensed to use the AMCA-Certified Ratings Seal.

- C. NEMA Compliance: Motors and electrical accessories shall comply with NEMA standards.
- D. UL Standard: Power ventilators shall comply with UL 705.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver fans as factory-assembled units, to the extent allowable by shipping limitations, with protective crating and covering.
- B. Disassemble and reassemble units, as required for moving to final location, according to manufacturer's written instructions.
- C. Lift and support units with manufacturer's designated lifting or supporting points.

1.8 COORDINATION

- A. Coordinate size and location of structural-steel support members.
- B. Coordinate size and location of concrete bases. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork requirements are specified in Division 03.
- C. Coordinate delivery and placement of roof curbs, and equipment supports. Installation of roof curbs, equipment supports, and roof penetrations is specified in Division 07 Section "Roof Accessories."

1.9 EXTRA MATERIALS

- A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Belts: One set for each belt-drive unit.

PART 2 - PRODUCTS

2.1 CENTRIFUGAL ROOF VENTILATORS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Acme Engineering & Manufacturing; Acme Fan Group; Models PRN and PV.
 - 2. Aerovent; a Twin City Fan Company.
 - 3. Greenheck Fan Corporation; Models G and GB.
 - 4. Loren Cook Company; Models ACED and ACES.
 - 5. Moffitt Corporation.
 - 6. PennBarry; Division of Air System Components; Domex.

- B. Description: Direct- or belt-driven centrifugal fans consisting of housing, wheel, fan shaft, bearings, motor and disconnect switch, drive assembly, curb base, and accessories.
- C. Housing: Removable, spun-aluminum, dome top and outlet baffle; square, one-piece, aluminum base with venturi inlet cone.
- D. Fan Wheels: Aluminum hub and wheel with backward-inclined blades.
- E. Belt-Driven Drive Assembly: Resiliently mounted to housing, with the following features:
 - 1. Fan Shaft: Turned, ground, and polished steel; keyed to wheel hub.
 - 2. Shaft Bearings: Permanently lubricated, permanently sealed, self-aligning ball bearings.
 - 3. Sheaves: Cast-iron, adjustable-pitch motor sheave.
 - 4. Fan and motor isolated from exhaust airstream.
 - 5. Refer to Division 23 Section "Common Work Results for HVAC" for additional requirements.
- F. Accessories:
 - 1. Disconnect Switch: Nonfusible type, with thermal-overload protection mounted outside fan housing, factory wired through an internal aluminum conduit.
 - 2. Bird Screens: Removable, 1/2-inch mesh, aluminum or brass wire.
- G. Provide prefabricated roof curbs for each fan.
- H. Capacities and Characteristics: Refer to schedule(s) on Drawings.

2.2 ROOF CURBS AND ACCESSORIES

- A. Construction: Galvanized steel; mitered and welded corners; 1-1/2-inch- thick, rigid, fiberglass insulation adhered to inside walls; and 1-1/2-inch chemically treated wood nailer. Size as required to suit roof opening and fan base.
 - 1. Manufacturers: Roof curbs shall be provided by the fan manufacturer, or one of the following:
 - a. Creative Metals.
 - b. The Pate Company.
 - c. Roof Products & Systems.
 - d. Thybar Corporation.
 - e. Any of the approved roof mounted exhaust fan manufacturers.
 - 2. Configuration: Self-flashing without a cant strip, with mounting flange, and suitable for flat roofs with tapered insulation.
 - 3. Height: Curb shall extend a minimum 18 inches above top surface of roof insulation.
 - 4. Metal Liner: Galvanized steel.
 - 5. Burglar Bars: Minimum 1/2-inch- thick steel bars welded in place to form 6-inch squares.

6. Mounting Pedestal: Galvanized steel with removable access panel.

2.3 MOTORS

- A. Comply with requirements in Division 20 Section "Motors."

2.4 SOURCE QUALITY CONTROL

- A. Sound-Power Level Ratings: Comply with AMCA 301, "Methods for Calculating Fan Sound Ratings from Laboratory Test Data." Factory test fans according to AMCA 300, "Reverberant Room Method for Sound Testing of Fans." Label fans with the AMCA-Certified Ratings Seal.
- B. Fan Performance Ratings: Establish flow rate, pressure, power, air density, speed of rotation, and efficiency by factory tests and ratings according to AMCA 210, "Laboratory Methods of Testing Fans for Rating."

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install power ventilators level and plumb.
- B. Secure roof-mounting fans to roof curbs with cadmium-plated hardware. Refer to Division 07 Section "Roof Accessories" for installation of roof curbs.
- C. Install units with clearances for service and maintenance.
- D. Label units according to requirements specified in Division 20 Section "Mechanical Identification."

3.2 CONNECTIONS

- A. Duct installation and connection requirements are specified in other Division 23 Sections. Drawings indicate general arrangement of ducts and duct accessories. Make final duct connections with flexible connectors. Flexible connectors are specified in Division 23 Section "Duct Accessories."
- B. Install ducts adjacent to power ventilators to allow service and maintenance.
- C. Ground equipment according to Division 26 Section "Grounding and Bonding."
- D. Connect wiring according to Division 26 Section "Conductors and Cables."

3.3 FIELD QUALITY CONTROL

- A. Perform the following field tests and inspections and prepare test reports:
1. Verify that shipping, blocking, and bracing are removed.
 2. Verify that unit is secure on mountings and supporting devices and that connections to ducts and electrical components are complete. Verify that proper thermal-overload protection is installed in motors, starters, and disconnect switches.
 3. Verify that cleaning and adjusting are complete.
 4. Disconnect fan drive from motor, verify proper motor rotation direction, and verify fan wheel free rotation and smooth bearing operation. Reconnect fan drive system, align and adjust belts, and install belt guards.
 5. Adjust belt tension.
 6. Adjust damper linkages for proper damper operation.
 7. Verify lubrication for bearings and other moving parts.
 8. Verify that manual and automatic volume control and fire and smoke dampers in connected ductwork systems are in fully open position.
 9. Disable automatic temperature-control operators, energize motor and adjust fan to indicated rpm, and measure and record motor voltage and amperage.
 10. Shut unit down and reconnect automatic temperature-control operators.
 11. Remove and replace malfunctioning units and retest as specified above.
- B. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

3.4 ADJUSTING

- A. Adjust damper linkages for proper damper operation.
- B. Adjust belt tension.
- C. Refer to Division 23 Section "Testing, Adjusting, and Balancing" for testing, adjusting, and balancing procedures.
- D. Replace fan and motor sheaves as required to achieve design airflow.
- E. Lubricate bearings.

END OF SECTION 23 34 23

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PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- B. Related Sections include the following:
 - 1. Division 20 Section "Mechanical General Requirements."
 - 2. Division 23 Section "Metal Ducts."
 - 3. Division 23 Section "Temperature Controls."

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated, include rated capacities, furnished specialties, sound-power ratings, and accessories.
 - 1. Liners and adhesives.
 - 2. Sealants and gaskets.

1.3 INFORMATIONAL SUBMITTALS

- A. Shop Drawings: Detail equipment assemblies and indicate dimensions, required clearances, method of field assembly, components, and location and size of each field connection.
 - 1. Include a schedule showing unique model designation, room location, model number, size, and accessories furnished.
 - 2. Wiring Diagrams: Power, signal, and control wiring.
- B. Coordination Drawings: Reflected ceiling plans, drawn to scale, on which the following items are shown and coordinated with each other, based on input from installers of the items involved:
 - 1. Ceiling suspension assembly members.
 - 2. Method of attaching hangers to building structure.
 - 3. Size and location of initial access modules for acoustical tile.
 - 4. Ceiling-mounted items including lighting fixtures, diffusers, grilles, speakers, sprinklers, access panels, and special moldings.

1.4 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For air terminal units to include in operation and maintenance manuals. Include the following:
 - 1. Instructions for resetting minimum and maximum air volumes.
 - 2. Instructions for adjusting software set points.

1.5 QUALITY ASSURANCE

- A. Product Options: Drawings indicate size, profiles, and dimensional requirements of air terminal units and are based on the specific system indicated. Refer to Division 01 Section "Product Requirements."
- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by NRTL acceptable to authorities having jurisdiction, and marked for intended use.
- C. NFPA Compliance: Install air terminal units according to NFPA 90A, "Standard for the Installation of Air Conditioning and Ventilating Systems."

1.6 COORDINATION

- A. Coordinate layout and installation of air terminal units and suspension system with other construction that penetrates ceilings or is supported by them, including light fixtures, HVAC equipment, fire-suppression system, and partition assemblies.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

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

2.2 SINGLE-DUCT AIR TERMINAL UNITS

- A. Manufacturers:
1. Krueger-HVAC; Air Distribution Technologies, Inc.; a JCI Company.
 2. Nailor Industries, Inc.
 3. Price Industries.
 4. Titus; Air Distribution Technologies, Inc.; a JCI Company.
 5. Tuttle & Bailey; Air Distribution Technologies, Inc.; a JCI Company.
- B. Configuration: Variable and constant volume, medium pressure terminal units with casing, 24 volt control transformer, electrical service disconnect switch, 100 percent tight shutoff volume regulator, velocity sensor, and sound attenuating thermal insulation.
- C. Casing: Constructed of 0.034-inch mill galvanized steel or 0.032-inch aluminum.
1. Casing Lining: 1-inch- thick, coated, fibrous-glass duct liner complying with ASTM C 1071; secured with adhesive. Cover liner with nonporous foil.
 2. Air Inlet: Round stub connection or S-slip and drive connections for duct attachment.
 3. Air Outlet: S-slip and drive connections, size matching inlet size.
 4. Access: Removable panels for access to dampers and other parts requiring service, adjustment, or maintenance; with airtight gasket.
- D. Volume Damper: Galvanized steel with peripheral gasket and self-lubricating bearings.
1. Maximum Damper Leakage: AHRI 880 rated, 2 percent of nominal airflow at 3-inch wg inlet static pressure.
- E. Velocity Sensor: Multipoint averaging array. Sensor located in air inlet.
- F. Attenuator Section: 0.034-inch mill galvanized steel or 0.032-inch aluminum sheet metal.
1. Lining: 1-inch- thick, coated, fibrous-glass duct liner complying with ASTM C 1071; secured with adhesive. Cover liner with nonporous foil.
- G. Electric Heating Coil: Slip-in-type, open-coil design with integral control box factory wired and installed. Include the following features:

1. Primary and secondary overtemperature protection.
 2. Nickel chrome 80/20 heating elements.
 3. Airflow switch.
 4. Noninterlocking disconnect switch.
 5. Fuses (for coils more than 48 A).
 6. SCR power controller.
 7. Pneumatic-electric switches and relays.
 8. Magnetic contactor for each step of control (for three-phase coils).
- H. DDC Controls: Single-package unitary controller and actuator specified in Division 23 Section "Temperature Controls."
- I. Control Sequence: Refer to Temperature Control Diagrams on Drawings.

2.3 HANGERS AND SUPPORTS

- A. Hanger Rods for Noncorrosive Environments: Cadmium-plated steel rods and nuts.
- B. Steel Cables: Galvanized steel complying with ASTM A 603.
- C. Steel Cable End Connections: Cadmium-plated steel assemblies with brackets, swivel, and bolts designed for duct hanger service; with an automatic-locking and clamping device.
- D. Air Terminal Unit Attachments: Sheet metal screws, blind rivets, or self-tapping metal screws; compatible with duct materials.
- E. Trapeze and Riser Supports: Steel shapes and plates for units with steel casings; aluminum for units with aluminum casings.

2.4 SOURCE QUALITY CONTROL

- A. Identification: Label each air terminal unit with plan number, nominal airflow, maximum and minimum factory-set airflows, coil type, and AHRI certification seal.
- B. Verification of Performance: Rate air terminal units according to AHRI 880.
- C. Acoustical Applications and Sound Evaluation: Based on AHRI Standard 885-98, "Procedure for Estimating Occupied Space Sound Levels in the Application of Air Terminals and Air Outlets."

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install air terminal units according to NFPA 90A, "Standard for the Installation of Air Conditioning and Ventilating Systems."

- B. Install air terminal units level and plumb. Maintain sufficient clearance for normal service and maintenance.

3.2 HANGER AND SUPPORT INSTALLATION

- A. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Chapter 4, "Hangers and Supports."
- B. Building Attachments: Concrete inserts or structural-steel fasteners appropriate for construction materials to which hangers are being attached. Refer to Division 20 Section "Hangers and Supports" for additional information.
 - 1. Where practical, install concrete inserts before placing concrete.
- C. Hangers Exposed to View: Threaded rod and angle or channel supports.
- D. Install upper attachments to structures. Select and size upper attachments with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.

3.3 CONNECTIONS

- A. Connect ducts to air terminal units according to Division 23 Section "Metal Ducts."
- B. Ground units with electric heating coils according to Division 26 Section "Grounding and Bonding."
- C. Connect wiring according to Division 26 Section "Conductors and Cables."
- D. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

3.4 FIELD QUALITY CONTROL

- A. Perform the following field tests and inspections and prepare test reports:
 - 1. After installing air terminal units and after electrical circuitry has been energized, test for compliance with requirements.
 - 2. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- B. Remove and replace malfunctioning units and retest as specified above.

3.5 STARTUP SERVICE

- A. Complete installation and startup checks according to manufacturer's written instructions and do the following:
 - 1. Verify that inlet duct connections are as recommended by air terminal unit manufacturer to achieve proper performance.
 - 2. Verify that controls and control enclosure are accessible.
 - 3. Verify that control connections are complete.
 - 4. Verify that nameplate and identification tag are visible.
 - 5. Verify that controls respond to inputs as specified.

3.6 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain air terminal units.

END OF SECTION 23 36 00

SECTION 23 37 13 - DIFFUSERS, REGISTERS, AND GRILLES

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PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- B. Related Sections include the following:
 - 1. Division 20 Section "Mechanical General Requirements."
 - 2. Division 23 Section "Duct Accessories" for fire and smoke dampers and volume-control dampers not integral to diffusers, registers, and grilles.

1.2 ACTION SUBMITTALS

- A. Product Data: For each product indicated, include the following:
 - 1. Data Sheet: Indicate materials of construction, finish, and mounting details; and performance data including throw and drop, static-pressure drop, and noise ratings.
 - 2. Diffuser, Register, and Grille Schedule: Indicate Drawing designation, room location, quantity, model number, size, and accessories furnished.

1.3 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: Reflected ceiling plans, drawn to scale, on which the following items are shown and coordinated with each other, based on input from installers of the items involved:
 - 1. Ceiling suspension assembly members.
 - 2. Method of attaching hangers to building structure.
 - 3. Size and location of initial access modules for acoustical tile.

4. Ceiling-mounted items including lighting fixtures, diffusers, grilles, speakers, sprinklers, access panels, and special moldings.
5. Duct access panels.

PART 2 - PRODUCTS

2.1 AIR DIFFUSION DEVICES

- A. Manufacturers: Subject to compliance with requirements, provide the product indicated on Drawings or a comparable product by one of the following:
 1. Krueger-HVAC; Air Distribution Technologies, Inc.; a JCI Company.
 2. Nailor Industries, Inc.
 3. Price Industries.
 4. Titus; Air Distribution Technologies, Inc.; a JCI Company.
 5. Tuttle & Bailey; Air Distribution Technologies, Inc.; a JCI Company.
- B. Terminal air diffusion devices have been chosen in terms of specific air distribution requirements, spacing, and sound characteristics.
- C. Provide plaster frames for units installed in plaster ceilings.
- D. Provide gaskets for supply terminal air devices mounted in finished surfaces.
- E. Finish:
 1. Device Face and Visible Trim: Standard off white baked enamel finish unless noted otherwise.
 2. Device Interior Surfaces, Including Blank-Offs and Boots: Black matte finish.
- F. Air pattern adjustments shall be made from the face of the device.
- G. Refer to drawings and schedules for quantities, types, and finishes.
- H. Coordinate frame types with Architectural Reflected Ceiling Plan.

2.2 SOURCE QUALITY CONTROL

- A. Verification of Performance: Rate diffusers, registers, and grilles according to ASHRAE 70, "Method of Testing for Rating the Performance of Air Outlets and Inlets."
- B. Acoustical Applications and Sound Evaluation: Based on ARI Standard 885-98, "Procedure for Estimating Occupied Space Sound Levels in the Application of Air Terminals and Air Outlets."

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas where diffusers, registers, and grilles are to be installed for compliance with requirements for installation tolerances and other conditions affecting performance of equipment.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Install diffusers, registers, and grilles level and plumb.
- B. Ceiling-Mounted Outlets and Inlets: Drawings indicate general arrangement of ducts, fittings, and accessories. Air outlet and inlet locations have been indicated to achieve design requirements for air volume, noise criteria, airflow pattern, throw, and pressure drop. Make final locations where indicated, as much as practicable. For units installed in lay-in ceiling panels, locate units in the center of panel. Where architectural features or other items conflict with installation, notify Architect for a determination of final location.
- C. Wall-Mounted Supply Registers: Install 6 inches below finished ceiling unless otherwise indicated.
- D. Install diffusers, registers, and grilles with airtight connections to ducts and to allow service and maintenance of dampers, air extractors, and fire dampers.

3.3 ADJUSTING

- A. After installation, adjust diffusers, registers, and grilles to air patterns indicated, or as directed, before starting air balancing.

END OF SECTION 23 37 13

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PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and General Provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification sections, apply to work of this section.

1.2 SUMMARY

- A. This Section includes electrical general administrative and procedural requirements. The following requirements are included in this Section to supplement the requirements specified in Division 1 Specification Sections.

1.3 REFERENCES

- A. All materials shall be new. The electrical and physical properties of all materials, and the design, performance characteristics, and methods of construction of all items of equipment, shall be in accordance with the latest issue of the various, applicable Standard Specifications of the following recognized authorities:
1. ANSI - American National Standards Institute; www.ansi.org.
 2. ASTM - ASTM International; www.astm.org.
 3. CSI - Construction Specifications Institute (The); www.csiresources.org.
 4. ICEA - Insulated Cable Engineers Association, Inc.; www.icea.net.
 5. IEEE - Institute of Electrical and Electronics Engineers, Inc. (The); www.ieee.org.
 6. NEC - National Electrical Code
 7. NECA - National Electrical Contractors Association; www.necanet.org.
 - a. NECA 1-2000, "Practices for Good Workmanship in Electrical Contracting (ANSI)."
 8. NEMA - National Electrical Manufacturers Association; www.nema.org.
 9. NETA - InterNational Electrical Testing Association; www.netaworld.org.
 10. UL - Underwriters Laboratories Inc.; www.ul.com.

1.4 QUALITY ASSURANCE

- A. Scope of Work: Furnish all labor, material, equipment, technical supervision, and incidental services required to complete, test, and leave ready for operation the electrical systems as specified in the Division 26 Sections and as indicated on Drawings.
1. Contract Documents are complementary, and what is required by one shall be as binding as if required by all. In the event of inconsistencies or disagreements within the Construction Documents bids shall be based on the most expensive combination of quality and quantity of the work indicated.
 2. The Contractor understands that the work herein described shall be complete in every detail.
- B. Ordinances and Codes: Perform all Work in accordance with applicable Federal, State, and local ordinances and regulations, the Rules and Regulations of NFPA, NECA, and UL, unless otherwise indicated.
1. Notify the Architect/Engineer if revisions to the Drawings or Specifications are required to conform to applicable ordinances, codes, or regulations. Identify the cost associated with these revisions in the bid.

- C. Source Limitations: All equipment of the same or similar systems shall be by the same manufacturer.
- D. Tests and Inspections: Perform all tests required by state, city, county, and/or other agencies having jurisdiction. Provide all materials, equipment, etc., and labor required for tests.
- E. Performance Requirements: Perform all work in a first class and workmanlike manner, in accordance with the latest accepted standards and practices for the trades involved.
- F. Sequence and Schedule: Avoid interference with the work of other trades. Remove and relocate any work which in the opinion of the Owner's Representatives causes interference.

1.5 CODES, PERMITS AND FEES

- A. Unless otherwise indicated, all required permits, licenses, inspections, approvals, and fees for electrical work shall be secured and paid for by the Contractor. All work shall conform to all applicable codes, rules, and regulations.
- B. Comply with rules of local utility companies. Coordinate with the utility company supplying service to the installation and determine all devices including, but not limited to, all current and potential transformers, meter boxes, C.T. cabinets, and meters which will be required and include the cost of all such items and all utilities costs in proposal.
- C. All work shall be executed in accordance with the rules and regulations outlined in local and state codes. Prepare any detailed Drawings or diagrams which may be required by the governing authorities. Where the Drawings and/or Specifications indicate materials or construction that exceed code requirements, the Drawings and/or Specifications shall govern.

1.6 DRAWINGS

- A. The Drawings show the location and general arrangement of equipment, electrical systems, and related items. They shall be followed as closely as elements of the construction will permit.
- B. Examine the Drawings of other trades and verify the conditions governing the work on the job site. Arrange work accordingly, providing such fittings, conduit, junction boxes, and accessories as may be required to meet such conditions.
- C. Deviations from the Drawings, apart from minor changes in routing and other such incidental changes that do not affect the functioning or serviceability of the systems, shall not be made without the written approval of the Architect/Engineer.
- D. The architectural and structural Drawings take precedence in all matters pertaining to the building structure, mechanical Drawings in all matters pertaining to mechanical trades, and electrical Drawings in all matters pertaining to electrical trades. Where there

are conflicts or differences between the Drawings for the various trades, report such conflicts or differences to the Architect/Engineer for resolution.

- E. Drawings are not intended to be scaled for rough-in or to serve as shop drawings. Take all field measurements required to complete the Work.

1.7 MATERIAL AND EQUIPMENT MANUFACTURERS

- A. All items of equipment shall be furnished complete with all accessories normally supplied with the catalog items listed and all other accessories necessary for a complete and satisfactory operating system. All equipment and materials shall be new, be standard products of manufacturers regularly engaged in the production of electrical equipment and be of the manufacturer's latest design.
- B. If an approved manufacturer is other than the manufacturer used as the basis for design, the equipment or product provided shall be equal in size, quality, durability, appearance, capacity, and efficiency through all ranges of operation, shall conform with arrangements and space limitations of the equipment shown on the plans and/or specified, shall be compatible with the other components of the system and shall comply with the requirements for Items Requiring Prior Approval specified in this section of the Specifications. All costs to make these items of equipment comply with these requirements including, but not limited to, electrical work, and building alterations shall be included in the original Bid. Similar equipment shall be by one manufacturer.
- C. Where existing equipment is modified to include new switches, circuit breakers, metering, or other components, the new components shall be by the original equipment manufacturer and shall be listed for installation in the existing equipment. Where original equipment manufacturer components are not available, third-party aftermarket components shall be listed for the application and submitted to the engineer for approval. Reconditioned or salvaged components shall not be used unless specifically indicated on the drawings.

1.8 INSPECTION OF SITE

- A. Visit the site, examine, and verify the conditions under which the Work must be conducted before submitting Proposal. The submitting of a Proposal implies that the Contractor has visited the site and understands the conditions under which the Work must be conducted. No additional charges will be allowed because of failure to make this examination or to include all materials and labor to complete the Work.

1.9 ITEMS REQUIRING PRIOR APPROVAL

- A. Bids shall be based upon manufactured equipment specified. All items that the Contractor proposes to use in the Work that are not specifically named in the Contract Documents must be submitted for review prior to bids. Such items must be submitted in compliance with Division 1 specifications. Requests for prior approval must be accompanied by complete catalog information, including but not limited to, model, size, accessories, complete electrical information, and performance data in the form given in

the equipment schedule on the drawings at stated design conditions. Where items are referred to by symbolic designations on the drawings, all requests for prior approval shall bear the same designations.

1. Equipment to be considered for prior approval shall be equal in quality, durability, appearance, capacity, and efficiency through all ranges of operation, shall fulfill the requirements of equipment arrangement and space limitations of the equipment shown on the plans and/or specified and shall be compatible with the other components of the system.
2. All costs incurred to make equipment comply with other requirements, including providing maintenance, clearance, electrical, replacement of other components, and building alterations shall be included in the original bid.

- B. Voluntary alternates may be submitted for consideration, with listed addition or deduction to the bid.

1.10 SHOP DRAWINGS/SUBMITTALS

- A. Submit project-specific submittals for review in compliance with Division 1.
- B. All shop Drawings shall be submitted in groupings of similar and/or related items (lighting fixtures, switchgear, etc.). Incomplete submittal groupings will be returned unchecked.

1.11 COORDINATION DRAWINGS

- A. Submit project specific coordination drawings for review in compliance with Division 1 Specification Sections.

1.12 OPERATION AND MAINTENANCE INSTRUCTIONAL MANUALS

- A. Submit project specific Operation and Maintenance Instructional Manuals for review in compliance with Division 01 Specification Sections.
- B. Provide complete operation and maintenance instructional manuals covering all electrical equipment herein specified, together with parts lists. Maintenance and operating instructional manuals shall be job specific to this project. Generic manuals are not acceptable. Manual shall be provided on electronic media. All literature shall be combined in one document and shall be properly bookmarked with all applicable sections. Maintenance and operating instructional manuals shall be provided when construction is approximately 75% complete.
- C. The operating and maintenance instructions shall include a brief, general description for all electrical systems including, but not limited to:
1. Routine maintenance procedures.
 2. Trouble-shooting procedures.

3. Contractor's telephone numbers for warranty repair service.
4. Submittals.
5. Recommended spare parts list.
6. Names and telephone numbers of major material suppliers and subcontractors.
7. System schematic drawings on 8-1/2" x 11" sheets.

1.13 RECORD DRAWINGS

- A. Submit record drawings in compliance with Division 01.
- B. Contractor shall submit to the Architect/Engineer, record drawings on electronic media which have been neatly marked to represent as-built conditions for all new electrical work. Modifications to original drawings shall be marked with a contrasting color so the marks are readily apparent.
- C. The Contractor shall keep accurate note of all deviations from the construction documents and discrepancies in the underground concealed conditions and other items of construction on field drawings as they occur. The marked up field documents shall be available for review by the Architect, Engineer, and Owner at their request during construction.

1.14 INSTRUCTION OF OWNER PERSONNEL

- A. Before final inspection, instruct Owner's designated personnel in operation, adjustment, and maintenance of electrical equipment and systems at agreed upon times. A minimum of 1 hour of formal instruction to Owner's personnel shall be provided. Additional hours are specified in individual specification sections.
- B. Use operation and maintenance manuals as basis for instruction. Review contents of manual with personnel in detail to explain all aspects of operation and maintenance.
- C. In addition to individual equipment training provide overview of each electrical system. Utilize the as-built documents for this overview.
- D. Prepare and insert additional data in operation and maintenance manual when need for such data becomes apparent during instruction, or as requested by Owner.

1.15 WARRANTY

- A. Warranty: Comply with the requirements in Division 01 Specification Sections. Contractor shall warranty that the electrical installation is free from defects and agrees to replace or repair, to the Owner's satisfaction, any part of this electrical installation which becomes defective within a period of one year (unless specified otherwise in other Division 26 sections) from the date of substantial completion following final acceptance, provided that such failure is due to defects in the equipment, material, workmanship, or failure to follow the contract documents.

- B. Contractor shall be responsible for any temporary services including equipment and installation required to maintain operation as a result of any equipment failure or defect during warranty period.
- C. File with the Owner all warranties from the equipment manufacturers including the operating conditions and performance capacities they are based on.

1.16 USE OF EQUIPMENT

- A. The use of any equipment, or any part thereof for purposes other than testing even with the Owner's consent, shall not be construed to be an acceptance of the work on the part of the Owner, nor be construed to obligate the Owner in any way to accept improper work or defective materials.
- B. Do not use Owner's lamps for temporary lighting except as allowed and directed by the Owner. Equip lighting fixtures with new lamps when the project is turned over to the Owner.

1.17 COORDINATION

- A. Coordinate arrangement, mounting, and support of electrical equipment:
 - 1. To allow maximum possible headroom unless specific mounting heights that reduce headroom are indicated.
 - 2. To provide for ease of disconnecting the equipment with minimum interference to other installations.
 - 3. To allow right of way for piping and conduit installed at required slope.
 - 4. To ensure that connecting raceways, cables, wireways, cable trays, and busways will be clear of obstructions; and to maintain the working and access space of other equipment.
- B. Coordinate installation of required supporting devices and set sleeves in cast-in-place concrete, masonry walls, and other structural components as they are constructed.
- C. Coordinate location of access panels and doors for electrical items that are behind finished surfaces or otherwise concealed. Access doors and panels are specified in Division 8 Section "Access Doors and Frames."
- D. Coordinate electrical testing of electrical, mechanical, and architectural items, so equipment and systems that are functionally interdependent are tested to demonstrate successful interoperability.

PART 2 - PRODUCTS (NOT APPLICABLE)

PART 3 - EXECUTION

3.1 COMMON REQUIREMENTS FOR ELECTRICAL INSTALLATION

- A. Comply with NECA 1.
- B. Measure indicated mounting heights to bottom of unit for suspended items and to center of unit for wall-mounting items.
- C. Headroom Maintenance: If mounting heights or other location criteria are not indicated, arrange, and install components and equipment to provide maximum possible headroom consistent with these requirements.
- D. Equipment: Install to facilitate service, maintenance, and repair or replacement of components of both electrical equipment and other nearby installations. Connect in such a way as to facilitate future disconnecting with minimum interference with other items in the vicinity.
- E. Right of Way: Give to raceways and piping systems installed at a required slope.

3.2 DEMOLITION WORK

- A. All demolition of existing electrical equipment and materials will be done by this Contractor unless otherwise indicated. Include all items related to the existing systems that are being removed such as, but not limited to, electrical equipment, cabinets, devices, lighting fixtures, conduit, fittings, boxes, wiring, and supports. No abandoned components of the electrical systems indicated to be removed shall remain.
 - 1. Where electrically powered equipment is included in the demolition scope of other trades, disconnect electrical wiring connections and remove circuit wiring complete.
- B. In general, demolition work is indicated on the Drawings. However, the Contractor shall visit the job site to determine the full extent and character of this work.
- C. Unless specifically noted otherwise, removed materials shall not be reused in the work.
 - 1. Materials indicated to be salvaged shall be carefully removed, stored, and protected from damage.
 - 2. Salvaged materials intended to be re-used shall be thoroughly cleaned, refurbished if necessary, and determined to be fully functional prior to placing back into service.
 - 3. Salvaged materials of value that are not to be reused shall remain the property of the Owner unless such ownership is waived. Items that the Owner has waived ownership shall become the property of the Contractor, who shall remove and legally dispose of same, away from the premises.

- D. Where equipment or fixtures are removed, outlet boxes that remain recessed in walls shall be properly blanked off, and conduits capped. After alterations are complete, the entire installation shall present a "finished" look, as approved by the Architect/Engineer. The original function of the present electrical systems remaining in service shall not be changed unless specifically indicated as part of the project scope.
- E. Reroute signal wires, lighting, and power wiring as required to maintain services that are to remain and/or unaffected by the renovations. Where walls and ceilings are to be removed as shown on the Drawings, the conduit is to be cut off by the Electrical Trades so that the abandoned conduit in these walls and ceilings may be removed with the walls and ceilings by the Architectural Trades. All dead-end conduit runs shall be plugged at the remaining line outlet boxes or the panels.
- F. Where new walls and/or floors are installed which interfere with existing outlets, devices, etc., the Electrical Trades shall adjust, extend and reconnect such items as required to maintain continuity of same.
- G. All electrical work in altered and unaltered areas shall be run concealed wherever possible. Use of surface raceway or exposed conduits will be permitted only where specifically indicated on the drawings or approved by the Architect/Engineer.
- H. Existing lighting shall be reused where indicated on plans. Reused fixtures shall be detergent cleaned, re-lamped, and reconditioned suitable for satisfactory operation and appearance.

3.3 INSTALLATION OF EQUIPMENT

- A. Install all equipment in strict accordance with all directions and recommendations furnished by the manufacturer. Where such directions conflict with the Drawings and Specifications, report such conflicts to the Architect/Engineer for resolution.
- B. Device Location:
 - 1. Allow for wiring devices, control devices, and fire alarm devices to be relocated within a 10' radius to accommodate final coordination with furnishings and other finish elements. Devices relocated prior to installation shall be done without additional cost to the project.

3.4 WORK IN EXISTING BUILDINGS

- A. The Owner will provide access to existing buildings as required. Access requirements to occupied buildings shall be identified on the project schedule. The Contractor, once Work is started in the existing building, shall complete same without interruption to return work areas as soon as possible to Owner.
- B. Adequately protect and preserve all existing and newly installed Work. Promptly repair any damage to same at Contractor's expense.

- C. Consult with the Owner's Representative as to the methods of carrying on the Work so as not to interfere with the Owner's operation any more than necessary. Accordingly, all service lines shall be kept in operation as long as possible and the services shall only be interrupted at such time as will be designated by the Owner's Representative.

3.5 TEMPORARY SERVICES

- A. Provide and remove upon completion of the project, following the general conditions and as described in Division 01, a complete temporary electrical and telephone service during construction.

3.6 DISPOSAL

A. Fluorescent Lamps

1. Fluorescent lamps are known to contain mercury and are classified as hazardous material. All fluorescent lamps shall be assumed to contain mercury unless tested and confirmed otherwise with a toxicity characteristic leaching procedure (TCLP).
2. Hazardous materials (fluorescent lamps), shall be sent to a lamp recycling facility. The materials shall be properly packaged with labels that meet the Department of Transportation Regulations and stored in a secure location before transportation.
3. The Contractor shall identify the costs of the lamp disposal process including, but not limited to, the lamp packaging, storage, transportation, disposal, and any profile fees.
4. Upon completion of the project, provide documentation to verify that the lamps have been properly disposed of in accordance with all local, state, and federal guidelines.

B. Ballasts

1. Lighting ballasts manufactured prior to 1979 have been known to contain polychlorinated biphenyls (PCBs). Unless specifically noted on the ballast as containing "No PCBs," the ballast shall be assumed to contain components with PCB materials.
2. Hazardous materials (ballasts with PCBs), shall be disposed of at a hazardous waste incineration facility, or at a recycling facility in accordance with the Code of Federal Regulations as administered by the EPA in regards to this issue. The ballasts shall be packaged/stored in fifty-five gallon steel drums with labels that meet the Department of Transportation Regulations.
3. The Contractor shall identify the costs of the ballast disposal process including, but not limited to, the packaging, storage, transportation, disposal, and any profile fees.
4. Provide at completion of the project documentation (manifests) to verify that the ballasts have properly been disposed of in accordance with all local, state, and federal guidelines.

3.7 CHASES AND RECESSES

- A. Provided by the architectural trades, but the Contractor shall be responsible for their accurate location and size.

3.8 CUTTING, PATCHING AND DAMAGE TO OTHER WORK

- A. Refer to General Conditions for requirements.
- B. All cutting, patching, and repair work shall be performed by the Contractor through approved, qualified subcontractors. Contractor shall include full cost of same in bid.

3.9 EQUIPMENT CONNECTIONS

- A. Make connections to equipment and other items included in the work in accordance with the approved shop Drawings and rough-in measurements furnished by the manufacturers of the particular equipment furnished. All additional connections not shown on the Drawings, but called out by the equipment manufacturer's shop Drawings shall be provided.

3.10 CLEANING

- A. All debris shall be removed daily as required to maintain the work area in a neat, orderly condition.
- B. Final cleanup shall include, but not be limited to, washing of fixture lenses or louvers, switchboards, substations, motor control centers, panels, etc. Fixture reflectors and lenses or louvers shall be left with no water marks or cleaning streaks.

3.11 PROTECTION AND HANDLING OF EQUIPMENT AND MATERIALS

- A. Equipment and materials shall be protected from theft, injury, or damage.
- B. Protect conduit openings with temporary plugs or caps.
- C. Provide adequate storage for all equipment and materials delivered to the job site. Location of the space will be designated by the Owner's representative or Architect/Engineer. Equipment set in place in unprotected areas must be provided with temporary protection.

3.12 EXTRA WORK

- A. For additional electrical work which may be proposed or requested, furnish an itemized cost breakdown of material and labor required to complete the work. Proceed only after receiving a written authorization.

- B. Before providing an itemized break-down for additional electrical work, submit unit prices for the following items: 1/2", 3/4", 1", 1-1/2" EMT conduit; #12, #10, #8, #6, #2 building wire; duplex receptacles, GFCI receptacles, data box and raceway, fire alarm audible/visual notification appliance and visual notification appliance, clocks and speakers, and other common electrical work which may be anticipated for any future revisions. These unit costs, once agreed to, shall be applied to additions and deducts for all project change orders.

3.13 DRAWINGS AND MEASUREMENTS

- A. The Drawings are not intended to be scaled for rough-in measurements nor to serve as Shop Drawings. Field measurements necessary for ordering materials and fitting the installation to the building construction and arrangement are the Contractor's responsibility. The Contractor shall check latest Architectural Drawings and locate light switches from same where door swings are different from Electrical Drawings.

END OF SECTION 26 00 10

SECTION 26 05 19 - CONDUCTORS AND CABLES

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PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes:

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

B. Related Sections include the following:

- 1. Division 26 Section "Medium-Voltage Cables" for single-conductor and multiconductor cables, cable splices, and terminations for electrical distribution systems with 2001 to 35,000 V.
- 2. Division 27 Section "Communications Horizontal Cabling" for cabling used for voice and data circuits.

1.3 SUBMITTALS

- A. Field Quality-Control Test Reports
- B. Submit letter of compliance (intent) for general building wire and cable. Provide product data for the following:
 - 1. Metal-Clad Cable, Type MC

1.4 QUALITY ASSURANCE

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

PART 2 - PRODUCTS

2.1 COPPER BUILDING WIRE

- A. Description: Flexible, insulated and uninsulated, drawn copper current-carrying conductor with an overall insulation layer or jacket, or both, rated 600 V or less.
- B. Standards:
 - 1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and use.
 - 2. Conductor and Cable Marking: Comply with wire and cable marking according to UL's "Wire and Cable Marking and Application Guide."
- C. Conductors: Copper, complying with ASTM B 3 for bare annealed copper and with ASTM B 8 for stranded conductors.
- D. Conductor Insulation:
 - 1. Type THHN/THWN-2: Comply with UL 83.
 - 2. Type THW/THW-2: Comply with NEMA WC-70/ICEA S-95-658 and UL 83.
 - 3. Type XHHW-2: Comply with UL 44.

2.2 ALUMINUM BUILDING WIRE

- A. Description: Flexible, insulated and uninsulated, drawn aluminum current-carrying conductor with an overall insulation layer or jacket, or both, rated 600 V or less.
 - 1. Allowed only for conductors used in feeders 100A and larger.
- B. Manufacturers:

1. General Cable
2. Southwire

C. Standards:

1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and use.
2. Conductor and Cable Marking: Comply with wire and cable marking according to UL's "Wire and Cable Marking and Application Guide."

D. Conductors: Aluminum, complying with ASTM B 800 and ASTM B 801.

E. Conductor Insulation:

1. Type XHHW-2: Comply with UL 44.

2.3 METAL-CLAD CABLE, TYPE MC

A. Description: A factory assembly of one or more current-carrying insulated conductors in an overall metallic sheath.

B. Manufacturers:

1. AFC Cable Systems
2. Alpha Wire Company
3. American Bare Conductor
4. Belden
5. Encore
6. General Cable
7. Okonite
8. Service Wire Co.
9. Southwire Company

C. Standards:

1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and use.
2. Comply with UL 1569.
3. Conductor and Cable Marking: Comply with wire and cable marking according to UL's "Wire and Cable Marking and Application Guide."

D. Circuits:

1. Single circuit and multi-circuit with color-coded conductors for branch circuit distribution.
2. Power-Limited Fire-Alarm Circuits: Comply with UL 1424.

E. Conductors:

1. Copper, complying with ASTM B 3 for bare annealed copper and with ASTM B 8 for stranded conductors.
- F. Ground Conductor: Insulated. Ground conductor sized as indicated on drawings (reduced ground conductor is not acceptable).
- G. Conductor Insulation:
 1. Type TFN/THHN/THWN-2: Comply with UL 83.
 2. Type XHHW-2: Comply with UL 44.
- H. Armor: Steel OR Aluminum, interlocked.

2.4 CONNECTORS AND SPLICES

- A. Description: Factory-fabricated connectors and splices of size, ampacity rating, material, type, and class for application and service indicated.

PART 3 - EXECUTION

3.1 CONDUCTOR MATERIAL APPLICATIONS

- A. Refer to application schedule on the drawings
- B. If providing aluminum feeders, contractor is responsible for providing correct feeder, equipment ground and conduit size based on voltage drop and any de-rating required.
- C. Feeders and Branch Circuits: Solid or stranded for No. 12 AWG and smaller; stranded for No. 10 AWG and larger.
- D. Each feeder shall be of the same conductor and insulation material (phase, neutral, and parallel).
- E. Use conductor not smaller than 14 AWG for control circuits,
- F. Where equipment is listed for use with copper conductors only, use copper conductors for the entire length of feeder.

3.2 CONDUCTOR INSULATION AND MULTICONDUCTOR CABLE APPLICATIONS AND WIRING METHODS

- A. Refer to application schedule on the drawings
- B. Cord Drops and Portable Appliance Connections: Type SO, hard service cord with stainless-steel wire-mesh strain relief device at terminations to suit application.
- C. Fire Alarm Circuits: Power-limited, fire-protective, signaling circuit cable.

- D. Class 1 Control Circuits: Type THHN/THWN-2, in raceway.
- E. Class 2 Control Circuits: Type THHN/THWN-2, in raceway.
- F. Connection between Variable Frequency Controllers and Motors: Use power cable for variable frequency- controlled motors. Install and terminate according to cable manufacturer's recommendations.

3.3 INSTALLATION OF CONDUCTORS AND CABLES

- A. Conceal cables in finished walls, ceilings, and floors, unless otherwise indicated.
- B. Complete raceway installation between conductor and cable termination points according to Section 26 05 33 "Raceways and Boxes for Electrical Systems" prior to pulling conductors and cables.
- C. Use manufacturer-approved pulling compound or lubricant where necessary; compound used must not deteriorate conductor or insulation. Do not exceed manufacturer's recommended maximum pulling tensions and sidewall pressure values.
- D. Use pulling means, including fish tape, cable, rope, and basket-weave wire/cable grips, that will not damage cables or raceway.
- E. Install exposed cables parallel and perpendicular to surfaces of exposed structural members, and follow surface contours where possible.
- F. Support cables according to Division 26 Section "Hangers and Supports for Electrical Systems."
- G. Support communication cables above accessible ceiling, using spring metal clips or plastic cable ties to support cables from structure. Do not rest cable on ceiling panels.
- H. Neatly train and lace wiring inside boxes, equipment, and panelboards.
- I. Provide a separate neutral conductor for each circuit unless multi-wire branch circuits are specifically indicated on the drawings.
- J. Electrical Contractor shall be responsible for de-rating of conductors as required by N.E.C. when more than three current carrying conductors are installed in a single raceway or cable. Neutral conductors shall be considered current carrying conductors.
- K. Type MC cable shall be supported and secured at intervals not exceeding 4'-0" in new construction
- L. AC/MC cable shall not be used for home runs to receptacle or distribution panels.
- M. Where AC/MC cable is permitted by the specifications, AC/MC cable shall not be bundled.

- N. Between support, hangers and termination no more than 3" deflection from the bottom of the cable to a horizontal line between the support/hanger or termination.
- O. Do not route conductors across roof without prior approval from engineer.
- P. Install and terminate power cable for variable frequency- controlled motors according to cable manufacturer's recommendations.

3.4 CONNECTIONS

- A. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.
- B. Make splices and taps that are compatible with conductor material and that possess equivalent or better mechanical strength and insulation ratings than un-spliced conductors.
 - 1. Use oxide inhibitor in each splice and tap conductor for aluminum conductors.
 - 2. Use compression type terminations for aluminum conductors.
- C. Wiring at Outlets: Install conductor at each outlet, with at least 6 inches of slack.
- D. Clean conductor surfaces before installing lugs and connectors.
- E. Make splices, taps, and terminations to carry full ampacity of conductors with no perceptible temperature rise.
- F. Use solderless pressure connectors with insulating covers for copper conductor splices and taps, 8 AWG and larger.
- G. Use Sta-Kon connectors to terminate stranded conductors #10 AWG and smaller to screw terminals.
- H. Use insulated spring wire connectors with plastic caps (wire nuts) for copper conductor splices and taps, 10 AWG and smaller. Push-in style connectors are not permitted.
- I. Provide lugs suitable for bussing and conductor material used.

3.5 IDENTIFICATION

- A. Identify and color-code conductors and cables according to Section 26 05 53 "Identification for Electrical Systems."
- B. Identify each spare conductor at each end with identity number and location of other end of conductor, and identify as spare conductor.

3.6 SLEEVE AND SLEEVE-SEAL INSTALLATION FOR ELECTRICAL PENETRATIONS

- A. Install sleeves and sleeve seals at penetrations of exterior floor and wall assemblies. Comply with requirements in Section 26 05 33 "Raceways and Boxes."

3.7 FIRESTOPPING

- A. Apply firestopping to electrical penetrations of fire-rated floor and wall assemblies to restore original fire-resistance rating of assembly according to Division 07 Section "Penetration Firestopping".

3.8 FIELD QUALITY CONTROL

- A. Perform the following field quality control tests in accordance with Division 26 section "Electrical Testing"

1. Description: Test all feeders rated 100 A and above.
2. Visual and Mechanical Inspection
 - a. Inspect cables for physical damage and proper connection in accordance with the one line diagram.
 - b. Test cable mechanical connections with an infrared survey.
 - c. Check cable color-coding against project Specifications and N.E.C. requirements.
3. Electrical Tests
 - a. Perform insulation resistance test on each conductor with respect to ground and adjacent conductors. Applied potential to be 1000 volts dc for 1 minute.
 - b. Perform continuity test to insure proper cable connection.
4. Test Values
 - a. Minimum insulation resistance values shall be not less than fifty mega-ohms.

- B. Test Reports: Prepare a written report to record the following:

1. Test procedures used.
2. Test results that comply with requirements.
3. Test results that do not comply with requirements and corrective action taken to achieve compliance with requirements.

END OF SECTION 26 05 19

SECTION 26 05 26 - GROUNDING AND BONDING

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PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes grounding of electrical systems and equipment. Grounding requirements specified in this Section may be supplemented by special requirements of systems described in other Sections.
- B. Related Sections include the following:
 - 1. Division 26 Section "Electrical General Requirements".
 - 2. Division 26 Section "Conductors and Cables".

1.3 REFERENCES

- A. ASTM B 3: Specification for Soft or Annealed Copper Wire.
- B. ASTM B 8: Specification for Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard or Soft.

- C. ASTM B 33: Specification for Tinned Soft or Annealed Copper Wire for Electrical Purposes.
 - D. ASTM B 187: Specification for Copper, Bus Bar, Rod, and Shapes and General Purpose Rod, Bar, and Shapes.
 - E. IEEE 81: Guide for Measuring Earth Resistivity, Ground Impedance, and Earth Surface Potentials of a Ground System.
 - F. IEEE 142: Grounding of Industrial and Commercial Power Systems.
 - G. IEEE 837: Qualifying Permanent Connections Used in Substation Grounding.
 - H. IEEE 1100 – 1992: Recommended Practice for Powering and Grounding Sensitive Electronic Equipment.
 - I. IEEE C2: National Electrical Safety Code.
 - J. NETA MTS – 2001: Maintenance Testing Specifications.
 - K. NFPA 70: National Electrical Code.
 - L. NFPA 70B: Recommended Practice for Electrical Equipment Maintenance.
 - M. TIA/EIA 607: Commercial Building Grounding and Bonding Requirements Standard.
 - N. UL 467: Grounding and Bonding Equipment.
 - O. UL 486 A: Wire Connectors and Soldering Lugs for Use with Copper Conductors.
 - P. UL 486B: Wire Connectors for Use with Aluminum Conductors.
- 1.4 SUBMITTALS
- A. Qualification Data: For firms and persons specified in "Quality Assurance" Article.
- 1.5 PROJECT RECORD DOCUMENTS
- A. Submit under provisions of Division 26 "Electrical General Requirements".
 - B. Accurately record actual locations of grounding electrodes and connections to building steel.
- 1.6 QUALITY ASSURANCE
- A. Testing Agency Qualifications: Refer to specification section "Electrical Testing."

- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
 - 1. Comply with UL 467.
- C. Comply with NFPA 70; for overhead-line construction and medium-voltage underground construction, comply with IEEE C2.
- D. Comply with NFPA 780 and UL 96 when interconnecting with lightning protection system.
- E. Comply with ANSI/TIA/EIA-607 "Standard for Commercial Building Grounding and Bonding Requirements for Telecommunications".
- F. Comply with ANSI/IEEE 1100 -1992 "Powering and Grounding Sensitive Electronic Equipment".

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Grounding Conductors and Cables:
 - a. Refer to Division 26 Section "Conductors and Cables".
 - 2. Grounding Rods:
 - a. American Electric-Blackburn.
 - b. Apache Grounding/Erco Inc.
 - c. Chance/Hubbell.
 - 3. Mechanical Connectors:
 - a. American Electric-Blackburn.
 - b. Burndy.
 - c. Chance/Hubbell.
 - 4. Exothermic Connections:
 - a. Cadweld.
 - 5. Compression-type Connectors:
 - a. Burndy HyGround
 - b. Blackburn EZ Ground.
 - c. Panduit.

2.2 GROUNDING CONDUCTORS

- A. For insulated conductors, comply with Division 26 Section "Conductors and Cables."
- B. Material: Aluminum, copper-clad aluminum, and copper.
- C. Equipment Grounding Conductors: Insulated with green-colored insulation.
- D. Grounding Electrode Conductors: Stranded cable.
- E. Bare Copper Conductors: Comply with the following:
 - 1. Solid Conductors: ASTM B 3.
 - 2. Assembly of Stranded Conductors: ASTM B 8.
 - 3. Tinned Conductors: ASTM B 33.
- F. Copper Bonding Conductors: As follows:
 - 1. Bonding Conductor: Stranded copper conductor; size per the NEC.
 - 2. Bonding Jumper: Bare copper tape, braided bare copper conductors, terminated with copper ferrules; size per the NEC.
 - 3. Tinned Bonding Jumper: Tinned-copper tape, braided copper conductors, terminated with copper ferrules; size per the NEC.
- G. Aluminum Bonding Conductors: As follows:
 - 1. Bonding Conductor: Stranded aluminum conductor; size per the NEC.
 - 2. Bonding Jumper: Aluminum tape, braided bare aluminum conductors, terminated with aluminum ferrules; size per the NEC.
- H. Ground Conductor and Conductor Protector for Wood Poles: As follows:
 - 1. No. 4 AWG minimum, soft-drawn copper conductor.
 - 2. Conductor Protector: Half-round PVC or wood molding. If wood, use pressure-treated fir, or cypress or cedar.
- I. Electrical Grounding Busbar
 - 1. 24" (min) x 2" x 1/4" tin plated, copper busbar with two rows of 1/4" x 20 tapped holes 1" on center.
- J. Telecommunications Main Grounding Busbar (TMGB)
 - 1. 48" (min) x 4" x 1/4" tin plated, copper busbar with three rows of 1/4" x 20 tapped holes 1" on center.
- K. Telecommunications Grounding Busbar (TGB)
 - 1. 12" (min) x 2" x 1/4" tin plated, copper busbar with two rows of 1/4" x 20 tapped holes 3" on center.
- L. Telecommunications Bonding Backbone (TBB)

1. Minimum No. 2 AWG insulated stranded copper.

M. Telecommunications Bonding Conductors

1. Minimum No. 6 AWG insulated stranded copper.

2.3 CONNECTOR PRODUCTS

A. Comply with IEEE 837 and UL 467; listed for use for specific types, sizes, and combinations of conductors and connected items.

B. Bolted Connectors: Bolted-pressure-type connectors, or compression type.

C. Welded Connectors: Exothermic-welded type, in kit form, and selected for the specific application per manufacturer's written instructions.

D. Compression-Type Connectors: Pure, wrought copper, per ASTM B187.

PART 3 - EXECUTION

3.1 EQUIPMENT GROUNDING

A. Comply with NFPA 70, Article 250, for types, sizes, and quantities of equipment grounding conductors, unless specific types, larger sizes, or more conductors than required by NFPA 70 are indicated.

B. Use only copper conductors for both insulated and bare grounding conductors in direct contact with earth, concrete, masonry, crushed stone, and similar materials.

C. Underground Grounding Conductors: No. 2/0 AWG minimum. Bury at least 24 inches below grade or bury 12 inches above duct bank when installed as part of the duct bank.

D. In raceways, use insulated equipment grounding conductors. Install equipment grounding conductors in all feeders and circuits. Terminate each end on suitable lugs, bus or bushing.

1. Where existing branch circuits are using conduit as equipment grounding conductor and are extended, provide grounding bushing on existing conduit and provide new equipment grounding conductor with new branch circuit.

E. Install equipment grounding conductors in all feeders and circuits. Terminate each end on suitable lugs, bus or bushing.

F. Busway Supply Circuits: Install insulated equipment grounding conductor from the grounding bus in the switchgear, switchboard, or distribution panel to equipment grounding bar terminal on busway.

G. Computer Outlet Circuits: Install insulated equipment grounding conductor in branch-circuit runs from computer-area power panels or power-distribution units.

- H. Nonmetallic Raceways: Install an equipment grounding conductor in nonmetallic raceways unless they are designated for telephone or data cables.
- I. Air-Duct Equipment Circuits: Install an equipment grounding conductor to duct-mounted electrical devices operating at 120 V and more, including air cleaners and heaters. Bond conductor to each unit and to air duct.
- J. Water Heater, Heat-Tracing, and Anti-frost Heating Cables: Install a separate equipment grounding conductor to each electric water heater, heat-tracing, and anti-frost heating cable. Bond conductor to heater units, piping, connected equipment, and components.
- K. Verify specific equipment grounding requirements with the manufacturer's recommendations.

3.2 CONNECTIONS

- A. General: Make connections so galvanic action or electrolysis possibility is minimized. Select connectors, connection hardware, conductors, and connection methods so metals in direct contact will be galvanically compatible.
 - 1. Use electroplated or hot-tin-coated materials to ensure high conductivity and to make contact points closer to order of galvanic series.
 - 2. Make connections with clean, bare metal at points of contact.
 - 3. Make aluminum-to-steel connections with stainless-steel separators and mechanical clamps.
 - 4. Make aluminum-to-galvanized steel connections with tin-plated copper jumpers and mechanical clamps.
 - 5. Coat and seal connections having dissimilar metals with inert material to prevent future penetration of moisture to contact surfaces.
- B. Exothermic-Welded Connections: Use for connections to structural steel and for underground connections, except those at test wells. Comply with manufacturer's written instructions. Welds that are puffed up or that show convex surfaces indicating improper cleaning are not acceptable.
- C. Equipment Grounding Conductor Terminations
 - 1. Use solderless pressure connectors with insulating covers for copper conductor splices and taps, 8 AWG and larger.
 - 2. Use insulated spring wire connectors with plastic caps for copper conductor splices and taps, 10 AWG and smaller.
- D. Noncontact Metal Raceway Terminations: If metallic raceways terminate at metal housings without mechanical and electrical connection to housing, terminate each conduit with a grounding bushing. Connect grounding bushings with a bare grounding conductor to grounding bus or terminal in housing. Bond electrically noncontinuous conduits at entrances and exits with grounding bushings and bare grounding conductors, unless otherwise indicated.

- E. Connections at Test Wells: Use compression-type connectors on conductors and make bolted- and clamped-type connections between conductors and ground rods.
- F. Tighten screws and bolts for grounding and bonding connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A or UL 486B as applicable.
- G. Compression-Type Connections: Use hydraulic compression tools to provide correct circumferential pressure for compression connectors. Connections shall be non-reversible. Use tools and dies recommended by connector manufacturer. Provide embossing die code or other standard method to make a visible indication that a connector has been adequately compressed on grounding conductor.
- H. Moisture Protection: If insulated grounding conductors are connected to ground rods or grounding buses, insulate entire area of connection and seal against moisture penetration of insulation and cable.

3.3 INSTALLATION

- A. Equipotential Ground: Interconnect grounding electrodes to form one, electrically continuous, equipotential grounding electrode system. Grounding electrodes to be interconnected include:
 - 1. Ground rods.
- B. Ground Rods: Install at least three rods spaced at least one-rod length from each other and located at least the same distance from other grounding electrodes.
 - 1. Verify that final backfill and compaction has been complete before driving ground rods.
 - 2. Drive ground rods until tops are 2 inches below finished floor or final grade, unless otherwise indicated.
 - 3. Interconnect ground rods with grounding electrode conductors. Use exothermic welds or non-reversing compression-type connectors, except at test wells and as otherwise indicated. Make connections without exposing steel or damaging copper coating.
- C. Grounding Conductors: Route along shortest and straightest paths possible, unless otherwise indicated. Avoid obstructing access or placing conductors where they may be subjected to strain, impact, or damage. Install in conduit where routed above grade.
 - 1. Aluminum and copper-clad aluminum conductors shall not be used in direct contact with masonry, within 18 inches of the earth, or where subject to corrosive conditions.
- D. Bonding Straps and Jumpers: Install so vibration by equipment mounted on vibration isolation hangers and supports is not transmitted to rigidly mounted equipment. Use exothermic-welded connectors or non-reversing compression-type connectors for outdoor locations, unless a disconnect-type connection is required; then, use a bolted

clamp. Bond straps directly to the basic structure taking care not to penetrate any adjacent parts. Install straps only in locations accessible for maintenance.

- E. Metal Water Service Pipes in direct contact with the earth for 10 feet: Provide insulated copper grounding conductors, in conduit, from building's main service equipment, or grounding bus, to all metal water service entrances to building including fire protection water service entrance. Connect grounding conductors to metal water service pipes by grounding clamp connectors. Where a dielectric main water fitting is installed, connect grounding conductor to street side of fitting. Bond metal grounding conductor conduit or sleeve to conductor at each end.
- F. Water Meter Piping: Use braided-type bonding jumpers to electrically bypass water meters. Connect to pipe with grounding clamp connectors.
- G. Bond each aboveground portion of gas piping system upstream from equipment shutoff valve.
- H. Separately Derived AC Power Systems: Ground separately-derived ac power system neutrals including distribution transformers to grounding electrodes per NFPA 70.
- I. Install one test well for each service at the ground rod electrically closest to the service entrance. Set top of well flush with finished grade or floor.
- J. Grounding Bus:
 - 1. Install grounding bus in the locations listed below and elsewhere as indicated:
 - a. Electrical equipment rooms.
 - b. Telephone equipment rooms.
 - c. Rooms housing service equipment.
 - 2. Use insulated spacer; space 2 inch from wall and support from wall 12 inches above finished floor, unless otherwise indicated.
- K. Equipment Grounding: Provide a permanent and continuous bonding of conductor enclosures, equipment frames, power distribution equipment ground busses, cable trays, metallic raceways, and other non-current carrying metallic parts of the electrical system.
- L. Bond together metal building elements not attached to grounded structure; bond to ground.

3.4 TELECOMMUNICATIONS GROUNDING

- A. Telecommunications Grounding System: The telecommunications grounding system shall consist of:
 - 1. Telecommunications Main Grounding Busbar (TMGB) located in the main telecommunications room near the telecommunications service entrance. Bond to the main building electrical grounding electrode system via a No. 3/0 AWG copper ground conductor.

2. A Telecommunications Grounding Busbar (TGB) in each telecommunications room, cabinets, etc.
 3. A Telecommunications Bonding Backbone (TBB) tying together the TMGB and each TGB.
 4. Bonding of all equipment racks, raceways, non-current carrying metallic equipment and surge protection devices within the telecommunications room to the TGB's or TMGB using approved bonding conductors. Each piece of equipment shall be bonded individually directly to the ground bus.
- B. All bonding connections shall be installed at an accessible location for inspection and maintenance.
- C. All telecommunications bonding connections shall be of an approved mechanical type connection. Do not use exothermic welds unless specifically indicated on the Drawings.
- D. The physical routing shall, in general, follow the same path as the backbone cable system.
- E. Bond each TGB directly to the building steel with a No. 6 AWG conductor.
- F. Do not use TGB's as a power system ground connection unless specifically noted on the Drawings.
- G. All bonding connectors and conductors shall be UL listed for the purpose intended.
- H. TMGB and TGB installation: Use insulated spacer; space 2 inch from wall and support from wall 12 inches above finished floor, unless otherwise indicated.
- I. Individually bond each piece of non-current carrying metallic equipment in the Telecommunications Room to the TGB.
- J. Install continuous cable from the TMGB to the furthest TGB. Bond all TGB's to TBB with bare No. 3/0 AWG copper ground conductor and T-tap grounding hardware.

3.5 FIELD QUALITY CONTROL

- A. Testing: Perform the following field quality control tests in accordance with Division 26 section "Electrical Testing"
1. Inspect grounding and bonding system conductors and connections for tightness and proper installation and for compliance with the Drawings and Specifications.
 2. After installing grounding system but before permanent electrical circuitry has been energized, test for compliance with requirements.
 - a. Test completed grounding system at each location where a maximum ground-resistance level is specified, at service disconnect enclosure grounding terminal.

- b. Measure ground resistance not less than two full days after the last trace of precipitation, and without the soil being moistened by any means other than natural drainage or seepage and without chemical treatment or other artificial means of reducing natural ground resistance.
- c. Perform tests, by the fall-of-potential method according to IEEE 81. Instrumentation utilized shall be as defined in Section 12 of IEEE 81 and shall be specifically designed for ground impedance testing. Provide sufficient spacing so that curves flatten in the 62% area of the distance between the item under test and the current electrode.

END OF SECTION 26 05 26

SECTION 26 05 29 - HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

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PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

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

1.3 DEFINITIONS

- A. EMT: Electrical metallic tubing.
- B. IMC: Intermediate metal conduit.
- C. RMC: Rigid metal conduit.

1.4 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Design supports for multiple raceways, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.
- B. Design supports for multiple raceways capable of supporting combined weight of supported systems and its contents.
- C. Design equipment supports capable of supporting combined operating weight of supported equipment and connected systems and components.
- D. Rated Strength: Adequate in tension, shear, and pullout force to resist maximum loads calculated or imposed for this Project, with a minimum structural safety factor of five times the applied force.

1.5 QUALITY ASSURANCE

- A. Welding: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."
- B. Comply with NFPA 70.

1.6 COORDINATION

- A. Coordinate size and location of concrete bases. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork requirements are specified in Division 03.
- B. Coordinate installation of roof curbs, equipment supports, and roof penetrations. These items are specified in Division 07 Section "Roof Accessories."

PART 2 - PRODUCTS

2.1 SUPPORT, ANCHORAGE, AND ATTACHMENT COMPONENTS

- A. Steel Slotted Support Systems: Comply with MFMA-4, factory-fabricated components for field assembly.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Allied Tube & Conduit; a part of Atkore International..
 - b. B-Line, by Eaton..
 - c. GS Metals Corp.
 - d. Pentair Electrical & Fastening Solutions.
 - e. Thomas & Betts Corporation.
 - f. Unistrut; a part of Atkore International.
 - g. Wesanco, Inc.

2. Metallic Coatings: Hot-dip galvanized after fabrication and applied according to MFMA-4.
 3. Painted Coatings: Manufacturer's standard painted coating applied according to MFMA-4.
 4. Channel Dimensions: Selected for applicable load criteria.
- B. Nonmetallic Slotted Support Systems: Structural-grade, factory-formed, glass-fiber-resin channels and angles with 9/16-inch- diameter holes at a maximum of 8 inches o.c., in at least 1 surface.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Allied Tube & Conduit; a part of Atkore International..
 - b. B-Line by Eaton.
 - c. Fabco Plastics Wholesale Limited.
 - d. Seasafe, Inc.
 2. Fittings and Accessories: Products of channel and angle manufacturer and designed for use with those items.
 3. Fitting and Accessory Materials: Same as channels and angles, except metal items may be stainless steel.
 4. Rated Strength: Selected to suit applicable load criteria.
- C. Raceway and Cable Supports: As described in NECA 1 and NECA 101.
- D. Conduit and Cable Support Devices: Steel hangers, clamps, and associated fittings, designed for types and sizes of raceway or cable to be supported.
- E. Support for Conductors in Vertical Conduit: Factory-fabricated assembly consisting of threaded body and insulating wedging plug or plugs for non-armored electrical conductors or cables in riser conduits. Plugs shall have number, size, and shape of conductor gripping pieces as required to suit individual conductors or cables supported. Body shall be malleable iron.
- F. Structural Steel for Fabricated Supports and Restraints: ASTM A 36/A 36M, steel plates, shapes, and bars; black and galvanized.
- G. Mounting, Anchoring, and Attachment Components: Items for fastening electrical items or their supports to building surfaces include the following:
1. Powder-Actuated Fasteners: Threaded-steel stud, for use in hardened portland cement concrete, steel, or wood, with tension, shear, and pullout capacities appropriate for supported loads and building materials where used.
 - a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1) Hilti Inc.
 - 2) ITW Ramset/Red Head; a division of Illinois Tool Works, Inc.
 - 3) MKT Fastening, LLC.

- 4) Simpson Strong-Tie Co., Inc.; Masterset Fastening Systems Unit.
2. Mechanical-Expansion Anchors: Insert-wedge-type, zinc-coated or stainless steel, for use in hardened portland cement concrete with tension, shear, and pullout capacities appropriate for supported loads and building materials in which used.
 - a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1) B-Line by Eaton.
 - 2) Empire Tool and Manufacturing Co., Inc.
 - 3) Hilti Inc.
 - 4) ITW Ramset/Red Head; a division of Illinois Tool Works, Inc.
 - 5) MKT Fastening, LLC.
 3. Concrete Inserts: Steel or malleable-iron, slotted support system units similar to MSS Type 18; complying with MFMA-4 or MSS SP-58.
 4. Clamps for Attachment to Steel Structural Elements: MSS SP-58, type suitable for attached structural element.
 5. Through Bolts: Structural type, hex head, and high strength. Comply with ASTM A 325.
 6. Toggle Bolts: All-steel springhead type.
 7. Hanger Rods: Threaded steel.

2.2 FABRICATED METAL EQUIPMENT SUPPORT ASSEMBLIES

- A. Description: Welded or bolted, structural-steel shapes, shop or field fabricated to fit dimensions of supported equipment.
- B. Materials: Comply with requirements in Division 05 Section "Metal Fabrications" for steel shapes and plates.

2.3 BACKBOARDS

- A. Backboards: Plywood, fire-retardant treated, 3/4 by 48 by 96 inches. Comply with requirements for plywood backing panels specified in Division 6 Section "Rough Carpentry." Plywood sheets shall be free of all voids. Plywood shall have a minimum of two coats of fire-resistant, non-conducting paint applied to all sides of all sheets. Provide flush hardware and supports to mount plywood to wall. The provided hardware shall have sufficient strength to carry all anticipated loads including, but not limited to cabling, cable management and equipment racks.

PART 3 - EXECUTION

3.1 APPLICATION

- A. Comply with NECA 1 and NECA 101 for application of hangers and supports for electrical equipment and systems except if requirements in this Section are stricter.
- B. Maximum Support Spacing and Minimum Hanger Rod Size for Raceway: Space supports for EMT, IMC, and RMC as required by NFPA 70. Minimum rod size shall be 1/4 inch in diameter.
- C. Multiple Raceways or Cables: Install trapeze-type supports fabricated with steel slotted support system, sized so capacity can be increased by at least 25 percent in future without exceeding specified design load limits.
 - 1. Secure raceways and cables to these supports with:
 - a. Two-bolt conduit clamps
 - b. Single-bolt conduit clamps
 - c. Single-bolt conduit clamps using spring friction action for retention in support channel.
- D. Spring-steel clamps designed for supporting single conduits without bolts may be used for 1-1/2-inch and smaller raceways serving branch circuits and communication systems above suspended ceilings and for fastening raceways to trapeze supports.
- E. Support single runs of MC cable using spring-steel clamps from suspended ceiling hangers, hanger wire or building structure at intervals not to exceed three feet. Do not support MC cable from ceiling grid.

3.2 SUPPORT INSTALLATION

- A. Comply with NECA 1 and NECA 101 for installation requirements except as specified in this Article.
- B. Raceway Support Methods: In addition to methods described in NECA 1, EMT may be supported by openings through structure members, as permitted in NFPA 70.
- C. Strength of Support Assemblies: Where not indicated, select sizes of components so strength will be adequate to carry present and future static loads within specified loading limits. Minimum static design load used for strength determination shall be weight of supported components plus 200 lb.
- D. Mounting and Anchorage of Surface-Mounted Equipment and Components: Anchor and fasten electrical items and their supports to building structural elements by the following methods unless otherwise indicated by code:
 - 1. To Wood: Fasten with lag screws or through bolts.
 - 2. To New Concrete: Bolt to concrete inserts.
 - 3. To Masonry: Approved toggle-type bolts on hollow masonry units and expansion anchor fasteners on solid masonry units.
 - 4. To Existing Concrete: Expansion anchor fasteners.

5. Instead of expansion anchors, powder-actuated driven threaded studs provided with lock washers and nuts may be used in existing standard-weight concrete 4 inches thick or greater. Do not use for anchorage to lightweight-aggregate concrete or for slabs less than 4 inches thick.
 6. To Steel:
 - a. Welded threaded studs complying with AWS D1.1/D1.1M, with lock washers and nuts.
 - b. Beam clamps (MSS Type 19, 21, 23, 25, or 27) complying with MSS SP-69
 - c. Spring-tension clamps.
 7. To Light Steel: Sheet metal screws.
 8. Items Mounted on Hollow Walls and Nonstructural Building Surfaces: Mount cabinets, panelboards, disconnect switches, control enclosures, pull and junction boxes, transformers, and other devices on slotted-channel support systems attached to substrate.
- E. Slotted support systems applications:
1. Indoor dry and damp Locations: Painted Steel
 2. Outdoors and interior wet locations: Galvanized Steel
 3. Corrosive Environments, including pool equipment rooms: Nonmetallic
- F. Drill holes for expansion anchors in concrete at locations and to depths that avoid reinforcing bars.
- G. Do not fasten supports to pipes, ducts, mechanical equipment, and conduit.
- H. Obtain permission from Architect/Engineer before using powder-actuated anchors.
- I. Obtain permission from Architect/Engineer before drilling or cutting structural members.
- J. Fabricate supports from structural steel or steel channel. Rigidly weld members or use hexagon head bolts to present neat appearance with adequate strength and rigidity. Use spring lock washers under all nuts.
- K. Install surface-mounted cabinets and panelboards with minimum of four anchors.
- L. In wet and damp locations use steel channel supports to stand cabinets and panelboards one inch off wall.
- M. Use sheet metal channel to bridge studs above and below cabinets and panelboards recessed in hollow partitions.
- N. The Contractor shall replace all supports and channels that sag, twist, and/or show signs of not providing proper structural support, to the equipment, it is intended for, as determined by the Owner and Architect/Engineer. All costs associated with replacing supports and steel channels shall be incurred by the Contractor.

3.3 INSTALLATION OF FABRICATED METAL SUPPORTS

- A. Comply with installation requirements in Division 05 Section "Metal Fabrications" for site-fabricated metal supports.
- B. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor electrical materials and equipment.
- C. Field Welding: Comply with AWS D1.1/D1.1M.

3.4 CONCRETE BASES

- A. Provide concrete bases for all floor mounted electrical equipment.
- B. Provide concrete bases for all exterior, grade level electrical equipment, and where indicated.
- C. Base/Pad Construction:
 - 1. Construct per manufacturer's recommendations for particular equipment, including suggested piers and dowel rods.
 - 2. Interior concrete bases shall have a minimum depth of 4" unless other indicated or recommended by the manufacturer.
 - 3. Exterior concrete bases shall have a minimum depth of 8" unless other indicated or recommended by the manufacturer.
 - 4. Construct concrete bases for primary and secondary power distribution equipment per requirements of the electrical utility, where submitted for its review.
- D. Anchor equipment to base per both supports and equipment manufacturer's instructions.
- E. Coordinate conduit openings and sleeve locations in base with requirements of equipment to be supported.

3.5 BACKBOARDS

- A. A minimum of two walls (or as indicated on drawings) shall be covered with plywood backboards to a minimum 8'-6" above finished floor in all Telecommunication Rooms and similar spaces and as indicated on Drawings.
- B. Securely fasten backboard to wall using appropriate hardware and mount at all four corners, minimum. Securely fasten backboard to wall-framing members (studs).
- C. Provide adequate backboard space to allow a clean and workable arrangement for telephone and data connections.

3.6 PAINTING

- A. Touchup: Clean field welds and abraded areas of shop paint. Paint exposed areas immediately after erecting hangers and supports. Use same materials as used for shop painting. Comply with SSPC-PA 1 requirements for touching up field-painted surfaces.
 - 1. Apply paint by brush or spray to provide minimum dry film thickness of 2.0 mils.
- B. Touchup: Comply with requirements in Division 09 painting Sections for cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint on miscellaneous metal.
- C. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A 780.

END OF SECTION 26 05 29

SECTION 26 05 33 - RACEWAYS AND BOXES

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PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes raceways, fittings, boxes, enclosures, and cabinets for electrical wiring.
- B. Related Sections include the following:
 - 1. Division 26 Section "Wiring Devices" for devices installed in boxes and for floor-box service fittings, and for access floor boxes and service poles.
 - 2. Division 26 "Hangers and Supports for Electrical Systems" for concrete bases.

1.3 DEFINITIONS

- A. EMT: Electrical metallic tubing.
- B. ENT: Electrical nonmetallic tubing.
- C. FMC: Flexible metal conduit.
- D. IMC: Intermediate metal conduit.
- E. LFMC: Liquidtight flexible metal conduit.
- F. LFNC: Liquidtight flexible nonmetallic conduit.
- G. RNC: Rigid nonmetallic conduit.
- H. PVC: Polyvinyl Chloride.
- I. HDPE: High Density Polyethylene.
- J. RTRC: Reinforced Thermosetting Resin Conduit

1.4 SUBMITTALS

- A. Product Data: For surface raceways, wireways and fittings, floor boxes, hinged-cover enclosures, and cabinets.

1.5 QUALITY ASSURANCE

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

1.6 COORDINATION

- A. Coordinate layout and installation of raceways, boxes, enclosures, cabinets, and suspension system with other construction that penetrates ceilings or is supported by them, including light fixtures, HVAC equipment, fire-suppression system, and partition assemblies.

PART 2 - PRODUCTS

2.1 METAL CONDUIT AND TUBING

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. AFC Cable Systems, Inc.
 2. Alflex Inc.
 3. Allied Tube Triangle Century.
 4. Anamet Electrical, Inc.; Anaconda Metal Hose.
 5. International Metal Hose.
 6. Electri-Flex Co
 7. Grinnell Co./Tyco International; Allied Tube and Conduit Div.
 8. LTV Steel Tubular Products Company – Manhattan/CDT/Cole-Flex.
 9. Maverick.
 10. O-Z Gedney; unit of General Signal.
 11. Wheatland.
- B. Rigid Steel Conduit: ANSI C80.1.
- C. Aluminum Rigid Conduit: ANSI C80.5.
- D. IMC: ANSI C80.6.
- E. PVC-Coated Steel Conduit: PVC-coated IMC.
1. Comply with NEMA RN 1.
 2. Coating Thickness: 0.040 inch, minimum.
- F. EMT: ANSI C80.3.
- G. FMC: Zinc-coated steel or Aluminum.
- H. LFMC: Flexible steel conduit with PVC jacket.
- I. Fittings for Conduit (Including all Types and Flexible and Liquidtight), EMT, and Cable: NEMA FB 1; listed for type and size raceway with which used, and for application and environment in which installed.
1. Fittings for EMT: Steel, compression type.
 2. Coating for Fittings for PVC-Coated Conduit: Minimum thickness, 0.040 inch, with overlapping sleeves protecting threaded joints.

2.2 FIRE ALARM EMT

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Allied Tube Triangle Century.
- B. EMT conduit with bright red topcoat; Fire Alarm EMT.

- C. EMT and Fittings: ANSI C80.3.

2.3 NONMETALLIC CONDUIT AND TUBING

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. American International.
 - 2. Anamet Electrical, Inc.; Anaconda Metal Hose.
 - 3. Arco Corp.
 - 4. Cantex Inc.
 - 5. Certainteed Corp.; Pipe and Plastics Group.
 - 6. Condux International.
 - 7. ElecSys, Inc.
 - 8. Electri-Flex Co.
 - 9. Integral.
 - 10. Kor-Kap.
 - 11. Lamson and Sessions: Carlon Electrical Products.
 - 12. Manhattan/CDT/Cole-Flex.
 - 13. RACO; Division of Hubbell, Inc.
 - 14. Scepter.
 - 15. Spiralduct, Inc./AFC Cable Systems, Inc.
 - 16. Thomas & Betts Corporation.
- B. ENT: NEMA TC 13.
- C. RNC: NEMA TC 2, Schedule 40 and Schedule 80 PVC.
- D. ENT and RNC Fittings: NEMA TC 3; match to conduit or tubing type and material.
- E. LFNC: UL 1660.
- F. HDPE: UL 651, ASTM D 3350, ASTM D 1248 Schedule 40.
- G. RTRC: Comply with UL 2515A and NEMA TC 14.

2.4 METAL WIREWAYS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Hoffman.
 - 2. Square D.
- B. Material and Construction: Sheet metal sized and shaped as indicated, NEMA 1.
- C. Fittings and Accessories: Include couplings, offsets, elbows, expansion joints, adapters, hold-down straps, end caps, and other fittings to match and mate with wireways as required for complete system.

- D. Select features, unless otherwise indicated, as required to complete wiring system and to comply with NFPA 70.
- E. Wireway Covers: Hinged type.
- F. Finish: Manufacturer's standard enamel finish.

2.5 NONMETALLIC WIREWAYS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Hoffman.
 - 2. Lamson & Sessions; Carlon Electrical Products.
- B. Description: PVC plastic, extruded and fabricated to size and shape indicated, with snap-on cover and mechanically coupled connections with plastic fasteners.
- C. Fittings and Accessories: Include couplings, offsets, elbows, expansion joints, adapters, hold-down straps, end caps, and other fittings to match and mate with wireways as required for complete system.
- D. Select features, unless otherwise indicated, as required to complete wiring system and to comply with NFPA 70.

2.6 SURFACE RACEWAYS

- A. Surface Metal Raceways: Galvanized steel with snap-on covers. Finish with manufacturer's standard prime coating
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Airey-Thompson Sentinel Lighting: Wiremold Company (The).
 - b. Thomas & Betts Corporation.
 - c. Walker Systems, Inc.; Wiremold Company (The).
 - d. Wiremold Company (The); Electrical Sales Division.
 - e. Mono-Systems, Inc.
- B. Surface Nonmetallic Raceways: Two-piece construction, manufactured of rigid PVC compound with matte texture and manufacturer's standard color.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Hubbell, Inc.; Wiring Device Division.
 - b. Carlon Electric Products.
 - c. Panduit Corporation.
 - d. Walker Systems, Inc.; Wiremold Company (The).

- e. Wiremold Company (The); Electrical Sales Division.
- f. Mono-Systems, Inc.

- C. Types, sizes, and channels as indicated and required for each application, with fittings that match and mate with raceways.

2.7 BOXES, ENCLOSURES, AND CABINETS

- A. Sheet Metal Outlet and Device Boxes: NEMA OS 1. Shall be used within walls or ceiling.
- B. Cast-Metal Outlet and Device Boxes: NEMA FB 1, Type FD, with gasketed cover. Shall be used in all exposed, non-recessed, locations.
- C. Floor Boxes: Cast metal, fully adjustable, rectangular.
- D. Floor Boxes: Nonmetallic, nonadjustable, round.
- E. Small Sheet Metal Pull and Junction Boxes: NEMA OS 1.
- F. Cast-Metal Pull and Junction Boxes: NEMA FB 1, cast aluminum with gasketed cover. Shall be used in areas exposed to water.
- G. Hinged-Cover Enclosures: NEMA 250, Type 1, with continuous hinge cover and flush latch.
 - 1. Metal Enclosures: Steel, finished inside and out with manufacturer's standard enamel.

2.8 SLEEVES FOR RACEWAYS

- A. Steel Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, galvanized steel, plain ends.
- B. Cast-Iron Pipe Sleeves: Cast or fabricated "wall pipe," equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop, unless otherwise indicated.
- C. Sleeves for Rectangular Openings: Galvanized sheet steel with minimum 0.052- or 0.138-inch thickness as indicated and of length to suit application.
- D. Coordinate sleeve selection and application with selection and application of firestopping specified in Division 7 Section "Through-Penetration Firestop Systems."

PART 3 - EXECUTION

3.1 RACEWAY APPLICATION

- A. Provide raceways in interior and exterior locations in accordance with the "Raceway Application Matrix" included on the drawings.
- B. Boxes and Enclosures: NEMA 250, Type 1, except use NEMA 250, Type 4, nonmetallic in damp or wet locations.
- C. Minimum Raceway Size: 3/4-inch trade size.
- D. Raceway Fittings: Compatible with raceways and suitable for use and location.
 - 1. Rigid and Intermediate Steel Conduit: Use threaded rigid steel conduit fittings, unless otherwise indicated.
 - 2. PVC Externally Coated, Rigid Steel Conduits: Use only fittings listed for use with that material. Patch and seal all joints, nicks, and scrapes in PVC coating after installing conduits and fittings. Use sealant recommended by fitting manufacturer.
 - 3. EMT: Use compression, cast-metal fittings. Comply with NEMA FB 2.10.
 - 4. Flexible Conduit: Use only fittings listed for use with flexible conduit. Comply with NEMA FB 2.20.
- E. Install nonferrous conduit or tubing for circuits operating above 60 Hz. Where aluminum raceways are installed for such circuits and pass through concrete, install in nonmetallic sleeve.
- F. Do not install aluminum conduits in contact with concrete.
- G. Install surface raceways only where indicated on Drawings.
- H. Do not install nonmetallic conduit where ambient temperature exceeds 120 deg F.

3.2 INSTALLATION

- A. Comply with NECA 1 and NECA 101 for installation requirements except where requirements on Drawings or in this article are stricter. Comply with NECA 102 for aluminum conduits. Comply with NFPA 70 limitations for types of raceways allowed in specific occupancies and number of floors.
- B. Keep raceways at least 6 inches away from parallel runs of flues and steam or hot-water pipes. Install horizontal raceway runs above water and steam piping.
- C. Complete raceway installation before starting conductor installation.
- D. Support raceways as specified in Division 26 Section "Hangers and Supports for Electrical Systems."
- E. Install temporary closures to prevent foreign matter from entering raceways.
- F. Protect stub-ups from damage where conduits rise through floor slabs. Arrange so curved portions of bends are not visible above the finished slab.

- G. Make bends and offsets so ID is not reduced. Keep legs of bends in the same plane and keep straight legs of offsets parallel, unless otherwise indicated.
- H. Install no more than the equivalent of three 90-degree bends in any conduit run except for control wiring conduits, for which fewer bends are allowed. Support within 12 inches of changes in direction.
- I. Conceal conduit and EMT within finished walls, ceilings, and floors, unless otherwise indicated.
 - 1. Install concealed raceways with a minimum of bends in the shortest practical distance, considering type of building construction and obstructions, unless otherwise indicated.
- J. Support conduit within 12 inches of enclosures to which attached.
- K. Raceways Embedded in Slabs:
 - 1. Raceways embedded in slabs shall be limited to above grade concrete decks. Embedded conduit shall be limited to servicing floor boxes and equipment located in open spaces away from accessible walls.
 - 2. Install in middle 1/3 of slab thickness where practical and leave at least 2 inches of concrete cover.
 - 3. Secure raceways to reinforcing rods to prevent sagging or shifting during concrete placement.
 - 4. Space raceways laterally to prevent voids in concrete.
 - 5. Run conduit larger than 1-inch trade size parallel or at right angles to main reinforcement. Where at right angles to reinforcement, place conduit close to slab support.
 - 6. Arrange raceways to cross building expansion joints at right angles with expansion fittings.
 - 7. Conduits shall run flat. Do not allow conduits to cross.
 - 8. Change from non-metallic raceway to EMT before turning up out of the concrete and rising above the floor.
- L. Install exposed raceways parallel or at right angles to nearby surfaces or structural members and follow surface contours as much as possible.
 - 1. Run parallel or banked raceways together on common supports.
 - 2. Make parallel bends in parallel or banked runs. Use factory elbows only where elbows can be installed parallel; otherwise, provide field bends for parallel raceways.
- M. Raceway Terminations at Locations Subject to Moisture or Vibration: Use insulating bushings to protect conductors, including conductors smaller than No. 4 AWG.
- N. Terminate threaded conduits into threaded hubs or with locknuts on inside and outside of boxes or cabinets. Install bushings on conduits up to 1-1/4-inch trade size and insulated throat metal bushings on 1-1/2-inch trade size and larger conduits terminated with locknuts. Install insulated throat metal grounding bushings on service conduits.

- O. Install raceways square to the enclosure and terminate at enclosures with locknuts. Install locknuts hand tight plus 1/4 turn more.
- P. Do not rely on locknuts to penetrate nonconductive coatings on enclosures. Remove coatings in the locknut area prior to assembling conduit to enclosure to assure a continuous ground path.
- Q. Cut conduit perpendicular to the length. For conduits 2-inch trade size and larger, use roll cutter or a guide to make cut straight and perpendicular to the length.
- R. Threaded Conduit Joints, Exposed to Wet, Damp, Corrosive, or Outdoor Conditions: Apply listed compound to threads of raceway and fittings before making up joints. Follow compound manufacturer's written instructions.
- S. Where raceways are terminated with threaded hubs, screw raceways or fittings tightly into hub so end bears against wire protection shoulder. Where chase nipples are used, align raceways so coupling is square to box; tighten chase nipple so no threads are exposed.
- T. Install pull wires in empty raceways. Use polypropylene or monofilament plastic line with not less than 200-lb tensile strength. Leave at least 12 inches of slack at each end of pull wire.
- U. Provide pull string and 25% spare capacity in every branch circuit conduit.
- V. Communications and Signal Cabling Systems Raceways: In addition to above requirements, install raceways in maximum lengths of 150 feet and with a maximum of two 90-degree bends or equivalent. Separate lengths with pull or junction boxes where necessary to comply with these requirements.
 - 1. Electrical conduit (LB's) are not permitted.
 - 2. Conduits shall have no more than two 90 degree bends between pull points or pull boxes.
 - 3. Conduits shall contain no continuous sections longer than 150 ft. without a pull point/box.
 - 4. Conduit for fiber cabling shall have a bend radius of at least 10 times the internal diameter.
 - 5. Conduit for copper cabling less than 2" shall have a bend radius of at least 6 times the internal diameter. Conduit for copper cabling 2" and larger shall have a bend radius of at least 10 times the internal diameter.
 - 6. All conduit ends shall have an insulated bushing.
- W. Stub-up Connections: Extend conduits through concrete floor for connection to freestanding equipment. Install with an adjustable top or coupling threaded inside for plugs set flush with finished floor. Extend conductors to equipment with rigid steel conduit; FMC may be used 6 inches above the floor. Install screwdriver-operated, threaded plugs flush with floor for future equipment connections.
- X. Flexible Conduit Connections: Comply with NEMA RV3. Use maximum of 72 inches of flexible conduit for recessed and semi-recessed lighting fixtures; for equipment subject

to vibration, noise transmission, or movement; and for all motors. Use LFMC in damp or wet locations. Install separate ground conductor across flexible connections.

- Y. Surface Raceways: Install a separate, green, ground conductor in raceways from junction box supplying raceways to receptacle or fixture ground terminals. Provide cover clips to cover space between connecting pieces.
- Z. Recessed Boxes in Masonry Walls: Saw-cut opening for box in center of cell of masonry block, and install box flush with surface of wall.
- AA. Horizontally separate boxes mounted on opposite sides of walls so they are not in the same vertical channel.
- BB. Locate boxes so that cover or plate will not span different building finishes.
- CC. Support boxes of three gangs or more from more than one side by spanning two framing members or mounting on brackets specifically designed for the purpose.
- DD. Fasten junction and pull boxes to or support from building structure. Do not support boxes by conduits.
- EE. Set floor boxes level and flush with finished floor surface. Trim non-metallic boxes after installation to fit flush with finished floor surface.
- FF. Install hinged-cover enclosures and cabinets plumb. Support at each corner.
- GG. Do not route feeders across roof.
- HH. Provide a pull box (a handhole for outdoor applications) for each conduit run that exceeds 250 feet. Provide two pull boxes (handholes for outdoor applications) for runs that exceed 500 feet.

3.3 SLEEVE INSTALLATION FOR ELECTRICAL AND COMMUNICATIONS PENETRATIONS

- A. Coordinate sleeve selection and application with selection and application of firestopping specified in Division 07 Section "Through-Penetration Firestop Systems."
- B. Concrete Slabs and Walls: Install sleeves for penetrations unless core-drilled holes or formed openings are used. Install sleeves during erection of slabs and walls.
- C. Use pipe sleeves unless penetration arrangement requires rectangular sleeved opening.
- D. Rectangular Sleeve Minimum Metal Thickness:
 - 1. For sleeve cross-section rectangle perimeter less than 50 inches and no side greater than 16 inches, thickness shall be 0.052 inch.

2. For sleeve cross-section rectangle perimeter equal to, or greater than, 50 inches and 1 or more sides equal to, or greater than, 16 inches, thickness shall be 0.138 inch.
- E. Fire-Rated Assemblies: Install sleeves for penetrations of fire-rated floor and wall assemblies unless openings compatible with firestop system used are fabricated during construction of floor or wall.
- F. Cut sleeves to length for mounting flush with both surfaces of walls.
- G. Extend sleeves installed in floors 2 inches above finished floor level.
- H. Size pipe sleeves to provide 1/4-inch annular clear space between sleeve and raceway unless sleeve seal is to be installed.
- I. Seal space outside of sleeves with grout for penetrations of concrete and masonry and with approved joint compound for gypsum board assemblies.
- J. Interior Penetrations of Non-Fire-Rated Walls and Floors: Seal annular space between sleeve and raceway, using joint sealant appropriate for size, depth, and location of joint. Refer to Division 7 Section "Joint Sealants" for materials and installation.
- K. Fire-Rated-Assembly Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at raceway penetrations. Install sleeves and seal with firestop materials. Comply with Division 7 Section "Through-Penetration Firestop Systems."
- L. Roof-Penetration Sleeves: Seal penetration of individual raceways with flexible, boot-type flashing units applied in coordination with roofing work.
- M. Aboveground, Exterior-Wall Penetrations: Seal penetrations using sleeves and mechanical sleeve seals. Select sleeve size to allow for 1-inch annular clear space between pipe and sleeve for installing mechanical sleeve seals.
- N. Underground, Exterior-Wall Penetrations: Install cast-iron "wall pipes" for sleeves. Size sleeves to allow for 1-inch annular clear space between raceway and sleeve for installing mechanical sleeve seals.

3.4 SLEEVE-SEAL INSTALLATION

- A. Install to seal underground, exterior wall penetrations.
- B. Use type and number of sealing elements recommended by manufacturer for raceway material and size. Position raceway in center of sleeve. Assemble mechanical sleeve seals and install in annular space between raceway and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.

3.5 FIRESTOPPING

- A. Apply firestopping to electrical penetrations of fire-rated floor and wall assemblies to restore original fire-resistance rating of assembly. Firestopping materials and installation requirements are specified in Division 07 Section "Through-Penetration Firestop Systems."

3.6 PROTECTION

- A. Provide final protection and maintain conditions that ensure coatings, finishes, and cabinets are without damage or deterioration at time of Substantial Completion.
 - 1. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.
 - 2. Repair damage to PVC or paint finishes with matching touchup coating recommended by manufacturer.

3.7 CLEANING

- A. After completing installation of exposed, factory-finished raceways and boxes, inspect exposed finishes and repair damaged finishes.

END OF SECTION 26 05 33

SECTION 26 05 53 - ELECTRICAL IDENTIFICATION

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PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Identification for raceway and metal-clad cable.
 - 2. Identification for conductors and communication and control cable.
 - 3. Underground-line warning tape.
 - 4. Warning labels and signs.
 - 5. Instruction signs.
 - 6. Equipment identification labels.
 - 7. Miscellaneous identification products.

1.3 QUALITY ASSURANCE

- A. Comply with ANSI A13.1 and ANSI C2.
- B. Comply with NFPA 70.
- C. Comply with 29 CFR 1910.145.

1.4 COORDINATION

- A. Coordinate identification names, abbreviations, colors, and other features with requirements in the Contract Documents, Shop Drawings, manufacturer's wiring diagrams, and the Operation and Maintenance Manual, and with those required by codes, standards, and 29 CFR 1910.145. Use consistent designations throughout Project.
- B. Coordinate installation of identifying devices with completion of covering and painting of surfaces where devices are to be applied.
- C. Coordinate installation of identifying devices with location of access panels and doors.
- D. Install identifying devices before installing acoustical ceilings and similar concealment.

PART 2 - PRODUCTS

2.1 RACEWAY AND METAL-CLAD CABLE IDENTIFICATION MATERIALS

- A. Comply with ANSI A13.1 for minimum size of letters for legend and for minimum length of color field for each raceway and cable size.
- B. Color for Printed Legend:
 - 1. Power Circuits: Black letters on an orange field.
 - 2. Legend: Indicate system or service and voltage, if applicable.
- C. Self-Adhesive Vinyl Labels: Preprinted, flexible label laminated with a clear, weather- and chemical-resistant coating and matching wraparound adhesive tape for securing ends of legend label.

2.2 CONDUCTOR, COMMUNICATION AND CONTROL CABLE IDENTIFICATION MATERIALS

- A. Color-Coding Conductor Tape: Colored, self-adhesive vinyl tape not less than 3 mils thick by 1 to 2 inches wide.
- B. Marker Tapes: Vinyl or vinyl-cloth, self-adhesive wraparound type, with circuit identification legend machine printed by thermal transfer or equivalent process.

2.3 WARNING LABELS AND SIGNS

- A. Comply with NFPA 70 and 29 CFR 1910.145.
- B. Self-Adhesive Warning Labels: Factory printed, multicolor, pressure-sensitive adhesive labels, configured for display on front cover, door, or other access to equipment, unless otherwise indicated.

- C. Warning label and sign shall include, but are not limited to, the following legends:
 - 1. Multiple Power Source Warning: "DANGER - ELECTRICAL SHOCK HAZARD - EQUIPMENT HAS MULTIPLE POWER SOURCES."
 - 2. Workspace Clearance Warning: "WARNING - OSHA REGULATION - AREA IN FRONT OF ELECTRICAL EQUIPMENT MUST BE KEPT CLEAR FOR 36 INCHES."

2.4 EQUIPMENT IDENTIFICATION LABELS

- A. Engraved, Laminated Acrylic or Melamine Label: Punched or drilled for screw mounting. Black letters on a white background. Minimum letter height shall be 3/8 inch.
- B. Outdoor Equipment Stenciled Legend: In nonfading, waterproof, black ink or paint. Minimum letter height shall be 1 inch.

2.5 MISCELLANEOUS IDENTIFICATION PRODUCTS

- A. Cable Ties: Fungus-inert, self-extinguishing, 1-piece, self-locking, Type 6/6 nylon cable ties.
 - 1. Minimum Width: 3/16 inch.
 - 2. Tensile Strength: 50 lb, minimum.
 - 3. Temperature Range: Minus 40 to plus 185 deg F.
 - 4. Color: Black, except where used for color-coding.
- B. Paint: Paint materials and application requirements are specified in Division 9 painting Sections.
- C. Fasteners for Labels and Signs: Self-tapping, stainless-steel screws or stainless-steel machine screws with nuts and flat and lock washers.

PART 3 - EXECUTION

3.1 APPLICATION

- A. Accessible Raceways and Metal-Clad Cables More Than 600 V: Identify with "DANGER-HIGH VOLTAGE" in black letters at least 2 inches high, with self-adhesive vinyl labels. Repeat legend at 10-foot maximum intervals.
- B. Accessible Raceways and Metal-Clad Cables, 600 V or Less, for Service and Feeders More Than 400 A: Identify with orange self-adhesive vinyl label.
- C. Accessible Raceways and Cables of Auxiliary Systems: Identify the following systems with color-coded, self-adhesive vinyl tape applied in bands:
 - 1. Fire Alarm System: Red.
 - 2. Security System: Blue and yellow.

3. Telecommunication System: Green and yellow.
 4. Control Wiring: Green and red.
- D. Power-Circuit Conductor Identification: For conductors No. 1/0 AWG and larger in vaults, pull and junction boxes, manholes, and handholes use color-coding conductor tape and marker tape. Identify source and circuit number of each set of conductors. For single conductor cables, identify phase in addition to the above.
- E. Branch-Circuit Conductor Identification: Where there are conductors for more than three branch circuits in same junction or pull box, use marker tape. Identify each ungrounded conductor according to source and circuit number as indicated on Drawings. Identify control circuits by control wire number as indicated on shop drawings.
- F. Branch-Circuit Conductor Identification: Mark junction box covers in indelible ink with the panel and breaker numbers of other circuits contained within.
- G. Conductor Identification: Locate at each conductor at panelboard gutters, pull boxes, outlet and junction boxes, and each load connection or termination point.
- H. Auxiliary Electrical Systems Conductor Identification: Identify field-installed alarm, control, signal, sound, intercommunications, voice, and data connections.
1. Identify conductors, cables, and terminals in enclosures and at junctions, terminals, and pull points. Identify by system and circuit designation.
 2. Use system of marker tape designations that is uniform and consistent with system used by manufacturer for factory-installed connections.
 3. Coordinate identification with Project Drawings, manufacturer's wiring diagrams, and Operation and Maintenance Manual.
- I. Warning Labels for Indoor Cabinets, Boxes, and Enclosures for Power and Lighting: Comply with 29 CFR 1910.145 and apply self-adhesive warning labels. Identify system voltage with black letters on an orange background. Apply to exterior of door, cover, or other access.
1. Equipment with Multiple Power or Control Sources: Apply to door or cover of equipment including, but not limited to, the following:
 - a. Power transfer switches.
 - b. Controls with external control power connections.
 2. Equipment Requiring Workspace Clearance According to NFPA 70: Unless otherwise indicated, apply to door or cover of equipment but not on flush panelboards and similar equipment in finished spaces.
- J. Instruction Signs:
1. Operating Instructions: Install instruction signs to facilitate proper operation and maintenance of electrical systems and items to which they connect. Install instruction signs with approved legend where instructions are needed for system or equipment operation.

2. Emergency Operating Instructions: Install instruction signs with white legend on a red background with minimum 3/8-inch- high letters for emergency instructions at equipment used for power transfer.
- K. Equipment Identification Labels: On each unit of equipment, install unique designation label that is consistent with wiring diagrams, schedules, and Operation and Maintenance Manual. Apply labels to disconnect switches and protection equipment, central or master units, control panels, control stations, terminal cabinets, and racks of each system. Systems include power, lighting, control, communication, signal, monitoring, and alarm systems unless equipment is provided with its own identification.
1. Labeling Instructions:
 - a. Indoor Equipment: Engraved, laminated acrylic or melamine label mechanically secured.
 - b. Outdoor Equipment: Stenciled.
 - c. Elevated Components: Increase sizes of labels and letters to those appropriate for viewing from the floor.
 2. Equipment to Be Labeled: If included on project. All items may not be on project.
 - a. Panelboards, electrical cabinets, and enclosures.
 - b. Access doors and panels for concealed electrical items.
 - c. Electrical switchgear and switchboards.
 - d. Transformers.
 - e. Electrical substations.
 - f. Emergency system boxes and enclosures.
 - g. Motor-control centers.
 - h. Disconnect switches.
 - i. Enclosed circuit breakers.
 - j. Motor starters.
 - k. Push-button stations.
 - l. Power transfer equipment.
 - m. Contactors.
 - n. Remote-controlled switches, dimmer modules, and control devices.
 - o. Battery inverter units.
 - p. Battery racks.
 - q. Power-generating units.
 - r. Voice and data cable terminal equipment.
 - s. Master clock and program equipment.
 - t. Intercommunication and call system master and staff stations.
 - u. Television/audio components, racks, and controls.
 - v. Fire-alarm control panel and annunciators.
 - w. Security and intrusion-detection control stations, control panels, terminal cabinets, and racks.
 - x. Monitoring and control equipment.
 - y. Uninterruptible power supply equipment.
 - z. Terminals, racks, and patch panels for voice and data communication and for signal and control functions.
 - aa. Breakers or switches at distribution panels.

- L. Wiring Device Identification Labels: On each faceplate install circuit designation label that is consistent with panelboard directories, and as-built plan drawings. Apply labels to receptacle faceplates centered below bottom outlet. Apply labels to toggle switch faceplates on backside.

3.2 INSTALLATION

- A. Verify identity of each item before installing identification products.
- B. Location:
 - 1. Install identification materials and devices at locations for most convenient viewing without interference with operation and maintenance of equipment.
 - 2. Conduit Markers: Provide identification for each power conduit containing conductors rated 400A or greater.
- C. Apply identification devices to surfaces after completing finish work.
- D. Self-Adhesive Identification Products: Clean surfaces before application, using materials and methods recommended by manufacturer of identification device.
- E. Attach nonadhesive signs and plastic labels with screws and auxiliary hardware appropriate to the location and substrate.
- F. System Identification Color Banding for Raceways and Cables: Each color band shall completely encircle cable or conduit. Place adjacent bands of two-color markings in contact, side by side. Locate bands at changes in direction, at penetrations of walls and floors, at 50-foot maximum intervals in straight runs, and at 25-foot maximum intervals in congested areas.
- G. Color-Coding for Phase and Voltage Level Identification, 600 V and Less: Use the colors listed below for ungrounded service, feeder, and branch-circuit conductors.
 - 1. Color shall be factory applied or, for sizes larger than No. 10 AWG if authorities having jurisdiction permit, field applied.
 - 2. Colors for 208/120-V Circuits:
 - a. Phase A: Black.
 - b. Phase B: Red.
 - c. Phase C: Blue.
 - d. Grounded Conductor (Neutral): White.
 - 3. Colors for 480/277-V Circuits:
 - a. Phase A: Brown.
 - b. Phase B: Orange.
 - c. Phase C: Yellow.
 - d. Ground Conductor (Neutral): Grey.

- 4. Field-Applied, Color-Coding Conductor Tape: Apply in half-lapped turns for a minimum distance of 6 inches from terminal points and in boxes where splices or taps are made. Apply last two turns of tape with no tension to prevent possible unwinding. Locate bands to avoid obscuring factory cable markings.

- H. Underground-Line Warning Tape: During backfilling of trenches install continuous underground-line warning tape directly above line at 6 to 8 inches below finished grade. Use multiple tapes where width of multiple lines installed in a common trench or concrete envelope exceeds 16 inches overall.

- I. Label information arrangement for 3 lines of text.
 - 1. Line one shall describe the panel or equipment. Line one example: "DP-XX," RP-XX," "T-XX," "EF-XX," etc.
 - 2. Line two shall describe the first disconnecting means feeding this panel or equipment. Line two example: "Fed from DP-XX," "Fed from RP-XX," etc.
 - 3. Line three indicates that location of the disconnecting means as identified in line two. Line three example: "First Floor Elect. Rm #XXX."
 - 4. Line four shall include "Via T-XX" when panel or equipment is fed from a transformer.

- J. Examples:

RP-1A FED FROM DP-1A ELECTRICAL ROOM A100 VIA T-1A	EF-1 FED FROM MCC-1A MECHANICAL ROOM F101	LP-1A LOCATED IN ELECTRICAL ROOM A100
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- K. Fusible Enclosed Switches and Distribution Equipment: Install self-adhesive vinyl label indicating fuse rating and type on the outside of door on each fused switch.

- L. Painted Identification: Prepare surface and apply paint according to Division 9 painting Sections.

- M. Degrease and clean surface to receive nameplates.

- N. Install nameplate and labels parallel to equipment lines.

- O. Secure nameplate to equipment front using screws.

- P. Secure nameplate to inside surface of door on panelboard that is recessed in finished locations.

- Q. Identify conduit using field painting where required.

- R. Paint red colored band on each fire alarm conduit and junction box.

- S. Paint bands 10 feet on center, and 4 inches minimum in width.

END OF SECTION 26 05 53

SECTION 26 09 23 - LIGHTING CONTROL DEVICES

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PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following lighting control devices:
 - 1. Occupancy sensors.
- B. Related Sections include the following:
 - 1. Division 26 Section "Electrical General Requirements".
 - 2. Division 26 Section "Wiring Devices" for wall-box dimmers and manual light switches.
 - 3. Division 26 Section "Lighting Control Systems" for programmable lighting systems.

1.3 REFERENCES

- A. IEEE C62.41: Guide for Surge Voltages in Low-Voltage AC Power Circuits.

- B. IEEE C136.10: Standard for Roadway Lighting Equipment Locking-Type Photocontrol Devices and Mating Receptacle Physical and Electrical Interchangeability and Testing.
- C. NEMA ICS 2: Industrial Control and Systems Controllers, Contactors, and Overload Relays, Rated Not More Than 2000 Volts AC or 750 Volts DC Part 8: Disconnect Devices for Use in Industrial Control Equipment.
- D. NFPA 70: National Electrical Code.
- E. UL 486A: Wire Connectors and Soldering Lugs for Use with Copper Conductors.
- F. UL 486B: Wire Connectors for Use with Aluminum Conductors.
- G. UL 773: Plug-in, Locking Photocontrols for Use with Area Lighting.
- H. UL 773A: Nonindustrial Photoelectric Switches for Lighting Control.
- I. UL 917: Clock Operated Switches.
- J. UL 1449: Surge Protective Devices.
- K. UL 1598: Luminaires.
- L. NECA 130-2010: Installing and Maintaining Wiring Devices.

1.4 DEFINITIONS

- A. LED: Light-emitting diode.
- B. PIR: Passive infrared.
- C. ULTRASONIC: Active emission of at least 35 kHz sound waves, using Doppler reflectance to detect motion.
- D. MICROPHONIC: Passive reception to listen for continued occupancy, with circuitry to filter out white noise.
- E. MULTI-Tech: Using PIR and ultrasonic or microphonic technologies in one sensor.

1.5 SUBMITTALS

- A. Product Data: For each type of product indicated including physical data and electrical performance.
- B. Shop Drawings: Show installation details for occupancy and light-level sensors.
 - 1. Lighting plan showing location, orientation, and coverage area of each sensor.
 - 2. Interconnection diagrams showing field-installed wiring.
- C. Field quality-control test reports.

- D. Operation and Maintenance Data: For each type of product to include in emergency, operation, and maintenance manuals. Include the following:
 - 1. Description of operation and servicing procedures.
 - 2. List of major components.
 - 3. Recommended spare parts.
 - 4. Programming instructions and system operation procedures.

1.6 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

1.7 COORDINATION

- A. Coordinate layout and installation of ceiling-mounted devices with other construction that penetrates ceilings or is supported by them, including light fixtures, HVAC equipment, fire-suppression system, and partition assemblies.
- B. Coordinate interface of lighting control devices with temperature controls specified in Division 23.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to the site under provisions of Division 26 Section "Electrical General Requirements".
- B. Store and protect products under provisions of Division 26 Section "Electrical General Requirements".

PART 2 - PRODUCTS

2.1 GENERAL LIGHTING CONTROL DEVICE REQUIREMENTS

- A. Line-Voltage Surge Protection: An integral part of the devices for 120- and 277-V solid-state equipment. For devices without integral line-voltage surge protection, field-mounting surge protection shall comply with IEEE C62.41 and with UL 1449.

2.2 OCCUPANCY SENSORS

- A. General
 - 1. Coordinate occupancy sensor locations, coverages and required quantities with manufacturer's recommendations. Coverage areas indicated on the Drawings are for minor motion (6 to 8 inches of hand movement). Provide additional

- occupancy sensors and control units as required to achieve complete minor motion coverage of the space indicated.
2. Adjust occupancy sensors and test that complete minor motion coverage is obtained in accordance with Part 3. Provide written confirmation of testing to owner, architect and engineer.
 3. Provide occupancy sensors with a bypass switch to override the "ON" function in the event of sensor failure.
 4. Provide occupancy sensors with an LED indicator indicating when motion is being detected during testing and normal operation of the sensor.
 5. Provide occupancy sensors and occupancy sensor control units from single manufacturer.
- B. Wall Switch Passive Infrared Occupancy Sensor
1. Manufacturers:
 - a. Perfect Sense – PS-PWS
 - b. Wattstopper PW-100.
 - c. Hubbell Building Automation SOM 101.
 - d. Greengate OSW-P-0451-W.
 - e. Sensorswitch WSD.
 - f. Philips LRS2210.
 - g. Leviton ODS10-IDW.
 2. Description: Wall mounted, 180° coverage, passive infrared sensing occupancy sensor.
 - a. Electrical Characteristics: Capable of switching up to 800W fluorescent or incandescent lighting loads at 120V and 1200 watts fluorescent loads at 277V.
 - b. Functions: Automatic ON/Automatic OFF, or Manual ON/Automatic OFF operation, field selectable. Integral manual override pushbutton switch.
 - c. Adjustments: User adjustable sensitivity and time delay. Time delay shall be adjustable from 30 seconds to 30 minutes.
 - d. Device Body: Finish selected by architect, plastic with momentary on/off override pushbutton designed to mount in a standard switch box with "decora" style switch plate.
 3. Dual Level Switching: Provide occupancy sensor capable of controlling two switch legs independently where dual level switching is indicated.
 - a. Manufacturers:
 - 1) Perfect Sense PWD.
 - 2) Wattstopper PW-200.
 - 3) Hubbell Building Automation SOM-102.
 - 4) Greengate OSW-P-0451-DMV.
 - 5) Sensorswitch WSD-2P.
 - 6) Philips LRS2215.
 - 7) Leviton ODSOD-IDW.

- C. 360° Ceiling Mounted Dual Technology Occupancy Sensor
1. Manufacturers:
 - a. Perfect Sense CDS.
 - b. Wattstopper DT 300
 - c. Hubbell Building Automation "OMNI-DT" Series.
 - d. Greengate OMC-DT-2000-R.
 - e. Sensorswitch CM-PDT-R.
 - f. Philips LRM2255.
 - g. Leviton OSC10-M0W.
 2. Description: Ceiling mounted, 360° coverage, multi-tech sensing occupancy sensor.
 - a. Housing: White, thermoplastic, tamper resistant ceiling mount.
 - b. Functions: Automatic ON must sense motion from both ultrasonic and infrared sensing elements. Either technology shall maintain ON, with adjustable time delays.
 - c. Adjustments: User adjustable sensitivity adjustment shall be provided for each sensing technology. Time delay shall be adjustable from 30 seconds to 30 minutes.
 - d. Sensor shall operate on 24V DC power through control unit which supplies DC power to the sensor and provides relay contacts to control the lighting load and auxiliary contacts.
 - e. Manual override function.
- D. 110° Wall Mounted Dual Technology Occupancy Sensor
1. Manufacturers:
 - a. Perfect Sense DTC.
 - b. Wattstopper DT-200
 - c. Hubbell Building Automation "LO-DT" Series.
 - d. Sensorswitch WV-PDT-R/WV-BR.
 - e. Philips LRM2265.
 - f. Leviton OSW12-M0W.
 2. Description: Wall mounted, 110° coverage, multi-tech occupancy sensor.
 - a. Housing: White, thermoplastic, tamper resistant with swivel bracket for wall or ceiling mounting.
 - b. Functions: Automatic ON must sense motion from both sensing elements. Either technology shall maintain ON, with adjustable time delays.
 - c. Adjustments: User adjustable sensitivity adjustment shall be provided for each sensing technology. Time delay shall be adjustable from 30 seconds to 15 minutes.
 - d. Sensor Orientation: Orient sensor in room such that sensor will not detect motion through open door which could cause false activation.

- e. Sensor shall operate on 24V DC power through control unit which supplies DC power to the sensor and provides relay contacts to control the lighting load and auxiliary contacts.
 - f. Manual override function.
- E. 360° Ceiling Mounted Ultrasonic Occupancy Sensors
- 1. Manufacturers:
 - a. Perfect Sense WDS.
 - b. Wattstopper "WT" Series.
 - c. Hubbell Building Automation "OMNI-US" Series.
 - d. Greengate OPC-U-2000.
 - e. Sensorswitch CM MPT-10.
 - f. Philips LRM2255.
 - g. Leviton OSC20-U0W.
 - 2. Description: Ceiling mounted, 360° coverage, ultrasonic or microphonics sensing occupancy sensor.
 - a. Housing: White, thermoplastic, tamper resistant.
 - b. Adjustments: User adjustable sensitivity and time delay. Time delay shall be adjustable from 30 seconds to 15 minutes.
 - c. Sensor shall operate on 24V DC power through control unit which supplies DC power to the sensor and provides relay contacts to control the lighting load and auxiliary contacts.
 - d. Manual override function.
- F. 360° Ceiling Mounted Passive Infrared Occupancy Sensor.
- 1. Manufacturers:
 - a. Perfect Sense CPS.
 - b. Wattstopper CI-200.
 - c. Hubbell Building Automation OMNI-IR.
 - d. Greengate OMC-P-04500-R.
 - e. Sensorswitch CM-9.
 - f. Philips LRM2250.
 - g. Leviton OSC04-I0W.
 - 2. Description: Ceiling mounted, 360° coverage, infrared sensing occupancy sensor.
 - a. Housing: White, thermoplastic, tamper resistant ceiling mount.
 - b. Adjustments: User adjustable sensitivity adjustment shall be provided for each sensing technology. Time delay shall be adjustable from 30 seconds to 30 minutes.
 - c. Sensor shall operate on 24V DC power through control unit which supplies DC power to the sensor and provides relay contacts to control the lighting load and auxiliary contacts.
 - d. Manual override function.

G. Occupancy Sensor Control Units:

1. Description: Transformer and relay combined in single unit to provide 24DC power to sensors and provide 20A contact(s) for control of lighting loads at 120 or 277V. Control unit input power shall be from unswitched leg of lighting circuit it is controlling.
 - a. Control units shall be provided as required to power ceiling mounted occupancy sensors, control lighting loads and provide a minimum of one auxiliary contact.
 - b. Occupancy sensor control units shall mount external to 4" sq junction box in the ceiling space. Wiring between control unit and occupancy sensor shall be plenum rated.
 - c. Locate control unit in accessible location in gyp-board ceilings, adjacent to return air grilles, or provide access panel.
 - d. Additional auxiliary relay modules shall be provided as required to provide control of all lighting circuits and additional auxiliary contacts as required.
 - e. It is acceptable to provide controls and auxiliary contacts as required integral to the ceiling sensor, provided all required contacts are provided.
 - f. Maximum of 3 sensors per power pack. Verify exact quantities required with manufacturer.

PART 3 - EXECUTION

3.1 LIGHTING CONTACTOR INSTALLATION

- A. Install lighting contactors as indicated on plan. Install at accessible locations. Switch controls where provided shall be no higher than 54" or lower than 48".
- B. Demonstrate proper operation of all lighting control functions to the Owner and Engineer.

3.2 OCCUPANCY SENSOR INSTALLATION

- A. Install wall mounted occupancy sensors as noted on plan. Arrange occupancy sensors with adjacent switch devices so that device plates line-up and are equally spaced.
- B. Install ceiling mounted sensors at approximate locations as indicated on plan. Sensor manufacturer shall provide quantity of sensors as required to provide complete coverage for rooms.
- C. Locate sensors such that motion through open doors will not falsely activate sensors.
- D. Do not locate ultrasonic sensors within six feet of supply air diffusers.
- E. Locate infrared sensors to avoid obstructions.

- F. Provide the services of a manufacturer's representative for commissioning of occupancy sensor installation. This shall include consultation on layout and location prior to installing sensors, testing of each sensor for compliance with Contract Documents and field adjustment and fine tuning after installation is complete. Provide written confirmation of testing to the Owner, Architect and Engineer.
- G. Field adjustments shall take place in the presence of the owner and the engineer. This shall include owner training on adjustment techniques for the occupancy sensors.

3.3 WIRING INSTALLATION

- A. Wiring Method: Comply with Division 26 Section "Conductors and Cables".
- B. Wiring within Enclosures: Bundle, lace, and train conductors to terminal points. Separate power-limited and nonpower-limited conductors according to conductor manufacturer's written instructions.
- C. Size conductors according to lighting control device manufacturer's written instructions, unless otherwise indicated.
- D. Splices, Taps, and Terminations: Make connections only on numbered terminal strips in junction, pull, and outlet boxes; terminal cabinets; and equipment enclosures.
- E. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

3.4 IDENTIFICATION

- A. Identify components and power and control wiring according to Division 26 Section "Electrical Identification."
- B. Label time switches and contactors with a unique designation.

3.5 FIELD QUALITY CONTROL

- A. Perform the following field tests and inspections and prepare test reports:
 - 1. After installing time switches and sensors, and after electrical circuitry has been energized, adjust and test for compliance with requirements.
 - 2. Operational Test: Verify actuation of each sensor and adjust time delays.
- B. Remove and replace lighting control devices where test results indicate that they do not comply with specified requirements.
- C. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

3.6 ADJUSTING

- A. Occupancy Adjustments: When requested within 12 months of date of Substantial Completion, provide on-site assistance in adjusting sensors to suit actual occupied conditions. Provide up to two visits to site outside normal occupancy hours for this purpose.

END OF SECTION 26 09 23

SECTION 26 09 43 - LIGHTING CONTROL SYSTEMS

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PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the design and installation programmable automatic lighting controls with all input and control devices necessary to meet the performance indicated on the contract drawings and this specification
- B. Related Sections include the following:

1. Division 26 Section "Lighting Control Devices" for time switches, photoelectric switches, occupancy sensors, and multi-pole contactors.
2. Division 26 Section "LED Interior Lighting" for luminaire specifications and accessories.

1.3 DEFINITIONS

- A. BACnet: A networking communication protocol that complies with ASHRAE 135.
- B. Lon Works: A control network technology platform for designing and implementing interoperable control devices and networks.
- C. Low Voltage: As defined in NFPA 70 for circuits and equipment operating at less than 50 V or for remote-control, signaling and power-limited circuits.
- D. RS-485: A serial network protocol, like RS-232, complying with TIA/EIA-485-A.

1.4 SUBMITTALS

- A. Product Data: Indicating general device descriptions, dimensions, electrical specifications, wiring details, and nomenclature for all sensors, relays, dimming modules, control stations and other devices necessary for complete operation of the system
- B. Shop Drawings: Detail assemblies of standard components, custom assembled for specific application on this Project.
 1. Outline Drawings: Indicate dimensions, weights, arrangement of components, and clearance and access requirements for all system components requiring field installation.
 2. Riser Diagram: Show interconnection between all system components.
 - a. Identify complete data communication backbone and interconnection between sensors, relays, dimming modules control stations and other components.
 - b. Identify typical room/area type configurations.
 - c. Indicate interconnections with emergency egress lighting relays and transfer devices required.
 3. Information Technology (IT) connection: Provide information pertaining to interconnection with facility IT networking equipment and third-party systems.
 4. Other Diagrams and Operational Descriptions – as needed to indicate system operation or interaction with other system(s).
 5. Contractor startup and commissioning worksheet.
- C. Software and Firmware Operational Documentation:
 1. Software operating and upgrade manuals.
 2. Program Software Backup: On a magnetic media or compact disc, complete with data files.

3. Device address list.
 4. Printout of software application and graphic screens.
- D. Submit qualifications of commissioning agent and draft functional test plans for review and approval.
- E. Field quality-control test reports and commissioning reports at project closeout.
- F. Software licenses and upgrades required by and installed for operation and programming of digital devices.
- G. Operation and Maintenance Data: For lighting controls to include in emergency, operation, and maintenance manuals. Include the following:
1. Software manuals.
 2. Operation of adjustable zone controls.
 3. Description of operation and servicing procedures.
 4. List of major components and recommended parts.
 5. System operation and integration instructions.
- H. Warranty: Special warranty specified in this Section.

1.5 QUALITY ASSURANCE

- A. Source Limitations: Obtain lighting control module and power distribution components through one source from a single manufacturer with total responsibility for compatibility of lighting control system components specified in this Section.
- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- C. Comply with 47 CFR, Subparts A and B, for Class A digital devices.
- D. Comply with NFPA 70.
- E. Listed as qualified under Design Lights Consortium (DLC) Networked Lighting Control System Specification V2.0.
- F. System luminaires and controls are certified by manufacturer to have been designed, manufactured and tested for interoperability.
- G. Comply with ASHRAE 90.1 - 2013

1.6 COORDINATION

- A. Coordinate lighting control components specified in this Section and with systems and components specified in other Sections to form an integrated interconnection of compatible components.

- B. Match components and interconnections for optimum performance of lighting control functions.
- C. Provide open protocol interface for interoperability with building automation system including status of each occupancy/vacancy sensor, control station, dimming module, relay, time schedule, display graphics and status of lighting controls by zone.
- D. Coordinate lighting controls with devices specified in Division 26 Section "Lighting Control Devices".

1.7 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of lighting controls that fail in materials or workmanship within specified warranty period.
 - 1. Warranty Period: Five years from date of Substantial Completion.

1.8 EXTRA MATERIALS

- A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Batteries for all sensors and switches: Quantity equal to 10% percent of each type and size, but no fewer than 3 of each type and size.

1.9 SOFTWARE SERVICE AGREEMENT

- A. Technical Support: Beginning with Substantial Completion, provide software support for five years.
- B. Upgrade Service: Update software to latest version at Project completion. Install and program software upgrades that become available within two years from date of Substantial Completion. Upgrading software shall include operating system. Upgrade shall include new or revise licenses for use of the software.
 - 1. Provide 30-day notice to Owner to allow scheduling and access to system and to allow Owner to upgrade computer equipment, if necessary.

1.10 SYSTEM COMMISSIONING

- A. Provide the services of a third party, independent agent to perform functional testing and verification of the lighting control system to comply with the requirements of ASHRAE 90.1 – 2013.
- B. Perform functional testing of all lighting control system operations.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Acuity nLight Air
 2. Lutron Vive
 3. WaveLinx – Eaton

2.2 SYSTEM PERFORMANCE REQUIREMENTS

A. System Architecture

1. System shall have an architecture that is based upon three main concepts: (a) networkable intelligent lighting control devices, (b) standalone lighting control zones using distributed intelligence, (c) system backbone for remote, time based and global operation between control zones.
 - a. Intelligent lighting control devices shall have individually addressable network communication capability and consist of one or more basic lighting control components: occupancy sensor, photocell sensor, relay, dimming output, contact closure input, analog 0-10V input, and manual wall station capable of indicating switching, dimming, and/or scene control. Combining one or more of these components into a single device enclosure shall be permissible to minimize overall device count of system.
 - b. Lighting control zones consisting of one or more networked luminaires and intelligent lighting control devices and shall be capable of providing automatic control from sensors (occupancy and/or photocell) and manual control from local wall stations without requiring connection to a higher-level system backbone; this capability is referred to as “distributed intelligence.”
 - c. System must be capable of interfacing directly with networked luminaires such that either low voltage network cabling or wireless RF communication is used to interconnect networked luminaires with control components such as sensors, switches and system backbone.
2. The system shall provide individually addressable switching and dimming control of the following: networked luminaires, control zones to include multiple switch legs or circuits, and relay and dimming outputs from centralized panels to provide design flexibility appropriate with sequence of operations required in each project area or typical space type. A single platform shall be used for both indoor and outdoor lighting controls.
3. Lighting control zones shall be networked with a higher-level system backbone to provide time-based control, remote control from inputs and/or systems external to the control zone, and remote configuration and monitoring through a software.
4. All system devices shall support remote firmware update, such that physical access to each device is not necessary, for purposes of upgrading functionality later.

5. System shall be capable of “out of box” sequence of operation for each control zone. Standard sequence is:
 - a. All switches control all fixtures in a zone
 - b. All occupancy sensors automatically control all fixtures in the control zone with a default timeout.

B. Wired Networked Control Zone Characteristics

1. All networked devices connected with low voltage network cable shall automatically form a functional lighting control zone without requiring any type of programming, regardless of the programming mechanism (e.g., software application, handheld remote, pushbutton). The “out of box” default sequence of operation is intended to provide typical sequence of operation to minimize the system startup and programming requirements and to also have functional lighting control operation prior to system startup and programming.
2. System shall be able to automatically discover all connected devices without requiring any provisioning of system or zone addresses.
3. The following types of wired networked control devices shall be provided for egress and/or emergency light fixtures:
 - a. Low-Voltage power sensing: These devices shall automatically provide 100% light level upon detection of loss of power sensed via the low voltage network cable connection.
 - b. UL924 Listed Line-Voltage power sensing: These devices shall be listed as emergency relays under the UL924 standard and shall automatically close the load control relay(s) and provide 100% light output upon detection of loss of power sensed via line voltage connections.
 - c. Emergency egress devices shall be provided, and UL labeled by the lighting control manufacturer.

C. Wireless Networked Control Zone Characteristics

1. All wireless networked devices paired, meshed or grouped together shall automatically follow the “out of box” default sequence of operations.
2. Wireless network communication shall support uniform and instant response such that all luminaires in a lighting control zone respond immediately and synchronously in response to a sensor or wall station signal.
3. To support the system architecture requirement for distributed intelligence, wireless network communication shall support communication of control signals from sensors and wall stations to networked luminaires and wireless load control devices, without requiring any communication, interpretation, or translation of information through a backbone device such as a wireless access point, communication bridge or gateway.
4. All wireless communication shall be encrypted using at least 128-bit Advanced Encryption Standard (AES).
5. The following types of wired networked control devices shall be provided for egress and/or emergency light fixtures:
 - a. UL924 Listed Line-Voltage power sensing: These devices shall be listed as emergency relays under the UL924 standard and shall automatically close

the load control relay(s) and provide 100% light output upon detection of loss or interruption of power sensed via line voltage connections.

D. System Integration Capabilities

1. The system shall be capable of interface with third party building management systems (BMS) to support two-way communication using the industry standard BACnet/IP or BACnet/MSTP protocols.
 - a. Systems utilizing a third-party converter or systems that require a dedicated server to achieve integration are not acceptable.

2.3 SYSTEM SOFTWARE INTERFACES

A. Management Interface

1. System shall provide a web-based management interface that provides remote system control, live status monitoring, and configuration capabilities of lighting control settings and schedules.
2. Management interface must be compatible with industry-standard web browser clients, including, but not limited to, Microsoft Internet Explorer®, Apple Safari®, Google Chrome®, Mozilla Firefox®.
3. All system software updates must be available for automatic download and installation via the internet.

B. Historical Database and Analytics Interface

1. System shall provide a browser-based trending and monitoring interface that stores historical data for all occupancy/daylight sensors and lighting loads. Additionally, the system shall optionally upload that data to a cloud-based server.

C. Visualization Interfaces

1. System shall provide an optional web-based visualization interface that displays a graphical floorplan. System data, to include status of occupancy sensors, daylight sensors and light output shall be overlaid to the floorplan to provide a graphical status page.

D. Portable Programming Interface for Standalone Control Zones

1. Portable handheld application interface for standalone control zones shall be provided for systems that allows configuration of lighting control settings.
2. Programming capabilities through the application shall include, but not be limited to, the following:
 - a. Switch, occupancy and photo sensor group configuration
 - b. Manual/automatic on modes
 - c. Turn-on dim level
 - d. Occupancy sensor time delays
 - e. Dual technology occupancy sensors sensitivity

- f. Photo-sensor calibration adjustment and auto-setpoint
- g. Trim level settings

2.4 SYSTEM BACKBONE AND SYSTEM INTEGRATION EQUIPMENT

A. System Controller

1. System Controller shall be a multi-tasking, real-time digital control processor consisting of modular hardware with plug-in enclosed processors, communication controllers, and power supplies.
2. System Controller shall perform the following functions:
 - a. Facilitation of global network communication between different areas and control zones.
 - b. Time-based control of downstream wired and wireless network devices.
 - c. Linking into an Ethernet network.
 - d. Integration with Building Management Systems (BMS) and Heating, Ventilation and Air Conditioning (HVAC) equipment.
 - e. Connection to various software interfaces, including management interface, historical database and analytics interface, visualization interface, and personal control applications.
3. System Controller shall not require a dedicated PC or a dedicated cloud connection.
4. Device shall automatically detect all networked devices connected to it, including those connected to wired and wireless communication bridges.
5. Device shall have a standard and astronomical internal time clock.
6. Shall be capable of connecting to the customers Local Area Network (LAN) via IEEE 802.11.x Wireless and IEEE 802.3 Wired connection.
7. System Controller shall support BACnet/IP and BACnet/MSTP protocols to directly interface with BMS and HVAC equipment without the need for additional protocol translation gateways.
 - a. BACnet/MSTP shall support a minimum of 50 additional BACnet MS/TP controllers in addition to the Expansion I/O modules.
 - b. BACnet/MSTP shall support 9600 to 115200 baud.
 - c. System Controller shall be BACnet Testing Laboratory (BTL listed) using Device Profile BACnet Building Controller (B-BC) with outlined enhanced features.
 - d. System controller must support BACnet/IP Broadcast Management Device (BBMD) and Foreign Device Registration (FDR).

2.5 WIRED NETWORKED DEVICES

A. Wired Networked Wall Switches, Dimmers, Scene Controllers

1. Wall switches & dimmers shall support the following device options:

- a. Number of control zones: 1, 2 or 4. Gang multiple switches where more than 4 control zones are required in a single location under a single faceplate.
 - b. Control Types Supported: On/Off or On/Off/Dimming
2. Scene controllers shall support the following device options:
 - a. Number of scenes: 1, 2 or 4
 - b. Control Types Supported:
 - 1) On/Off or On/Off/Dimming
 - 2) Preset Level Scene Type
 - 3) Reprogramming of other devices within daisy-chained zone so as to implement user selected lighting scene
 - 4) Selecting a lighting profile to be run by the system's upstream controller to implement a selected lighting profile across multiple zones
 3. Match color specified in Division 26 Section "Wiring Devices."
 4. Integral green LED pilot light to indicate when circuit is on.
 5. Internal white LED locator light to illuminate when circuit is off.
 6. Networked switch stations shall have backlit buttons.
 7. Wall Plates:
 - a. Single and multi-gang plates as specified in Division 26 Section "Wiring Devices."
 - b. Where multiple switches and/or dimmers are adjacent to each other, install a single cover plate. Provide separate boxes or barriers as required for the application.
 - c. Provide cover plates that are identical in material and dimension to standard single and double gang switch plates.
 - d. Verify back box requirements for multiple control points with manufacturer.
 8. Legend: Engraved or permanently silk-screened on wall plate where indicated. Use designations indicated on Drawings.
- B. Wired Networked Graphic Wall Stations**
1. Device shall have a full color touch screen.
 2. Device shall enable configuration of all switches, dimmers, and lighting preset scenes via password protected setup screens.
 3. Graphic wall stations shall support the following device options:
 - a. Number of control zones: Minimum of 16
 - b. Number of scenes: Minimum of 16
 - c. Optional password protection for setup screens.
- C. Wired Networked Auxiliary Input / Output (I/O) Devices**
1. Auxiliary Input/output Devices shall be specified as an input or output device with the following options:

- a. Contact closure input: Programmable to support maintained or momentary inputs that can activate local or global scenes and profiles, ramp light level up or down, or toggle lights on/off.
- b. 0-10V analog input: Programmable to function as a daylight sensor.
- c. RS-232/RS-485 digital input: Supports activation of up to 4 local or global scenes and profiles, and on/off/dimming control of up to 16 local control zones.
- d. 0-10V dimming control output, capable of sinking a minimum of 20mA of current programmable to support all standard sequence of operations supported by system.

D. Wired Networked Occupancy and Photosensors

1. Sensors shall utilize passive infrared (PIR) or passive dual technology (PDT) to detect both major and minor motion as defined by NEMA WD-7 standard.
2. Sensing technologies that are acoustically passive, meaning they do not transmit sounds waves of any frequency do not require additional commissioning. Ultrasonic or Microwave based sensing technologies may require commissioning due to the active nature of their technology, if factory required.
3. Sensor programming parameter shall be available and configurable remotely from the software and locally via the device.
4. Sensor mounting type shall match project design requirements as shown on plans.
 - a. Sensors shall have optional features for photosensor/daylight override, dimming control, and low temperature/high humidity operation.
5. The system shall support the following types of photocell-based control:
 - a. On/Off: The control zone is automatically turned off if the photocell reading exceeds the defined setpoint and automatically turned on if the photocell reading is below the defined setpoint. A time delay or adaptive setpoint adjustable behavior may be used to prevent the system from exhibiting nuisance on/off switching.
 - b. Continuous Dimming: The control zone automatically adjusts its dimming output in response to photocell readings, such that a minimum light level consisting of both electric light and daylight sources is maintained at the task. The photocell response shall be configurable to adjust the photocell setpoint and dimming rates.

E. Wired Networked Wall Switch Sensors

1. Wall switches sensors shall support the following device options:
 - a. User Input Control Types Supported: On/Off or On/Off/Dimming
 - b. Occupancy Sensing Technology: PIR only or Dual Tech
 - c. Daylight Sensing Option: Inhibit Photosensor

F. Wired Networked Embedded Sensors

1. Embedded sensors shall support the following device options:

- a. Occupancy Sensing technology: PIR only or Dual Tech
- b. Daylight Sensing Option: Occupancy only, Daylight only, or combination Occupancy/Daylight sensor

G. Distributed System Power, Switching and Dimming Controls

1. Devices shall incorporate one optional Class 1 relay, optional 0-10 VDC dimming output, and contribute low voltage Class 2 power to the rest of the system.
2. Device programming parameters shall be available and configurable remotely from the software and locally via the device push-button.
3. Device shall be plenum rated.
4. Devices shall be UL Listed for load and load type as specified on the plans.

H. Wired Networked Luminaires

1. Networked luminaire shall have a factory installed mechanically integrated control device and carry a UL Listing as required.
2. Networked LED luminaire shall provide low voltage power to other networked control devices.
3. System shall be able to maintain constant lumen output over the specified life of the LED luminaire (also called lumen compensation) by automatically varying the dimming control signal to account for lumen depreciation.
4. System shall be able to provide control of network luminaire intensity, in addition to correlated color temperature of specific LED luminaires.
5. Controls manufacturer is responsible for primary troubleshooting and tech support of complete fixture.

2.6 CONDUCTORS AND CABLES

- A. General: All conductors and cables shall comply with the requirements of Division 26 Section "Conductors and Cables." Where cable is permitted to be installed exposed in ceiling space, provide plenum rated cable.
- B. Power Wiring to Supply Side of Class 2 Power Source: Not smaller than No. 12 AWG.
- C. Classes 2 and 3 Control Cables: Multi-conductor cable with copper conductors not smaller than No. 22 AWG.
- D. Class 1 Control Cables: Multi-conductor cable with copper conductors not smaller than No. 18 AWG.
- E. Digital and Multiplexed Signal Cables: As required by system manufacturer. Provide plenum rated cables where installed exposed in ceiling space.

PART 3 - EXECUTION

3.1 WIRING INSTALLATION

- A. The lighting control system shall be installed and connected as shown on the plans and as directed by the manufacturer.
- B. Comply with NECA 1.
- C. Wiring Method: Install wiring in raceways except where installed in accessible ceilings. Comply with Division 26 Sections "Conductors and Cables" and "Raceways and Boxes".
- D. Where cables are installed in finished areas with exposed construction, conceal cables from view. Route at top of structural systems and conceal on top of structural members where possible. Where cable is exposed to view, provide raceway. As an alternative to raceway, provide cable that is factory colored to match exposed ceiling. Submit sample to Architect for approval.
- E. Wiring within Enclosures: Bundle, lace, and train conductors to terminal points. Separate power-limited and non-power-limited conductors according to conductor manufacturer's written instructions.
- F. Install field-mounting transient voltage suppressors for lighting control devices in Category A locations that do not have integral line-voltage surge protection.
- G. Size conductors according to lighting control device manufacturer's written instructions, unless otherwise indicated.
- H. Splices, Taps, and Terminations: Make connections only on numbered terminal strips in terminal cabinets, equipment enclosures, and in junction, pull, and outlet boxes as per manufacturers' recommendations.
- I. Identify components and power and control wiring according to Division 26 Section "Electrical Identification."
- J. Label each relay with a unique designation.

3.2 INSTALLATION REQUIREMENTS

- A. Review all required installation and pre-startup procedures with the manufacturer's representative through pre-construction meetings.
- B. Install and connect the networked lighting control system components according to the manufacturer's installation instructions, wiring diagrams, the project submittals, plans and specifications.
- C. Coordination with Owner's IT Network Infrastructure to secure all required network connections to the owner's IT network infrastructure. Provide the owner's representative with all network infrastructure requirements of the networked lighting control system. Provide the manufacturer's representative with all necessary contacts pertaining to the owner's IT infrastructure, to ensure that the system is properly connected and started up.

- D. Verify integration and interoperability scope with the Mechanical Contractor prior to submittal phase and provide all necessary schedules to the Lighting Control manufacturer.

3.3 SYSTEM STARTUP

- A. Upon completion of installation by the installer, including completion of all required verification and documentation required by the manufacturer, the system shall be started up and programmed by an authorized representative of the manufacturer.
 - 1. Low voltage network cable testing shall be performed prior to system startup at the discretion of the manufacturer.
- B. System start-up and programming shall include:
 - 1. Verifying operational communication to all system devices.
 - 2. Programming the network devices into functional control zones to meet the required sequence of operation.
 - 3. Programming and verifying all sequence of operations.
 - 4. Customization of owner's software interfaces and applications.
- C. Initial start-up and programming are to occur on-site. Additional programming may occur on-site or remotely over the Internet as necessary.

3.4 DOCUMENTATION

- A. Submit software database file with desired device labels and notes completed.
- B. Document the installed location of all networked devices, including networked luminaires. Provide as-built plan drawing showing device addresses corresponding to locations of installed equipment.

3.5 FIELD QUALITY CONTROL

- A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust components and equipment installation, including connections and assist in field testing. Report results in writing.
- B. Perform the following field tests and inspections and prepare test reports:
 - 1. Test for circuit continuity.
 - 2. Verify that the control module features are operational.
 - 3. Check operation of local override controls.
 - 4. Test system diagnostics by simulating improper operation of several components selected by Architect.

3.6 SYSTEM COMMISSIONING

- A. Facilitate the functional testing and verification of the lighting control system by an independent, third party commissioning agent.
- B. Perform commissioning in the presence of the Owner's representative.
- C. Submit functional test plan checklist signed by the commissioning agent.

3.7 SOFTWARE INSTALLATION

- A. Install and program software with initial settings of adjustable values. Make backup copies of software and user-supplied values. Provide current licenses for software.

3.8 ADJUSTING

- A. Occupancy Adjustments: When requested within 12 months of date of Substantial Completion, provide on-site assistance in adjusting programming functions and other system parameters and to assist Owner's personnel in making program changes to suit actual occupied conditions. Provide up to two visits to Project during other than normal occupancy hours for this purpose.

3.9 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to program, adjust, operate, and maintain lighting controls.
- B. Demonstration shall be done only after initial system start-up setup has occurred and system is functioning properly.
- C. Demonstration shall consist of a four-hour minimum session.

3.10 MANUFACTURER SUPPORT

- A. Manufacturer telephone support shall be available at no cost to the Owner during the warranty period and shall include the following:
 - 1. Assistance in solving programming or other application issues pertaining to the control equipment.
 - 2. The manufacturer shall provide a toll-free number for direct technical support available 7 days a week, 24 hours a day.
 - 3. A factory authorized technician shall be located within a 100-mile radius of the project site.

END OF SECTION 26 09 43

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PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Single and duplex receptacles
 - 2. Ground-fault circuit interrupter receptacles
 - 3. Controlled receptacles.
 - 4. Device wall plates.
 - 5. Poke-through assemblies

1.3 DEFINITIONS

- A. EMI: Electromagnetic interference.
- B. GFCI: Ground-fault circuit interrupter.

- C. AFCI: Arc-fault circuit interrupter.
- D. PVC: Polyvinyl chloride.
- E. RFI: Radio-frequency interference.
- F. SPD: Surge protective devices.
- G. UTP: Unshielded twisted pair.
- H. USB: Universal serial bus.

1.4 REFERENCES

- A. DSCC W-C-596G: Federal Specification Connector, Electrical, Power, General Specification.
- B. DSCC W-C-896F: Federal Specification Switches, Toggle (Toggle and Lock), Flush Mounted (General Specification).
- C. IEC 309-1, Part 1: General Requirements: Plugs, Socket-Outlets and Couplers for Industrial Purposes
- D. NEMA FB 11: Plugs, Receptacles, and Connectors of the Pin and Sleeve Type for Hazardous Locations.
- E. NEMA WD 1: General Requirements for Wiring Devices.
- F. NEMA WD 6: Wiring Device – Dimensional Requirements.
- G. UL 20: General-Use Snap Switches.
- H. UL 486A: Wire Connectors and Soldering Lugs for Use with Copper Conductors.
- I. UL 486B: Wire Connectors for Use with Aluminum Conductors.
- J. UL 498: Electrical Attachment Plugs and Receptacles.
- K. UL 943: Ground Fault Circuit Interrupters.
- L. NECA 130-2010: Installing and Maintaining Wiring Devices.

1.5 SUBMITTALS

- A. Product Data: Provide manufacturer's catalog information showing dimensions, colors, and configurations for each type of product indicated.

1.6 QUALITY ASSURANCE

- A. Source Limitations: Obtain each type of wiring device through one source from a single manufacturer. Insofar as they are available, obtain all wiring devices and associated wall plates from a single manufacturer and source.
- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- C. Comply with NFPA 70.

1.7 COORDINATION

- A. Receptacles for Owner-Furnished Equipment: Match plug configurations.

PART 2 - PRODUCTS

2.1 GENERAL WIRING DEVICE REQUIREMENTS

- A. Comply with NFPA 70, NEMA WD 1, NEMA WD 6, Federal Specification WC-596G and UL498.
- B. Devices for Owner-Furnished Equipment:
 - 1. Receptacles: Match plug configurations.
 - 2. Cord and Plug Sets: Match equipment requirements.
- C. Device Color:
 - 1. Wiring Devices Connected to Normal Power System: As selected by Architect, unless otherwise indicated or required by NFPA 70 or device listing.
 - 2. Wall Switches: As selected by Architect, unless otherwise indicated.

2.2 STANDARD GRADE RECEPTACLES

- A. Duplex Receptacle, NEMA 5-20R:
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Hubbell Wiring Device-Kellems: BR20
 - b. Eaton/Arrow Hart Wiring Devices: BR20
 - c. Leviton: BR 20
 - d. Legrand, Pass & Seymour: CRB5362

2.3 GFCI RECEPTACLES

A. General:

1. Comply with UL 943

B. Duplex GFCI Receptacle, NEMA 5-20R:

1. Manufacturers: Subject to compliance with requirements, provide one of the following:
 - a. Hubbell Wiring Device-Kellems: GFRST20
 - b. Eaton/Arrow Hart Wiring Devices: SGF20
 - c. Leviton: GFNT2
 - d. Legrand, Pass & Seymour: 2097

2.4 WALL SWITCHES

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

1. Hubbell Wiring Device-Kellems: 1220 Series
2. Eaton/Arrow Hart Wiring Devices: AH1220 Series
3. Leviton: 1220 Series
4. Legrand, Pass & Seymour: PS20AC Series

B. Device body: Plastic handle.

C. Single- and Double-Pole Switches: Comply with DSCC W-C-896F and UL 20.

D. Snap Switches: Heavy Duty specification grade, quiet type; rated 20A., 120-277 V AC.

E. Provide single-pole, two-pole, three-way and four-way switches as indicated.

F. Provide pilot light where indicated. Switch shall be illuminated when the switch is on.

G. Provide key type where indicated. Furnish four keys to Owner.

H. Combination Switch and Receptacle: Both devices in a single gang unit with plaster ears and removable tab connector that permit separate or common feed connection.

1. Switch: 20 A, 120/277-V ac.
2. Receptacle: NEMA WD 6, Configuration 5-20R.

2.5 WALL PLATES

A. Manufacturers:

1. Provide wall plates and corresponding wiring devices from same manufacturer.

- B. Single and combination types to match corresponding wiring devices.
 - 1. Plate-Securing Screws: Metal with head color to match plate finish.
 - 2. Material for Finished Spaces:
 - a. 0.035-inch- thick, satin-finished stainless steel
 - b. Steel with white baked enamel, suitable for field painting
 - c. Smooth, high-impact thermoplastic
 - d. 0.04-inch thick, brushed brass with factory polymer finish
 - e. 0.05-inch- thick anodized aluminum
 - f. 0.04-inchthick steel with chrome-plated finish
 - 3. Material for Unfinished Spaces:
 - a. Galvanized steel
 - b. Smooth, high-impact thermoplastic.
 - 4. Material for Wet Locations: Gasketed Non-Metallic with hinged cover and listed and labeled as Extra Duty Weatherproof While-In-Use.
 - a. Manufacturers:
 - 1) Hubbell: MM420
 - 2) Legrand, Pass & Seymour: WIUC10FRED
 - 3) Eaton/Arrow Hart: WIU-1VX
 - 4) Red Dot: CKPS
 - 5) Intermatic: WP5000
 - 5. Material for Damp Locations: Gasketed Cast aluminum with hinged cover and listed and labeled as Weatherproof.
 - a. Manufacturers:
 - 1) Red Dot Model CCGV, ABB Installation Products
 - 2) Eaton/Arrow Hart WLRD1
 - 3) Legrand, Pass & Seymour
 - 4) Intermatic: WP3110MXD

2.6 POKE-THROUGH ASSEMBLIES

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Hubbell Wiring Device-Kellems
 - 2. Legrand, Wiremold
 - 3. Steel City
- B. Refer to Poke-Through Assembly Schedule on Plan.

- C. Description: Factory-fabricated and -wired assembly of below-floor junction box with multi-channeled, through-floor raceway/firestop unit and detachable matching floor service outlet assembly.
 - 1. Fire Rating: Unit is listed and labeled for fire rating of floor-ceiling assembly; minimum 2-hour rating.
 - 2. Comply with UL514A scrub water exclusion requirement.
- D. Compartments: Provide barrier separating power from telecommunications cabling.
- E. Provide a blank bracket for any unused gangs.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Prior to installation of devices, verify wall openings are neatly cut and will be completely covered by wall plates, clean debris from outlet boxes and provide extension rings to bring outlet boxes flush with finished surface.
- C. Install devices and assemblies level, plumb, and square with building lines.
- D. Arrangement of Devices:
 - 1. Coordinate locations of outlet boxes provided under Division 26 Section "Raceways and Boxes" to obtain mounting heights indicated on Drawings.
 - 2. Unless otherwise indicated, mount flush, with long dimension vertical, and with grounding terminal of receptacles on top.
 - 3. Where multiple switches, dimmers, and/or occupancy sensors are adjacent to each other, provide a single cover plate. Custom fabricate, if required, for all combinations. Provide separate boxes or barriers as required for the application.
 - 4. Install horizontally mounted receptacles with grounding pole on the left.
 - 5. Install GFCI receptacles so that the "Push To Test" and "Reset" designations can be read correctly. If printed in both directions, install with ground pole on top.
 - 6. Install switches with OFF position down.
- E. Install cover plates on switch, receptacle, and blank outlets in finished areas.
- F. Install weather-resistant type receptacles in all damp and wet locations.
- G. Install weatherproof cover plates on receptacles in damp locations.
- H. Install weatherproof While-In-Use cover plates on receptacles in wet locations.
- I. Install tamper-resistant type receptacles in all locations as required by the NEC (406.12) and as indicated on plan.

- J. Use oversized plates for outlets installed in masonry walls.
- K. Install galvanized steel plates on outlet boxes and junction boxes in unfinished areas, above accessible ceilings, and on surface mounted outlets.
- L. Remove wall plates and protect devices and assemblies during painting.
- M. Adjust locations of floor service outlets and service poles to suit arrangement of partitions and furnishings.
- N. Adjust devices and wall plates to be flush and level. Three corners of wall plates must be in contact with wall surfaces. Devices shall be solidly mounted against the box.

3.2 IDENTIFICATION

- A. Comply with Division 26 Section "Electrical Identification."
 - 1. Receptacles: Identify panelboard and circuit number from which served. Use adhesive label as specified in Division 26 Section "Electrical Identification" with black-filled lettering on face of wall plate, and durable wire markers or tags inside outlet boxes.
 - 2. Wall Switches: Identify panelboard and circuit number from which served. Use adhesive label as specified in Division 26 Section "Electrical Identification" with black-filled lettering on face of wall plate, and durable wire markers or tags inside outlet boxes.

3.3 CONNECTIONS

- A. Ground equipment according to Division 26 Section "Grounding and Bonding." Connect wiring device grounding terminal to outlet box with bonding jumper. Use of quick ground strap or screw is not acceptable.
- B. Connect wiring according to Division 26 Section "Conductors and Cables." Connect wiring devices by wrapping conductor around screw terminal or by using back wiring and tightening the screw securely.
- C. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

3.4 FIELD QUALITY CONTROL

- A. Perform the following field tests and inspections and prepare test reports:
 - 1. Inspect each wiring device for defects.
 - 2. Operate each wall switch with circuit energized and verify proper operation.

3. After installing wiring devices and after electrical circuitry has been energized, test each receptacle for proper polarity, ground continuity, and compliance with requirements.
 4. Test each GFCI receptacle for proper operation with both local and remote fault simulations according to manufacturer's written instructions.
- B. Remove malfunctioning units, replace with new units, and retest as specified above.

END OF SECTION 26 27 26

SECTION 26 51 19 - LED INTERIOR LIGHTING

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PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

- 1. Interior solid-state luminaires that use LED technology.
- 2. Lighting fixture supports.

- B. Related Requirements:
 - 1. Division 26 "Lighting Control Devices."

1.3 DEFINITIONS

- A. CCT: Correlated color temperature.
- B. CRI: Color Rendering Index.
- C. Fixture: See "Luminaire."
- D. IP: International Protection or Ingress Protection Rating.
- E. Lamp: LED and substrate as a replaceable assembly.
- F. LED: Light-emitting diode.
- G. Lumen: Measured output of lamp and luminaire, or both.
- H. Luminaire: Complete lighting unit, including lamp, reflector, and housing.

1.4 SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Arrange in order of luminaire designation.
 - 2. Include data on features, accessories, and finishes.
 - 3. Include physical description and dimensions of luminaires.
 - 4. Include emergency lighting units, including batteries and chargers.
 - 5. Include life, output (lumens, CCT, and CRI), and energy efficiency data.
 - 6. Photometric data and adjustment factors based on laboratory tests, complying with IESNA Lighting Measurements Testing and Calculation Guides, of each lighting fixture type. The adjustment factors shall be for lamps and accessories identical to those indicated for the lighting fixture as applied in this Project per IES LM-79 and IES LM-80.
 - a. Manufacturers' Certified Data: Photometric data certified by manufacturer's laboratory with a current accreditation under the National Voluntary Laboratory Accreditation Program for Energy Efficient Lighting Products or certified by a qualified independent testing agency.
- B. Shop Drawings: For nonstandard or custom luminaires.
 - 1. Include plans, elevations, sections, and mounting and attachment details.
 - 2. Include details of luminaire assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
 - 3. Include diagrams for power, signal, and control wiring.

- C. Qualification Data: For testing laboratory providing photometric data for luminaires.
- D. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.
- E. Product Test Reports: For each luminaire, for tests performed by a qualified testing agency.
- F. Sample warranty.

1.5 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For luminaires and lighting systems to include in operation and maintenance manuals.
 - 1. Provide a list of all lamp types used on Project; use ANSI and manufacturers' codes.

1.6 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Lamps: 5% attic stock of each type and rating installed. Furnish at least one of each type.
 - 2. LED Drivers 5% attic stock of each type and rating installed. Furnish at least one of each type.
 - 3. Diffusers and Lenses: 1% attic stock of each type and rating installed. Furnish at least one of each type.
 - 4. Globes and Guards: 5% attic stock of each type and rating installed. Furnish at least one of each type.

1.7 QUALITY ASSURANCE

- A. Luminaire Photometric Data Testing Laboratory Qualifications: Luminaire manufacturer's laboratory that is accredited under the NVLAP for Energy Efficient Lighting Products.
- B. Provide luminaires from a single manufacturer for each luminaire type.
- C. Each luminaire type shall be binned within a three-step MacAdam Ellipse to ensure color consistency among luminaires.
- D. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- E. Comply with:

1. NFPA 70 - National Electrical Code.
2. NECA/IESNA 500-1998 – Recommended Practice for Installing Indoor Commercial Lighting Systems.
3. NECA/IESNA 502-1999 – Recommended Practice for Installing Industrial Lighting Systems.
4. Code of Federal Regulations (47 CFR 37342).
5. Michigan Department of State Police, Fire Marshall Division Policy Number 11-06 “Plastic Materials as Interior Finishes” pertaining to the use of plastic lenses in lighting fixtures for health care facilities.
6. Michigan Department of Community Industry Services requirements that all lamps shall be protected from breakage. Exposed lamps are not acceptable.

F. NFPA 101 Compliance: Comply with visibility and luminance requirements for exit signs.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Protect finishes of exposed surfaces by applying a strippable, temporary protective covering before shipping.

1.9 COORDINATION

A. Coordinate layout and installation of lighting fixtures and suspension system with other construction that penetrates ceilings or is supported by them, including HVAC equipment, fire-suppression system, and partition assemblies.

1.10 WARRANTY

A. Warranty: Manufacturer and Installer agree to repair or replace components of luminaires that fail in materials or workmanship within specified warranty period.

B. Warranty Period: Five year(s) or manufacturer’s standard warranty length (whichever is longer) from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 LUMINAIRES (LIGHTING FIXTURES)

A. Provide Luminaires as included in specification 26 5700 “Luminaire Product Data.” This section contains product data sheets from the basis of design manufacturer with annotations.

B. Acceptable alternate manufacturers are indicated on the product data sheets. Alternate manufacturer products shall be equal in all respects including materials, finishes, photometric performance and energy performance and shall include all options, features, and accessories identified.

- C. The Luminaire schedule shown on the drawings is supplemental provided for convenience and reference only. The requirements of this section and 26 5700 shall govern.

2.2 LUMINAIRE REQUIREMENTS

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. NRTL Compliance: Luminaires for hazardous locations shall be listed and labeled for indicated class and division of hazard by an NRTL.
- C. Unless otherwise specified in Luminaire product data, provide products with a minimum CRI of 80.
- D. Unless otherwise specified in Luminaire product data, provide products with a CCT of 3500K.
- E. Unless otherwise specified in Luminaire product data, provide products with an IES LM-80 rated lamp life of 50,000 hours.
- F. Driver
 - 1. Provided as an integrated component of the luminaire or as an external component of an assembly of luminaries.
 - 2. Nominal Input Voltage: All drivers shall be rated for use on either 120V or 277V systems.

2.3 EXIT SIGNS

- A. General: Comply with UL 924; for sign colors and lettering size, comply with authorities having jurisdiction.
- B. Internally Lighted Signs:
 - 1. Lamps: Light-emitting diodes, 70,000 hours minimum of rated lamp life.
- C. Self-Powered Exit Signs (Battery Type): Integral automatic charger in a self-contained power pack.
 - 1. Battery: Sealed, maintenance-free, nickel-cadmium type with special warranty.
 - 2. Charger: Fully automatic, solid-state type with sealed transfer relay.
 - 3. Operation: Relay automatically energizes lamp from battery when circuit voltage drops to 80 percent of nominal voltage or below. When normal voltage is restored, relay disconnects lamps from battery, and battery is automatically recharged and floated on charger.
- D. Provide edge lit signs with a mirror plaque background.

2.4 EMERGENCY AUTOMATIC LOAD CONTROL RELAY

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

1. [Bodine](#) BLCD Series.
2. [Nine-24, Inc.](#): ELCR Series.
3. LVS, EPC Series
4. IOTA, ETS-20 Series
5. Functional Devices, Inc., ESR Series
6. ETC, ALCR Series
7. Wattstopper, ELCU series

B. Description:

1. The Automatic Load Control Relay (ALCR) shall provide required functionality to allow any standard lighting control device to control emergency lighting in conjunction with normal lighting in any area of the building.
2. The ALCR shall allow control of emergency lighting fixtures in tandem with normal lighting in an area while ensuring that emergency lighting will turn on immediately to full brightness upon loss of normal power supplying the control device.
3. Emergency lighting operation shall be independent for each controlled area and shall not require a generalized power failure for proper operation.
4. Self-contained with integral 1/2" nipple mount with snap in locking feature for mounting into a standard junction box knock out.
5. Normally closed dry contacts capable of switching 20 amp emergency ballast loads @ 120-277 VAC, 60 Hz, or 10 amp tungsten loads @ 120 VAC, 60 Hz.
6. Universal rated voltage inputs provided for normal power sense and normal switched power at 120-277 VAC, 60 Hz.
7. Integral momentary test switch. Pressing and holding this switch shall instantly force the unit into emergency mode and turn on emergency lighting. Releasing the test switch shall immediately return the unit to normal operation.
8. Dedicated leads and 24 VDC source for connection to remote test switch, fire alarm system, or other external system capable of providing a normally closed dry contact closure. Breaking contact between the terminals shall force and hold the emergency lighting on until the terminals are again closed. An integral LED indicator shall indicate the unit's current remote activation status.
9. Separate LEDs to indicate the presence of normal and emergency power sources. The LEDs shall indicate the unit's current operational mode (normal or emergency).
10. Normal power input leads shall be connected to the line side of the control device such that any upstream fault causing a loss of power, including the tripping of the branch circuit breaker, will force the unit into the emergency mode and turn on the emergency lighting.
11. Automatically switch emergency lighting on and off as normal lighting is switched. When normal power is not available, the unit shall force and hold emergency lighting on regardless of the state of any external control device until normal power is restored.
12. Utilize zero crossing circuitry to protect relay contacts from inrush current.
13. Plenum rated housing equipped with compression flying leads.

14. The unit shall be UL listed to the UL924 standard and labeled for connection to both normal and emergency lighting power sources.
- C. Provide device with proper rating for total load and load type being transferred
- D. Provide for devices suitable for line voltage and low voltage dimming control where required such that device bypasses dimming control signal to luminaire to provide full output upon loss of normal power.
- E. Coordinate with luminaire product data, lighting control schedules and details and diagrams included on the drawings for dimming characteristics.

2.5 BRANCH CIRCUIT EMERGENCY LIGHTING TRANSFER SWITCH

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 1. LVS EPC-D-F-ATS Series
 2. Bodine.
- B. Description: Localized load transfer switch to allow emergency fixture to be powered and controlled by the normal lighting circuit, sense presence of normal power ahead of control circuit and switch luminaire (both line and neutral) over to emergency source upon loss of normal source.
- C. Universal dimming capability to allow the lighting to be controlled and dimmed by the normal lighting circuit during normal times. In the event of a loss of the normal branch circuit, and transfer the designated emergency fixtures from normal dimming control to the emergency power source and bring them to full brightness, regardless of the current state of the dimming system.
- D. Device shall be mounted remotely for each control circuit as application requires.
- E. Listed and labeled by an NRTL to the UL1008 for emergency operation and listed for field installation.
- F. Integral test switch and indicating lamps to indicate status.
- G. Provide device with proper rating for total load and load type being transferred
- H. Coordinate with luminaire product data, lighting control schedules and details and diagrams included on the drawings.

2.6 MATERIALS

- A. Metal Parts:
 1. Free of burrs and sharp corners and edges.
 2. Sheet metal components shall be steel unless otherwise indicated.

3. Form and support to prevent warping and sagging.
- B. Doors, Frames, and Other Internal Access: Smooth operating, free of light leakage under operating conditions, and designed to permit relamping without use of tools. Designed to prevent doors, frames, lenses, diffusers, and other components from falling accidentally during relamping and when secured in operating position.
 - C. Diffusers and Globes:
 1. Acrylic Diffusers: One hundred percent virgin acrylic plastic, with high resistance to yellowing and other changes due to aging, exposure to heat, and UV radiation.
 2. Glass: Annealed crystal glass unless otherwise indicated.
 3. Lens Thickness: At least 0.125 inch minimum unless otherwise indicated.
 - D. Factory-Applied Labels: Comply with UL 1598 Locate labels where they will be readily visible to service personnel, but not seen from normal viewing angles when lamps are in place.
 1. Label shall include the following lamp characteristics:
 - a. "USE ONLY" and include specific lamp type.
 - b. Lamp diameter, shape, size, wattage, and coating.
 - c. CCT and CRI for all luminaires.

2.7 METAL FINISHES

- A. Variations in finishes are unacceptable in the same piece. Variations in finishes of adjoining components are acceptable if they are within the range of approved Samples and if they can be and are assembled or installed to minimize contrast.

2.8 LUMINAIRE FIXTURE SUPPORT COMPONENTS

- A. Comply with requirements in Section 26 05 29 "Hangers and Supports for Electrical Systems" for channel and angle iron supports and nonmetallic channel and angle supports.
- B. Single-Stem Hangers: Unless otherwise specified in Luminaire product data, provide products with a minimum 1/2-inch steel tubing with swivel ball fittings and ceiling canopy. Finish same as luminaire.
- C. Wires: Unless otherwise specified in Luminaire product data, provide products with a minimum ASTM A 641/A 641 M, Class 3, soft temper, zinc-coated steel, 12 gage.
- D. Rod Hangers: Unless otherwise specified in Luminaire product data, provide products with a minimum 3/16-inch minimum diameter, cadmium-plated, threaded steel rod.
- E. Hook Hangers: Integrated assembly matched to luminaire, line voltage, and equipment with threaded attachment, cord, and locking-type plug.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Examine roughing-in for luminaire to verify actual locations of luminaire and electrical connections before fixture installation. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 TEMPORARY LIGHTING

- A. Do not use permanent luminaires for temporary lighting.

3.3 INSTALLATION

- A. Install in accordance with manufacturer's instructions and N.E.C.A./I.E.S.N.A. 500-2006 and 502-2006.
- B. Locate ceiling luminaires as indicated on reflected ceiling plan.
- C. Support for Fixtures in or on Grid-Type Suspended Ceilings: Use grid for support.
 - 1. Install a minimum of four ceiling support system rods or wires for each fixture. Locate not more than 6 inches from fixture corners.
 - 2. Support Clips: Fasten to fixtures and to ceiling grid members at or near each fixture corner with clips that are UL listed for the application.
 - 3. Fixtures of Sizes Less Than Ceiling Grid: Install as indicated on reflected ceiling plans or center in acoustical panel, and support fixtures independently with at least two 3/4-inch metal channels spanning and secured to ceiling tees.
- D. Support luminaires independent of ceiling framing. Support recessed grid luminaires from two opposite corners directly to structure. Wire or rod shall have breaking strength of the weight of fixture at a safety factor of 3.
- E. Exposed Grid Ceilings: Support surface mounted luminaires on grid ceiling directly from building structure.
- F. Install recessed luminaires to permit removal from below.
- G. Install recessed luminaires using accessories and firestopping materials to meet regulatory requirements for fire rating.
- H. Install luminaires level, plumb, and square with ceilings and walls unless otherwise indicated.

- I. Install fixture with no gaps between adjacent fixtures or between fixtures and surrounding surfaces. Trims of fixtures shall be properly and uniformly aligned.
- J. Supports:
 - 1. Sized and rated for luminaire weight.
 - 2. Able to maintain luminaire position after cleaning and relamping.
 - 3. Provide support for luminaire without causing deflection of ceiling or wall.
 - 4. Luminaire mounting devices shall be capable of supporting a horizontal force of 100 percent of luminaire weight and vertical force of 400 percent of luminaire weight.
- K. Flush-Mounted Luminaire Support:
 - 1. Secured to outlet box.
 - 2. Attached to ceiling structural members at four points equally spaced around circumference of luminaire.
 - 3. Trim ring flush with finished surface.
- L. Wall-Mounted Luminaire Support:
 - 1. Attached to structural members in walls
 - 2. Do not attach luminaires directly to gypsum board.
- M. Ceiling-Mounted Luminaire Support:
 - 1. Ceiling mount with two 5/32-inch-diameter aircraft cable supports adjustable to 120 inches in length.
 - 2. Ceiling mount with pendant mount with 5/32-inch-diameter aircraft cable supports adjustable to 120 inches in length.
 - 3. Ceiling mount with hook mount.
- N. Suspended Luminaire Support:
 - 1. Pendants and Rods: Where longer than 48 inches, brace to limit swinging.
 - 2. Stem-Mounted, Single-Unit Luminaires: Suspend with twin-stem hangers. Support with approved outlet box and accessories that hold stem and provide damping of luminaire oscillations. Support outlet box vertically to building structure using approved devices.
 - 3. Continuous Rows of Luminaires: Use tubing or stem for wiring at one point and wire support for suspension for each unit length of luminaire chassis, including one at each end.
 - 4. Do not use ceiling grid as support for pendant luminaires. Connect support wires or rods to building structure.
- O. Comply with requirements in Section 26 05 19 "Conductors and Cables" for wiring connections.

- P. Fixtures shall have their exterior labels removed and shall be thoroughly cleaned.
- Q. Locate the remote test/monitor modules identically so that they are visible and they form a straight line when viewed from the end of the corridor or room. Where a suspended ceiling exists, center the modules in adjacent ceiling tiles.

3.4 CONNECTIONS

- A. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.
- B. Make wiring connections to branch circuit using building wire with insulation suitable for temperature conditions within luminaire.
- C. Bond products and metal accessories to branch circuit equipment grounding conductor.
- D. Connect luminaires to branch circuit outlet boxes provided under Division 26 Section "Raceways and Boxes" using 1/2" flexible conduit.

3.5 IDENTIFICATION

- A. Identify system components, wiring, cabling, and terminals. Comply with requirements for identification specified in Section 26 05 53 "Identification for Electrical Systems."

3.6 FIELD QUALITY CONTROL

- A. Perform the following tests and inspections:
 - 1. Operational Test: After installing luminaires, switches, and accessories, and after electrical circuitry has been energized, test units to confirm proper operation.
 - 2. Test for Emergency Lighting: Interrupt power supply to demonstrate proper operation. Verify transfer from normal power to battery power and retransfer to normal.
- B. Luminaire will be considered defective if it does not pass operation tests and inspections.
- C. Prepare test and inspection reports.
- D. A visual inspection shall be performed to verify cleanliness and alignment of the fixtures, misalignment and light leaks shall be corrected, and rattles due to ventilation system vibration shall be eliminated.

3.7 STARTUP SERVICE

- A. Comply with requirements for startup specified in Section 26 09 43.16 "Addressable-Fixture Lighting Controls."
- B. Comply with requirements for startup specified in Section 26 09 43.23 "Relay-Based Lighting Controls."

3.8 ADJUSTING

- A. Occupancy Adjustments: When requested within 12 months of date of Substantial Completion, provide on-site assistance in adjusting the direction of aim of luminaires to suit occupied conditions. Make up to two visits to Project during other-than-normal hours for this purpose. Some of this work may be required during hours of darkness.
 - 1. During adjustment visits, inspect all luminaires. Replace lamps, drivers, or luminaires that are defective.
 - 2. Parts and supplies shall be manufacturer's authorized replacement parts and supplies.
 - 3. Adjust the aim of luminaires in the presence of the Architect.
- B. Adjust exit sign directional arrows as indicated on Drawings.
- C. Adjust and calibrate all dimming system controls until the system works as designed. Contact the Architect/Engineer when dimming is complete and demonstrate operation to owner's representative and Architect/Engineer.

3.9 CLEANING

- A. Clean electrical parts to remove conductive and deleterious materials.
- B. Remove dirt and debris from enclosures and lenses.
- C. Clean photometric control surfaces as recommended by manufacturer.
- D. Clean finishes and touch up damage.

END OF SECTION 26 51 19

SECTION 27 05 00 – TELECOMMUNICATIONS GENERAL REQUIREMENTS

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PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and General Provisions of the Contract, including General and Supplementary Conditions and Division 1 specification sections, apply to work of this section.

1.2 SUMMARY

- A. This Section includes telecommunications general administrative and procedural requirements. The following requirements are included in this Section to supplement the requirements specified in Division 1 Specification Sections.

1.3 COORDINATION WITH OTHER TRADES

- A. The Contractor shall coordinate the installation of the telecommunications wiring devices, equipment, supports, pathways etc., with all other trades prior to installation. Verify and coordinate routing of cable trays, conduits, wireways, etc., intended to support routings of telecommunications cabling.

1.4 DRAWINGS

- A. The drawings show the location and general arrangement of equipment, electrical systems and related items. They shall be followed as closely as elements of the construction will permit.
- B. Examine the drawings of other trades and verify the conditions governing the work on the job site. Arrange work accordingly, providing such fittings, conduit, junction boxes and accessories as may be required to meet such conditions.
- C. Deviations from the drawings, with the exception of minor changes in routing and other such incidental changes that do not affect the functioning or serviceability of the systems, shall not be made without the written approval of the Architect.
- D. The architectural and structural drawings take precedence in all matters pertaining to the building structure, mechanical drawings in all matters pertaining to mechanical trades and electrical drawings in all matters pertaining to electrical trades. Where there are conflicts or differences between the drawings for the various trades, report such conflicts or differences to the Architect for resolution.

1.5 INSPECTION OF SITE

- A. Visit the site, examine and verify the conditions under which the work must be conducted before submitting proposal.
- B. The submitting of a proposal implies that the contractor has visited the site and understands the conditions under which the work must be conducted.

1.6 CONTRACT BREAKDOWN

- A. Within two (2) weeks following award of contract, submit to the Architect/Engineer for approval a contract amount breakdown. Breakdown shall be submitted on a form similar to the form available at the Architect's/Engineer's office. All requests for payment shall be based on the approved breakdown.

1.7 TEMPORARY FACILITIES

- A. None

1.8 ALTERNATES

- A. See Alternate Section and other applicable parts of the specifications.

1.9 GUARANTEE

- A. Contractor guarantees that the installation is free from defects and agrees to replace or repair, any part of this installation which becomes defective within a period of one year following final acceptance, provided that such failure is due to defects in the equipment, material or installation or to follow the specifications and drawings. File with the Owner any and all guarantees from the equipment manufacturers.

1.10 CODES, PERMITS AND FEES

- A. Unless otherwise indicated, all required permits, licenses, inspections, approvals and fees for telecommunications work shall be secured and paid for by the contractor. All work shall conform to all applicable codes, rules and regulations.
- B. Rules of local service providers shall be complied with. Check with the local exchange carrier supplying service to the installation and determine all raceways and devices required including, but not limited to, all terminal cabinets, backboards, space requirements, etc.
- C. All work shall be executed in accordance with the rules and regulations set forth in local and state codes. Prepare any detailed drawings or diagrams which may be required by the governing authorities. Where the drawings and/or specifications indicate materials or construction in excess of code requirements, the drawings and/or specifications shall govern.

1.11 STANDARDS OF MATERIAL AND WORKMANSHIP:

- A. All materials shall be new. The electrical and physical properties of all materials, and the design, performance characteristics, and methods of construction of all items of equipment, shall be in accordance with the latest issue of the various, applicable Standard Specifications of the following recognized authorities:
 - 1. A.N.S.I. American National Standards Institute
 - 2. A.S.T.M. American Society for Testing Materials
 - 3. BICSI Building Industry Consulting Services International
 - 4. I.C.E.A. Insulated Cable Engineer's Association
 - 5. I.E.E.E. Institute of Electrical and Electronics Engineers
 - 6. N.E.C. National Electrical Code
 - 7. N.E.M.A. National Electrical Manufacturer's Association

8. TIA/EIA Telecommunications Industry Association/Electronic Industries Association
9. U.L. Underwriters Laboratories, Inc.

- B. Perform all work in a first class and workmanlike manner, in accordance with the latest accepted standards and practices for the Trades involved.
- C. All equipment of the same or similar systems shall be by the same manufacturer.

1.12 RECORD DRAWINGS

- A. Provide complete operating and maintenance instruction manuals covering all telecommunications equipment herein specified, together with parts lists. All literature shall be furnished in triplicate for Owner and shall be bound in book or ring binder form as directed by Architect/Engineer.
- B. The operating and maintenance instructions shall include a brief, general description for all electrical systems including, but not limited to:
 1. Routine maintenance procedures.
 2. Trouble-shooting procedures.
 3. Contractor's telephone numbers for warranty repair service.
 4. Shop drawings.
 5. Recommended spare parts lists.
 6. Names and telephone numbers of major material suppliers.
- C. Provide revised telecommunications working drawings indicating "as-built" conditions. Drawings shall indicate all changes that have occurred during construction. Properly identify backbone and horizontal wiring pathways. Locate all network and workstation devices. Identify all devices on plan with proper labeling. "As-Built" drawings shall be submitted on AutoCAD 2010 or compatible electronic format.
- D. Provide certified test records for all installed cable showing compliance with specifications. Provide in single bound volume arranged by function and geographic location.

1.13 MATERIAL AND EQUIPMENT MANUFACTURERS

- A. All items of equipment shall be furnished complete with all accessories normally supplied with the catalog items listed and all other accessories necessary for a complete and satisfactory operating system. All equipment and materials shall be new and shall be standard products of manufacturers regularly engaged in the production of telecommunications equipment and shall be of the manufacturer's latest design.
- B. Any equipment offered as a substitution shall be equal in quality, durability, appearance, and performance through all ranges of operation, shall conform with arrangements and space limitations of the equipment shown on the plans and/or specified, shall be compatible with the other components of the system. All costs to make these items of equipment comply with these requirements including, but not

limited to, conduit, wiring, enclosures and building alterations shall be included in the original bid. Similar equipment shall be by one manufacturer.

1.14 SHOP DRAWINGS/SUBMITTALS

- A. All shop drawings shall be submitted in groupings of similar and/or related items (cable and connectors, equipment cabinets and racks, etc.). Incomplete submittal groupings will be returned unchecked.
- B. Provide detailed layout shop drawings of backbone and horizontal cabling distribution, pathways, equipment room layouts, details and related information necessary of installation and maintenance. After review by the Engineer, a copy of drawings will be stamped and returned to the contractor.
- C. Submit for approval eight (8) copies of shop drawings for all telecommunications systems or equipment but not limited to the items listed below. Where items are referred to by symbolic designation on the drawings and specifications, all submittals shall bear the same designation. Refer to other sections of the specifications for additional requirements.
 - 1. Structured cabling system components
 - 2. Structured cable system J-hooks, cable runway, cable management, innerduct, etc.
 - 3. Outside plant cabling and components
 - 4. Equipment racks and cabinets including management components
 - 5. Labeling equipment
 - 6. Audio/video system components
 - 7. Access control system components
 - 8. Closed circuit television system components

1.15 USE OF EQUIPMENT

- A. The use of any equipment or any part thereof for purposes other than testing even with the Owner's consent shall not be construed to be an acceptance of the work on the part of the Owner, nor be construed to obligate the Owner in any way to accept improper work or defective materials.

1.16 WORK PROVIDED BY OTHERS

- A. Conduit, cabletrays, sleeves, boxes, floor boxes, surface raceways and grounding shall be provided by the Electrical Contractor under Division 26.
- B. Coordinate installation of telecommunications work with work provided by Electrical Contractor in paragraph A above.
- C. The Owner will provide network electronics equipment in all Communication Rooms and all voice cross-connect jumpers and voice/data patch cords as required.

1.17 CONTRACTOR QUALIFICATIONS

- A. The Installing Contractor for each communications system shall have a minimum of 5 years of experience with the types of systems specified.

PART 2 - PRODUCTS (NOT APPLICABLE)

PART 3 - EXECUTION

3.1 INSTALLATION OF EQUIPMENT

- A. Install all equipment in strict accordance with all directions and recommendations furnished by the manufacturer. Where such directions are in conflict with the drawings and specifications, report such conflicts to the Architect/Engineer for resolution.

3.2 DEMOLITION WORK

- A. All demolition of existing telecommunications equipment and materials shall be done by this contractor unless otherwise indicated. Include all items such as, but not limited to, cable, patch panels, devices, conduit, and wiring called out on the drawings and as necessary whether such items are actually indicated on the drawings or not in order to accomplish the installation of the specified new work.
- B. In general, demolition work is indicated on the drawings. However, the contractor shall visit the job site to determine the full extent and character of this work.
- C. Unless specifically noted to the contrary, removed materials shall not be reused in the work. Salvaged materials that are to be reused shall be stored safe against damage and turned over to the appropriate trade for reuse. Salvaged materials of value that are not to be reused shall remain the property of the Owner unless such ownership is waived. Items on which the Owner waives ownership shall become the property of the contractor, who shall remove and legally dispose of same, away from the premises.
- D. Where equipment or fixtures are removed, outlets shall be properly blanked off, and conduits capped. After alterations are done, the entire installation shall present a "finished" look, as approved by the Architect/Engineer. The original function of the present systems to be modified shall not be changed unless required by the specific revisions to the system as specified or as indicated.
- E. Reroute signal wires, lighting and power wiring as required to maintain service. Where walls and ceilings are to be removed as shown on the drawings, the conduit is to be cut off by the Electrical Trades so that the abandoned conduit in these walls and ceilings may be removed with the walls and ceilings by the Architectural Trades. All dead-end conduit runs shall be plugged at the remaining outlet boxes or at the panels.

- F. Where new walls and/or floors are installed which interfere with existing telecommunications outlets, devices, etc., this contractor shall adjust, extend and reconnect such items as required to maintain continuity of same.
- G. All electrical work in altered and unaltered areas shall be run concealed wherever possible. Use of surface metal raceway or exposed conduits will be permitted only where approved by the Architect/Engineer and as specifically indicated on the drawings.

3.3 WORK IN EXISTING BUILDINGS

- A. The Owner will provide access to existing buildings as required. However, this contractor, once work is started in the existing building, shall complete same without interruption so as to return work areas as soon as possible to Owner.
- B. Adequately protect and preserve all existing and newly installed work. Promptly repair any damage to same at this contractor's expense.
- C. Consult with the Owner's representative as to the methods of carrying on the work so as not to interfere with the Owner's operation any more than absolutely necessary. Accordingly, all telecommunications services shall be kept in operation as long as possible and the services shall only be interrupted at such time as will be designated by the Owner's representative.

3.4 COORDINATION

- A. Install work to avoid interference with work of other trades including, but not limited to, architectural, mechanical and electrical trades. Remove and relocate any work that causes interference at this contractor's expense. Disputes regarding the cause of interference will be resolved by the Owner's representative or Architect/Engineer.

3.5 CHASES AND RECESSES

- A. Chases and recesses shall be provided by the Architectural Trades, but this contractor shall be responsible for coordinating their accurate location and size.

3.6 SLEEVES

- A. Provide and install rigid steel conduit sleeves cut to length wherever conduits or cabling pass through floors or cables pass through openings in walls.
- B. All sleeves through the floor are to extend 2 inches above floor, unless otherwise noted. Provide escutcheons at each sleeve in finished areas and adequate spacing between sleeves to accommodate escutcheons.

3.7 CUTTING, PATCHING AND DAMAGE TO OTHER WORK

- A. Refer to General Conditions for requirements.
- B. All cutting, patching and repair work will be done by the trades who installed the work and paid for by the trades for whom the work is done.
- C. All cutting, patching and repair work shall be done by the contractor.
- D. All cutting, patching and repair work shall be performed by the contractor through approved, qualified subcontractors. Contractor shall include full cost of same in bid.

3.8 ACCESS DOORS

- A. Provide access doors for installation by architectural trades. In the walls, provide Milcor No. "DW" or "M" as required to make all controls, electrical boxes and other equipment installed by the contractor accessible. Minimum size 12 inches x 12 inches. In the ceiling, provide Milcor No. 3210, 3105 or 3206 for accessibility as mentioned above, 24 inches x 24 inches minimum size. The plaster or acoustical tile insert shall be by the architectural trades. Areas with accessible ceilings (ceilings where tiles are not fastened in place and can be individually removed without removal of adjacent tiles) will not require access doors.
- B. When access doors are in fire resistant wall or ceilings, they must bear the Underwriters Laboratories, Inc., Label, with time design rating equal to or exceeding that of the wall or ceiling unless they were a part of the tested assembly.

3.9 CLEANING

- A. All debris shall be removed daily as required to maintain the work area in a neat, orderly condition.
- B. Final cleanup shall include, but not be limited to, cleaning all telecommunications equipment spaces, devices, cover plates, and removing all scrap cable and debris from pathways.

3.10 PROTECTION AND HANDLING OF EQUIPMENT AND MATERIALS

- A. Equipment and materials shall be protected from theft, injury or damage.
- B. Protect conduit openings with temporary plugs or caps.
- C. Provide adequate storage for all equipment and materials delivered to the job site. Location of the space will be designated by the Owner's representative or Architect. Equipment set in place in unprotected areas must be provided with temporary protection.

3.11 EXTRA WORK

- A. For any extra telecommunications work that may be proposed, this contractor shall furnish to the General Contractor, an itemized breakdown of the estimated cost of the materials and labor required to complete this work. This contractor shall proceed only after receiving a written order from the General Contractor establishing the agreed price and describing the work to be done.

3.12 DRAWINGS AND MEASUREMENTS

- A. These Specifications and accompanying drawings are intended to describe and provide for finished work. They are intended to be cooperative, and what is called for by either shall be as binding as if call for by both. The Contractor will understand that the work herein described shall be complete in every detail.
- B. The drawings are not intended to be scaled for rough-in measurements or to serve as Shop Drawings. Field measurements, necessary for ordering materials and fitting the installation to the building construction and arrangement, shall be taken by this contractor.

END OF SECTION 27 05 00

SECTION 28 31 00 - FIRE ALARM

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PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1. Division 26 Section "Electrical General Requirements."

1.2 SUMMARY

- A. This Section includes design and installation of new devices onto an existing fire alarm system.
- B. Related Sections include the following:
 1. Division 8 Section "Door Hardware" for door closers and holders with associated smoke detectors, electric door locks, and release devices that interface with the fire alarm system.

1.3 DEFINITIONS

- A. FACP: Fire alarm control panel.
- B. LED: Light-emitting diode.
- C. NICET: National Institute for Certification in Engineering Technologies.
- D. Definitions in NFPA 72 apply to fire alarm terms used in this Section.

1.4 SYSTEM DESCRIPTION

- A. Noncoded, addressable system; multiplexed signal transmission dedicated to fire alarm service only.
- B. Noncoded, analog-addressable system; automatic sensitivity control of certain smoke detectors; and multiplexed signal transmission dedicated to fire alarm service only.
- C. Fire alarm system shall consist of the following:
 1. All new fire alarm control panel, devices, and wiring.
 2. System smoke detection above all control panels and notification appliance power supply panels.
 3. System smoke detection as required at air handling units, smoke rated transfer openings, and smoke damper locations.
 4. All flow and tamper switches to monitor fire sprinkler and standpipe systems and report appropriate alarm and supervisory signals.
 5. Manual fire alarm boxes at each building exit (prior to entering exit stairwells at each floor).
 6. Audible and visual notification appliances in all public and common areas of the building.

1.5 PERFORMANCE REQUIREMENTS

- A. Comply with NFPA 72.

- B. Comply with NFPA 70.
- C. Comply with NFPA 720.
- D. A complete functional system meeting the requirements of this specification, including alarm initiating devices and notification appliances at locations and ratings to meet the requirements of the Authorities Having Jurisdiction and all applicable codes shall be provided.
- E. Coordinate and avoid conflicts with casework, markerboards, feature walls, and other areas where fire alarm devices would interfere with furnishings, finishes, etc.
- F. Fire alarm system vendor shall provide sound pressure level calculations demonstrating compliance with NFPA 72 and establish quantities and tap settings of audible devices.
- G. No additional charges for work or equipment required for a code compliant system approved by the Authority Having Jurisdiction will be allowed.
- H. Obtain and refer to mechanical drawings for smoke damper locations, smoke rated transfer openings, and air handling equipment CFM's. Provide smoke detection as required by applicable codes.
- I. Premises protection includes IB Type building use group.
 - 1. Refer to drawings for complete code analysis including construction type, use groups, special occupancy types, rated walls, smoke barriers and partitions, etc.
- J. System functional performance shall be as indicated on the fire alarm matrix on the drawings.

1.6 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings:
 - 1. Shop Drawings shall be prepared by persons with the following qualifications:
 - a. Trained and certified by manufacturer in fire alarm system design.
 - b. Fire alarm certified by NICET, minimum Level III.
 - 2. System Operation Description: Detailed description for this Project, including method of operation and supervision of each type of circuit and sequence of operations for manually and automatically initiated system inputs and outputs. Manufacturer's standard descriptions for generic systems are not acceptable.
 - 3. Device Address List: Include address descriptions that will appear on the FACP display.
 - 4. System riser diagram with device addresses, conduit sizes, and cable and wire types and sizes.

5. Wiring Diagrams: Power, signal, and control wiring. Include diagrams for equipment and for system with all terminals and interconnections identified. Show wiring color code.
 6. Batteries: Provide battery sizing calculations. Battery size shall be a minimum of 125% of the calculated requirement.
 7. Duct Smoke Detectors: Performance parameters and installation details for each detector, verifying that each detector is listed for the complete range of air velocity, temperature, and humidity possible when air-handling system is operating.
- C. Qualification Data: For Installer.
- D. Field quality-control test reports.
- E. Operation and Maintenance Data: For fire alarm system to include in emergency, operation, and maintenance manuals. Comply with NFPA 72, Appendix A, recommendations for Owner's manual. Include abbreviated operating instructions for mounting at the FACP.
- F. Submittals to Authorities Having Jurisdiction: In addition to distribution requirements for submittals specified in Division 1 Section "Submittals," make an identical submittal to authorities having jurisdiction. To facilitate review, include copies of annotated Contract Drawings as needed to depict component locations. Resubmit if required to make clarifications or revisions to obtain approval. On receipt of comments from authorities having jurisdiction, submit them to Architect for review.
- G. Documentation:
1. Approval and Acceptance: Provide the "Record of Completion" form according to NFPA 72 to Owner, Architect, and Authorities Having Jurisdiction.
 2. Record of Completion Documents: Provide the "Permanent Records" according to NFPA 72 to Owner, Architect, and authorities having jurisdiction. Format of the written sequence of operation shall be the optional input/output matrix.
 - a. Hard copies on paper to Owner, Architect, and Authorities Having Jurisdiction.
 - b. Electronic media may be provided to Architect.
- 1.7 QUALITY ASSURANCE
- A. Installer Qualifications: Personnel shall be trained and certified by manufacturer for installation of units required for this Project.
 - B. Installer Qualifications: Personnel certified by NICET as Fire Alarm Level II.
 - C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

1.8 PROJECT CONDITIONS

- A. Interruption of Existing Fire Alarm Service: Do not interrupt fire alarm service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary guard service according to requirements indicated:
 - 1. Notify Architect, Construction Manager and Owner no fewer than seven days in advance of proposed interruption of fire alarm service.
 - 2. Do not proceed with interruption of fire alarm service without Architect, Construction Manager and Owner written permission.

1.9 SEQUENCING AND SCHEDULING

- A. Existing Fire Alarm Equipment: Maintain fully operational until new equipment has been tested and accepted. As new equipment is installed, label it "NOT IN SERVICE" until it is accepted. Remove labels from new equipment when put into service and label existing fire alarm equipment "NOT IN SERVICE" until removed from the building.
- B. Equipment Removal: After acceptance of the new fire alarm system, remove existing disconnected fire alarm equipment.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. FACP and Equipment:
 - a. Edwards Systems Technology Inc.
 - b. NOTIFIER; a Honeywell Company.
 - c. Siemens Building Technologies, Inc.; a Cerberus Division.
 - d. SimplexGrinnell LP; a Tyco International Company.
 - e. Gamewell-FCI; a Honeywell Company.
 - f. National Time & Signal.
 - g. Xtralis.

2.2 EXISTING FIRE ALARM SYSTEM

- A. Compatibility with Existing Equipment: Fire alarm system and components shall operate as an extension of an existing system.

2.3 MANUAL FIRE ALARM BOXES

- A. Description: UL 38 listed; finished in red with molded, raised-letter operating instructions in contrasting color. Station shall show visible indication of operation. Mounted on recessed outlet box; if indicated as surface mounted, provide manufacturer's surface back box.
1. Double-action mechanism requiring two actions to initiate an alarm, pull-lever type. With integral addressable module, arranged to communicate manual-station status (normal, alarm, or trouble) to the FACP. Double action pull stations shall meet ADA guidelines.
 2. Station Reset: Key- or wrench-operated switch.

2.4 SYSTEM SMOKE DETECTORS

A. General Description:

1. UL 268 listed, operating at 24-V dc, nominal.
2. Integral Addressable Module: Arranged to communicate detector status (normal, alarm, or trouble) to the FACP.
3. Plug-in Arrangement: Detector and associated electronic components shall be mounted in a plug-in module that connects to a fixed base. Provide terminals in the fixed base for connection of building wiring.
4. Self-Restoring: Detectors do not require resetting or readjustment after actuation to restore them to normal operation.
5. Integral Visual-Indicating Light: LED type. Indicating detector has operated and power-on status.
6. Remote Control: Unless otherwise indicated, detectors shall be analog-addressable type, individually monitored at the FACP for calibration, sensitivity, and alarm condition, and individually adjustable for sensitivity from the FACP.
 - a. Provide multiple levels of detection sensitivity for each sensor.

B. Photoelectric Smoke Detectors:

1. Sensor: LED or infrared light source with matching silicon-cell receiver.
2. Detector Sensitivity: Between 2.5 and 3.5 percent/foot smoke obscuration when tested according to UL 268A.

C. Ionization Smoke Detector:

1. Sensor: Responsive to both visible and invisible products of combustion. Self-compensating for changes in environmental conditions.
2. Detector Sensitivity: Between 0.5 and 1.7 percent/foot smoke obscuration when tested according to UL 268A.

D. Beam-Type Smoke Detector:

1. Xtralsis Open-Area Smoke Imaging Detection (OSID).
2. UL 268 listed, operating at 24-V dc, nominal.

3. Smoke Detector: Dual wavelength particle detection with optical imaging.
 4. Transmitters and Receivers: Each detector shall consist of the maximum number of transmitters per receiver, as specified by the manufacturer conditions.
 5. Adjustable Sensitivity: At least three sensitivity levels, settable at the receiver, measured as percent of obscuration.
 6. Misalignment Angle: Minimum tolerance of 1°.
 7. Two selectable alarm delay settings, allowing each to be associated with a corresponding sensitivity.
 8. Trouble signal delay, fixed at 20 seconds.
 9. Separate Color-Coded LEDs: Indicate normal, alarm, and trouble status with remote indicator panels.
- E. Remote Air-Sampling Detector System: Includes air-sampling pipe network, a laser-based photoelectric detector, a sample transport fan, and a control unit.
1. UL 268 listed, operating at 24-V dc, nominal.
 2. Pipe Network: Electrical metallic tubing connects control unit with designated sampling holes.
 3. Smoke Detector: Particle-counting type with continuous laser beam. Sensitivity adjustable to a minimum of three preset values.
 4. Sample Transport Fan: Centrifugal type, creating a minimum static pressure of 0.05-inch wg at all sampling ports.
 5. Control Unit: Single or multizone unit as indicated. Provides same system power supply, supervision, and alarm features as specified for the central FACP plus separate trouble indication for airflow and detector problems.
 6. Signals to the Central FACP: Any type of local system trouble is reported to the central FACP as a composite "trouble" signal. Alarms on each system zone are individually reported to the central FACP as separately identified zones.
- F. Duct Smoke Detectors:
1. Photoelectric Smoke Detectors:
 - a. Sensor: LED or infrared light source with matching silicon-cell receiver.
 - b. Detector Sensitivity: Between 2.5 and 3.5 percent/foot smoke obscuration when tested according to UL 268A.
 2. UL 268A listed, operating at 24-V dc, nominal.
 3. Integral Addressable Module: Arranged to communicate detector status (normal, alarm, or trouble) to the FACP.
 4. Plug-in Arrangement: Detector and associated electronic components shall be mounted in a plug-in module that connects to a fixed base. The fixed base shall be designed for mounting directly to the air duct. Provide terminals in the fixed base for connection to building wiring.
 - a. Weatherproof Duct Housing Enclosure: UL listed for use with the supplied detector. The enclosure shall comply with NEMA 250 requirements for Type 4X.
 5. Self-Restoring: Detectors shall not require resetting or readjustment after actuation to restore them to normal operation.

6. Integral Visual-Indicating Light: LED type. Indicating detector has operated and power-on status. Provide remote status and alarm indicator and test station where required.
7. Each sensor shall have multiple levels of detection sensitivity.
8. Sampling Tubes: Design and dimensions as recommended by manufacturer for the specific duct size, air velocity, and installation conditions where applied.
9. Relay Fan Shutdown: Provide two (2) sets of contacts rated to interrupt fan motor-control circuit.

2.5 HEAT DETECTORS

- A. General: UL 521 listed.
- B. Heat Detector, Combination Type: Actuated by either a fixed temperature of 135 deg F or rate-of-rise of temperature that exceeds 15 deg F per minute, unless otherwise indicated.
 1. Mounting: Plug-in base, interchangeable with smoke-detector bases.
 2. Integral Addressable Module: Arranged to communicate detector status (normal, alarm, or trouble) to the FACP.
- C. Heat Detector, Fixed-Temperature Type: Actuated by temperature that exceeds a fixed temperature of 190 deg F.
 1. Mounting: Plug-in base, interchangeable with smoke-detector bases.
 2. Integral Addressable Module: Arranged to communicate detector status (normal, alarm, or trouble) to the FACP.
- D. Continuous Linear Heat-Detector System: Consists of detector cable and control unit.
 1. Detector Cable: Rated detection temperature 155 deg F. Listed for "regular" service and a standard environment. Cable includes two steel actuator wires twisted together with spring pressure, wrapped with protective tape, and finished with PVC outer sheath. Each actuator wire is insulated with heat-sensitive material that reacts with heat to allow the cable twist pressure to short circuit wires at the location of elevated temperature.
 2. Control Unit: Two-zone or multizone unit as indicated. Provides same system power supply, supervision, and alarm features as specified for the central FACP.
 3. Signals to the Central FACP: Any type of local system trouble is reported to the central FACP as a composite "trouble" signal. Alarms on each detection zone are individually reported to the central FACP as separately identified zones.
 4. Integral Addressable Module: Arranged to communicate detector status (normal, alarm, or trouble) to the FACP.

2.6 SYSTEM CARBON MONOXIDE DETECTORS

- A. General Description:
 1. UL 2075 listed, operating at 24-V dc, nominal.

2. Provide means for addressable connection to fire-alarm system.
3. Detector must communicate detector status (normal, alarm, or trouble) to the FACP.
4. Detector must send trouble alarm when nearing end-of-life, power supply problems, or internal faults.
5. Detector must provide alarm contacts and trouble contacts.
6. Mounting: Adapter plate for outlet box mounting.
7. Testable by introducing test carbon monoxide into sensing cell.
8. Locate, mount, and wire in accordance with manufacturer's written instructions.
9. Test button simulates alarm condition.

2.7 NOTIFICATION APPLIANCES

- A. Description: Equipped for mounting as indicated and with screw terminals for system connections.
1. Combination Devices: Factory-integrated audible and visible devices in a single-mounting assembly.
 2. Finishes:
 - a. Wall mounted appliances: Provide red finish with white lettering
 - b. Ceiling Mounted Appliances: Provide white finish.
- B. Horns: Electric-vibrating-polarized type, 24-V dc; with provision for housing the operating mechanism behind a grille. Horns shall produce a sound-pressure level of 90 dBA, measured 10 feet from the horn.
- C. Visible Alarm Devices: Xenon strobe lights listed under UL 1971, with clear or nominal white polycarbonate lens mounted on an aluminum faceplate. The word "FIRE" is engraved in minimum 1-inch- high letters on the lens.
1. Rated Light Output: 15, 30, 60, 75, 110, 135, 185 candela as required to meet NFPA 72 requirements.
 2. Strobe Leads: Factory connected to screw terminals.

2.8 REMOTE STATUS AND ALARM INDICATORS

- A. Remote status and alarm indicator and test stations, with LED indicating lights. Light is connected to flash when the associated device is in an alarm or trouble mode. Lamp is flush mounted in a single-gang wall plate. A red, laminated, phenolic-resin identification plate at the indicating light identifies, in engraved white letters, device initiating the signal and room where the smoke detector or valve is located. For water-flow switches, the identification plate also designates protected spaces downstream from the water-flow switch.

2.9 MAGNETIC DOOR HOLDERS

- A. Description: Units are equipped for wall or floor mounting as indicated and are complete with matching door plate.
 - 1. Electromagnet: Requires no more than 3 W to develop 25-lbf holding force.
 - 2. Wall-Mounted Units: Flush mounted, unless otherwise indicated.
 - 3. Rating: 24-V ac or dc.
- B. Material and Finish: Match door hardware.

2.10 REMOTE ANNUNCIATOR

- A. Description: Duplicate annunciator functions of the FACP for alarm, supervisory, and trouble indications. Also duplicate manual switching functions of the FACP, including acknowledging, silencing, resetting, and testing.
 - 1. Mounting: Flush cabinet, NEMA 250, Class 1.
- B. Display Type and Functional Performance: Alphanumeric display same as the FACP. Controls with associated LEDs permit acknowledging, silencing, resetting, and testing functions for alarm, supervisory, and trouble signals identical to those in the FACP.

2.11 ADDRESSABLE INTERFACE DEVICE

- A. Description: Microelectronic monitor module listed for use in providing a system address for listed alarm-initiating devices for wired applications with normally open contacts.

2.12 ADDRESSABLE CONTROL MODULE

- A. Provide for integration of auxiliary control functions into the analog signaling circuit. Intelligent analog signaling circuit control module shall have the following capabilities:
 - 1. Communication interaction with the analog signaling circuit having the capability of initiating a control function to an auxiliary device based on a specified event.
 - 2. Provide NO/NC contact pairs rated at 2 amps 120 VAC or 24 VDC.

2.13 DIGITAL ALARM COMMUNICATOR TRANSMITTER

- A. Listed and labeled according to UL 632.
- B. Functional Performance: Unit receives an alarm, supervisory, or trouble signal from the FACP, and automatically captures one or two telephone lines and dials a preset number for a remote central station. When contact is made with the central station(s), the signal is transmitted. The unit supervises up to two telephone lines. Where supervising 2 lines, if service on either line is interrupted for longer than 45 seconds, the unit initiates a local trouble signal and transmits a signal indicating loss of telephone line to the remote alarm receiving station over the remaining line. When telephone service is restored, unit

automatically reports that event to the central station. If service is lost on both telephone lines, the local trouble signal is initiated.

- C. Secondary Power: Integral rechargeable battery and automatic charger. Battery capacity is adequate to comply with NFPA 72 requirements.
- D. Self-Test: Conducted automatically every 24 hours with report transmitted to central station.

2.14 GUARDS FOR PHYSICAL PROTECTION

- A. Description: Welded wire mesh of size and shape for the manual station, smoke detector, gong, or other device requiring protection.
 - 1. Factory fabricated and furnished by manufacturer of the device.
 - 2. Finish: Paint of color to match the protected device.

2.15 WIRE AND CABLE

- A. Wire and cable for fire alarm systems shall be UL listed and labeled as complying with NFPA 70, Article 760.
- B. Fire alarm wire and cable shall be as specified by the system manufacturer including conductor gage, conductor quantity, conductor twists and shielding required to meet NFPA class and style performance specified.
- C. Signaling Line Circuits and other power limited fire alarm circuits (PLFA):
 - 1. PLFA circuits installed in conduit or raceway: U.L. Listed type FPL
 - 2. PLFA circuit cable installed exposed in accessible ceiling spaces, risers and elsewhere: U.L. Listed type FPLP.
 - 3. PLFA circuits installed where 2 hr rating is required to meet the survivability requirements of NFPA 72: Circuit integrity cable, NFPA 70 Article 760, Classification CI, UL listed as Type FPL, FPLR or FPLP as required, and complying with requirements in UL 1424 and in UL 2196 for a 2-hour rating.
- D. Non-Power-Limited Fire Alarm Circuits (NPLFA):
 - 1. NPLFA circuits installed in conduit: Solid-copper conductors with 600-V rated, 75 deg C, color-coded insulation.
 - a. Low-Voltage Circuits: No. 16 AWG, minimum.
 - b. Line-Voltage Circuits: No. 12 AWG, minimum.
 - 2. NPLFA circuit cable installed exposed in ceiling spaces, risers and elsewhere: Multi-conductor cable, U.L Listed type NPLFP.
 - 3. NPLFA circuits installed where 2 hr rating is required to meet the survivability requirements of NFPA 72: Multi-conductor cable, U.L Listed type NPLFP-CI

4. NPLFA circuit cable installed exposed in ceiling spaces, shafts and elsewhere: Multi-conductor Armored Cable, NFPA 70 Type MC, copper conductors, copper drain wire, aluminum or steel armor with red identifier stripe, UL listed for fire alarm and cable tray installation, plenum rated, and complying with requirements in UL 2196 for a 2-hour rating.

PART 3 - EXECUTION

3.1 EQUIPMENT INSTALLATION

- A. Connecting to Existing Equipment: Verify that existing fire alarm system is operational before making changes or connections.
 1. Connect new equipment to the existing control panel in the existing part of the building.
 2. Connect new equipment to the existing monitoring equipment at the Supervising Station.
 3. Expand, modify, and supplement the existing control or monitoring equipment as necessary to extend the existing control or monitoring functions to the new points.
 4. New components shall be capable of merging with the existing configuration without degrading the performance of either system.
- B. Smoke or Heat Detector Spacing:
 1. Smooth ceiling spacing shall not exceed 30 feet or the listed spacing of the detectors, whichever is less.
 2. Spacing of heat detectors for irregular areas, for irregular ceiling construction, and for high ceiling areas, shall be determined according to Appendix A in NFPA 72.
 3. Spacing of heat detectors shall be determined based on guidelines and recommendations in NFPA 72.
- C. HVAC: Locate detectors not closer than 3 feet from air-supply diffuser or return-air opening.
- D. Duct Smoke Detectors: Comply with NFPA 72. Install sampling tubes so they extend the full width of the duct.
- E. Heat Detectors in Elevator Shafts: Coordinate temperature rating and location with sprinkler rating and location.
- F. Single-Station Smoke Detectors: Where more than one smoke alarm is installed within a dwelling or suite, they shall be connected so that the operation of any smoke alarm causes the alarm in all smoke alarms to sound.
- G. Single-Station Carbon Monoxide Detectors: Where more than one carbon monoxide detector is installed within a dwelling or suite, they shall be connected so that the operation of any carbon monoxide detector causes the alarm in all carbon monoxide detectors to sound.

- H. Remote Status and Alarm Indicators: Install near each smoke detector, each duct detector that is above 10'-0" aff, concealed, or otherwise not readily visible from normal viewing position. Coordinate exact locations with local fire department and submit to architect for approval.
- I. Audible Alarm Notification Appliances: Install wall mounted appliances not less than 6 inches below the ceiling.
- J. Visible Alarm Notification Appliances: Install wall mounted appliances at 96" AFF or 6 inches below the ceiling, whichever is less.
- K. Coordinate ceiling mounted appliances with reflected ceiling plans. Do not install visual appliances where pendant mounted or suspended lighting fixtures will obstruct intended viewing angles.
- L. Install wall mounted and ceiling mounted notification appliances flush on recessed j-box or back box for all new work and on existing gyp-board partition walls.
- M. Install notification appliances on existing CMU walls on surface back-boxes matching the dimensions and finish of the notification appliance.
- N. Device Location-Indicating Lights: Locate in public space near the device they monitor.
- O. FACP: Surface mounted with tops of cabinets not more than 72 inches above the finished floor.
 - 1. Install smoke detector above panel. Install on ceiling for ceilings under 10 ft. For ceilings above 10', wall mount a smoke detector listed for releasing service 10' AFF or 1' below finished ceiling (whichever is lower).
- P. Annunciator: Install with top of panel not more than 72 inches above the finished floor.
- Q. Provide all 120V branch circuits for all control panels, sub panels, and ancillary equipment required for the system.

3.2 WIRING INSTALLATION

- A. Install wiring according to the following:
 - 1. NECA 1.
 - 2. TIA/EIA 568-A.
- B. Wiring Method:
 - 1. Fire alarm circuits shall consist of multi-conductor cables installed in accessible ceiling spaces.
 - 2. Where ceilings consist of exposed construction, fire alarm multi-conductor cable shall be installed on top of joists, beams etc. and shall be concealed from view. Where the structural elements do not allow for the cable to be installed in a concealed fashion, then install the cable in conduit.

3. Install fire alarm cable in conduit in mechanical rooms, loading docks and similar service spaces.
 4. Drops to surface mounted devices shall be installed in conduit or surface raceway. No exposed cable shall be visible below the ceiling. Where the ceiling is exposed, route the conduit or raceway up to the structural member that will conceal the cable.
 5. Drops to devices recessed in partition walls shall be installed in conduit.
 6. Cables and raceways used for fire alarm circuits, and equipment control wiring associated with the fire alarm system, may not contain any other wire or cable.
 7. Signaling Line Circuits: Power-limited fire alarm cables may be installed in the same cable or raceway as signaling line circuits, if the system manufacturer permits it.
- C. Wiring within Enclosures: Separate power-limited and non-power-limited conductors as recommended by manufacturer. Install conductors parallel with or at right angles to sides and back of the enclosure. Bundle, lace, and train conductors to terminal points with no excess. Connect conductors that are terminated, spliced, or interrupted in any enclosure associated with the fire alarm system to terminal blocks. Mark each terminal according to the system's wiring diagrams. Make all connections with approved crimp-on terminal spade lugs, pressure-type terminal blocks, or plug connectors.
- D. Cable Taps: Use numbered terminal strips in junction, pull, and outlet boxes, cabinets, or equipment enclosures where circuit connections are made.
- E. Color-Coding: Color-code fire alarm conductors differently from the normal building power wiring. Use one color-code for alarm circuit wiring and a different color-code for supervisory circuits. Color-code audible alarm-indicating circuits differently from alarm-initiating circuits. Use different colors for visible alarm-indicating devices. Paint fire alarm system junction boxes and covers red.
- F. Risers: Install at least two vertical cable risers to serve the fire alarm system. Separate risers in close proximity to each other with a minimum 1-hour-rated wall, so the loss of one riser does not prevent the receipt or transmission of signals from other floors or zones.
- G. Wiring to Remote Alarm Transmitting Device: 1-inch conduit between the FACP and the transmitter. Install number of conductors and electrical supervision for connecting wiring as needed to suit monitoring function.
- 3.3 IDENTIFICATION
- A. Identify system components, wiring, cabling, and terminals according to Division 26 Section "Electrical Identification."
 - B. Install instructions frame in a location visible from the FACP.
 - C. Paint power-supply disconnect switch red and label "FIRE ALARM."

3.4 GROUNDING

- A. Ground the FACP and associated circuits; comply with IEEE 1100. Install a ground wire from main service ground to the FACP.

3.5 FIELD QUALITY CONTROL

- A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust field-assembled components and equipment installation, including connections, and to assist in field testing. Report results in writing.
- B. Perform the following field tests and inspections and prepare test reports:
 - 1. Perform each electrical test and visual and mechanical inspection listed in NFPA 72. Certify compliance with test parameters. All tests shall be conducted under the direct supervision of a NICET technician certified under the Fire Alarm Systems program at Level III.
 - a. Include the existing system in tests and inspections.
 - 2. Visual Inspection: Conduct a visual inspection before any testing. Use as-built drawings and system documentation for the inspection. Identify improperly located, damaged, or nonfunctional equipment, and correct before beginning tests.
 - 3. Testing: Follow procedure and record results complying with requirements in NFPA 72.
 - a. Detectors that are outside their marked sensitivity range shall be replaced.
 - 4. Test and Inspection Records: Prepare according to NFPA 72, including demonstration of sequences of operation by using the matrix-style form in Appendix A in NFPA 70.

3.6 PROGRAMMING

- A. Coordinate final address descriptions for alarm, supervisory and trouble indication that appear on FACP and Annunciator displays with the Owners representative. This shall include all room names, room numbers, building areas for fire protection zones, exit door descriptions and similar items. This coordination shall take place and be implemented in the programming prior to Demonstration and Owner Training.

3.7 ADJUSTING

- A. Occupancy Adjustments: When requested within 12 months of date of Substantial Completion, provide on-site assistance in adjusting system to suit actual occupied conditions. Provide up to two visits to Project outside normal occupancy hours for this purpose.

- B. Follow-Up Tests and Inspections: After date of Substantial Completion, test the fire alarm system complying with testing and visual inspection requirements in NFPA 72. Perform tests and inspections listed for three monthly, and one quarterly, periods.

3.8 WARRANTY

- A. All newly installed equipment shall be warranted by the contractor for a period of one year following acceptance. The warranty shall include parts, labor, prompt field service, pickup and delivery.

3.9 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain the fire alarm system, appliances, and devices. Refer to Division 1 Section "Closeout Procedures".

END OF SECTION 28 31 00

APPENDIX 1

Report of Asbestos Building Materials Survey dated March 28, 2013



WILLEM ENVIRONMENTAL CONSULTING, LLC

Mr. Scott Goodsell, AIA
President
G.H. Forbes Associates Architects
816 E. 4th Street
Royal Oak, Michigan 48067

November 11, 2024
WEC Project No. 24-025-00

Re: Report for Hazardous Materials Verification Survey
Cadillac Place 15th Floor – Building Three Judicial Suites Project
3044 W. Grand Boulevard
Detroit, Michigan

Dear Mr. Goodsell:

Willem Environmental Consulting, LLC (WEC) is pleased to submit this letter summarizing the findings of the Hazardous Materials Verification Survey (HMVS) conducted for the above referenced renovation project located in the Cadillac Place Building in Detroit, Michigan. The HMS was conducted in accordance with the WEC's approved proposal (WEC Proposal No. 24-025), dated September 23, 2024.

BACKGROUND

It is understood that a portion of the 15th floor of the Cadillac Place building will be renovated into three judicial suites. The renovation areas include: Rooms 15001-15013, 15017, 15046-15048, corridor 15049, plumbing chase near bathrooms and portions of the 14th floor directly below. The renovation activities that may disturb potentially hazardous materials include, but are not limited to:

- Demolition of walls
- Removal of doors
- Removal of flooring and mechanically removal of adhesive
- Cores through floors and ceilings
- Demolition of light fixtures, ceiling and grid
- Removal of sink, faucet, disposal and associated components
- Removal of hot water, cold water, sanitary and vent piping, insulation, valves and associated components
- Removal of duct work, insulation, dampeners, temperature controls and associated components
- Removal of electrical components.

The purpose of this project is to identify asbestos-containing materials (ACM), lead-containing paint (LCP), cadmium-containing paint (CCP) and other hazardous materials in the buildings and provide consulting services to G.H. Forbes Associates Architects and State of Michigan for handling such materials that may be disturbed during renovation activities.

As part of the HMVS, previous reports (Asbestos Building Survey, Paint Chip Testing and Waste Assessment reports) prepared by Materials Testing Consultants (MTC) were reviewed and compared to the renovation areas and project design drawings.

Laura Willem of WEC, who is a State of Michigan accredited asbestos building inspector and lead inspector/risk assessor (Accreditation No. A25682 and P-08098, respectively) conducted the review of previous reports and the field survey on October 30, 2024. A Sample Location Plan and Photographic Log are included in **Appendix A** and **Appendix B**, respectively.

PREVIOUS STUDIES

WEC reviewed the following MTC reports and compared the results to the modernization drawings and site conditions:

- Report of Asbestos Building Materials Survey (MTC Project No. 121268), dated March 28, 2013. WEC reviewed the information related to the 14th and 15th floors only.
- Paint Chip Testing Report (MTC Project No. 231482), dated July 31, 2023.
- Waste Assessment Report (MTC Project No. 231482), dated July 31, 2023

Asbestos

ACM is defined as a building material that contains greater than 1% asbestos. MTC identified the following twelve (12) materials suspected to contain asbestos on the 14th and 15th floors of the building:

- Plaster
- 6" wool felt pipe insulation
- 2' x 4' ceiling tile, white – fake 2' x 2' with random pinholes and knife punctures
- Red/pink fire caulk
- Gray duct caulk
- Dark peach cove base
- Aircell pipe insulation
- Mag pipe insulation
- White interior window caulk
- Gray sink undercoating
- Beige duct caulk
- Mudded fittings

Additionally, the roofing materials are assumed to contain asbestos.

Of those 12 suspect ACMs, the following were identified as **ACM** in MTC's:

- Aircell pipe insulation
- Mag pipe insulation
- Mudded fittings
- Roofing materials (assumed)

Paint Chip Sampling

MTC collected four (4) paint chip samples from the 15th floor renovation areas and submitted them for lead, cadmium and chromium analysis. For the purpose of this report, LCP, CCP and chromium-containing paint is defined as a paint that contains any detectable level of lead/cadmium/chromium over the laboratory's method detection limit. MTC collected paint chips from the following materials on the 15th floor:

- White wall
- Blue wall
- Cream ceiling
- Teal on wall above ceiling tile level

According to the laboratory analysis, **cream** ceiling paint is considered LCP and the **teal** paint on wall above the ceiling tile level is considered LCP and chromium-containing paint.

Other Hazardous Materials

MTC also identified 219 mercury-containing fluorescent light bulbs in the renovation area.

CURRENT ASBESTOS SURVEY

The purpose of the asbestos survey was to compare current materials in the renovation areas to the previous MTC study, identify and sample friable and non-friable materials suspected of containing asbestos within the renovation areas that were not previously identified, and collect confirmatory samples. The results of this survey are needed prior to renovation activities.

Sixteen (16) bulk samples of suspect ACM were collected during the current study and were analyzed by Apex Research Laboratory (Apex) using Polarized Light Microscopy (PLM) analysis (EPA Method No. 600/R-93/116). Apex is accredited by the National Institute of Standards and Technology (NIST) and National Voluntary Laboratory Accreditation Program (NVLAP) for analysis of asbestos using PLM.

Asbestos Summary Tables and laboratory results are included in **Appendix C** of this report. The table includes the following information:

- Homogeneous Area number - *a homogeneous area is defined as a material that appears similar throughout the building in terms of color, texture, composition and/or date of application.*
- Sample description
- Sample number
- Sample location
- Type of material
 - Thermal Systems Insulation - *ACM applied to pipes, fittings, boilers, tanks, ducts, or other HVAC components to prevent heat loss or gain.*

- Surfacing material - *ACM that is sprayed-on, troweled-on, or otherwise applied to surfaces, such as acoustical plaster and fireproofing materials on structural members, or other materials on surfaces for acoustical, decorative, fireproofing, or other purposes.*
- Miscellaneous material - *All other ACM, including but not limited to, acoustical ceiling tile, resilient floor tile and coverings, concrete pipes, siding, and roofing materials.*
- Friability of the material
 - Friable – *materials that can be crumbled, pulverized, or reduced to powder by hand pressure, when dry.*
 - Category I, non-friable - *includes packings, gaskets, resilient floor coverings and asphalt roofing products*
 - Category II, non-friable – *all other non-friable materials*
- Asbestos result of each sample
- Locations, general notes and quantities of the identified ACM

The following materials were sampled during this current study:

- Drywall and joint compound
- Brown glue pods, remnants
- Carpet mastic/light gray floor leveler/mastic under leveler
- Black older floor leveler
- 4" concrete floor tiles
- Thin darker gray floor leveler
- 12" x 12" peach floor tile and associated glue
- White mud-like debris on insulation

Asbestos Findings

As indicated in the Asbestos Sample Summary table (Table 1) and laboratory reports included in **Appendix C** and based on the results of the previous MTC findings, the following materials on the 14th floor and 15th floor renovation areas are considered ACM:

- Brown glue pods remnants: Approximately 1,500 square feet of this material was observed on the plaster ceiling in the north wing of the 15th floor renovation area and on the 14th floor plaster ceiling under Room 1503.
- Pipe insulation and fittings: Approximately 4 linear feet of asbestos-containing pipe insulation was observed in the bathroom chase on the 15th floor and approximately 20 linear feet of asbestos-containing pipe insulation and 4 fittings were observed in the bathroom chase on the 15th floor. Additionally, this material by be present in enclosed in chases in the walls.
- Roof materials above the 15th floor.

CURRENT PAINT SURVEY

The purpose of the paint survey was to compare current materials in the renovation areas to the previous MTC study. Additionally, 4 Paint chip samples were collected from the renovation areas and submitted to Apex for cadmium and lead analysis using atomic

absorption spectroscopy (USEPA Method 7420). Apex is accredited by the American Industrial Hygiene Association (AIHA) Laboratory Accreditation Programs, LLC (AIHA-LAP, LLC) in the Environmental Lead Laboratory Accreditation Program (ELLAP) for lead in paint, air, and dust wipes.

Lead and Cadmium Paint Chip Sampling Summary Tables and laboratory results are included in Appendix C of this report. Each table includes the following information:

- Sample Number
- Sample Location
- Color
- Substrate
- Result
- Other Locations where paint is found

The samples were collected from the following substrates:

- Off-white plaster ceiling
- Blue drywall wall
- White drywall wall
- Black concrete floor under floor tile

Cadmium, Chromium and Lead Paint Findings

The results of paint chip analysis were compared with Michigan Occupational Safety and Health Administration (MIOSHA) standards, which states that LCP is a paint with detectable levels of lead at or above the laboratory method detection limits (MDLs). It is standard to apply the requirements in the MIOSHA Part 603 Lead Exposure in Construction standard to working on surfaces containing any detectable levels of cadmium or chromium.

As indicated in the Paint Chip Sampling Summary Tables and laboratory reports included in **Appendix D** as well as MTC's sampling report, the cadmium was not detected in any of the samples. Lead was detected in the following paints:

- Off-white/cream plaster ceiling
- Teal wall above the ceiling tile level
- Black concrete floor under 12" x 12" peach floor tile

Additionally, chromium was found in the teal found on walls above the ceiling tile level.

Hazardous Materials Survey

A visual survey of the renovation areas was performed to identify and quantify fluorescent light ballasts potentially containing polychlorinated biphenyls (PCBs), light tubes assumed to contain mercury and other potentially hazardous materials that may be encountered

during demolition or rehabilitation activities. The following potentially hazardous materials were observed in the building and may requiring special handling and disposal:

Hazardous Materials Inventory by Building		
Item/Material	Possible Contaminant	Quantity
Exit signs	Metals and/or radioactive source	4
4' fluorescent light tubes	Mercury	183
U-shaped fluorescent light tubes	Mercury	6

CONCLUSIONS

Asbestos

Brown glue pods, pipe and fitting insulation and roofing materials were identified as ACM in the renovation areas and may be disturbed during renovation activities. Cores through the floor and tie-ins to plaster ceiling are anticipated that may disturb the glue pods. Disturbing the glue pods shall be avoided or the glue pods shall be abated prior to renovation activities that will disturb the material.

Asbestos-containing pipe insulation and fittings in the bathroom plumbing chases shall be abated if plumbing tie-ins are required at areas where the asbestos materials are present.

Roof cuts are anticipated as part of the renovation activities and the roof is assumed to contain asbestos. Roofing material in these cut areas shall be abated prior to renovation activities.

Lead and Chromium Containing Paints

Lead was detected in the following paints:

- Off-white/cream plaster ceiling
- Teal wall above the ceiling tile level
- Black concrete floor under 12" x 12" peach floor tile

Additionally, chromium was found in the teal found on walls above the ceiling tile level.

Cores through the floor and plaster ceilings are anticipated and surfaces are painted with LCP. Contractors shall perform cores in accordance with MIOSHA Part 603 Lead in Construction Standard.

Mercury

Mercury-containing fluorescent light tubes were found in the renovation area. These materials should be removed as universal waste prior to renovation activities that may disturb these items.

Potentially Hazardous Materials

Exit signs were observed in the renovation areas that may require proper removal and disposal or recycling prior to renovation activities.

Specifications

WEC will develop technical specifications for removal of asbestos, LCP and hazardous materials identified in this report. These specifications should be included in the project biddings documents and provided to the abatement and renovation contractors prior to initiating renovation activities.

Abatement

A State of Michigan-licensed asbestos abatement contractor should be retained to abate and dispose the hazardous materials identified in this report. The contractors should conduct a pre-bid walk-through survey of the building to verify the locations and quantities of ACM and other hazardous materials identified in this report.

Visual observations, verification of removal and cleanup, and air monitoring for asbestos fibers during abatement activity should be performed by a third-party consultant retained by the owner, such as WEC, to demonstrate compliance with the project specifications.

The contractor performing the abatement and renovation activities will need to comply with Michigan Occupational Safety and Health Administration (MIOSHA) Part 309 (Cadmium) and Part 603 (Lead Exposure in Construction).

LIMITATIONS

The findings and opinions presented in this report are based on the scope of services defined herein and have been made to assist G.H. Forbes Associates Architects and State of Michigan in making a reasonable assessment of risk with respect to the possible presence of hazardous materials associated within the Cadillac Place 15th Floor – Build Three Judicial Suites renovation project. This study was performed in accordance with standard of care and diligence considered to be representative of industrial hygiene practices in this region at the present time.

The results of this assessment cannot and should not be construed as a certification of the absence of any hazardous or regulated substances from the property, but rather a diligent and prudent review of available data within an established work scope, and time and budgetary restraints.

Through the course of this survey or any hazardous materials building survey, there are a number of obstacles and limitations that can affect the final outcome of the report. These limitations include, but are not limited to, the following factors: access concerns; materials that are damaged or cannot be intrusively sampled; materials that have been replaced during renovation activities; and materials that are located in inaccessible and/or concealed areas which limits quantification. Due to these limitations, suspect building materials uncovered during renovation activities and not mentioned in this report should be sampled,



analyzed, and dealt with based on the findings, in accordance with the regulations governing such materials.

I appreciate this opportunity to be of service to you on this project. If you have any questions or need any additional information, please feel free to contact me at 248.546.3684 or lwillem.env@gmail.com.

Sincerely,

A handwritten signature in blue ink, appearing to read 'Laura A. Willem', is positioned above the printed name.

Laura A. Willem
Willem Environmental Consulting, LLC

Attachments

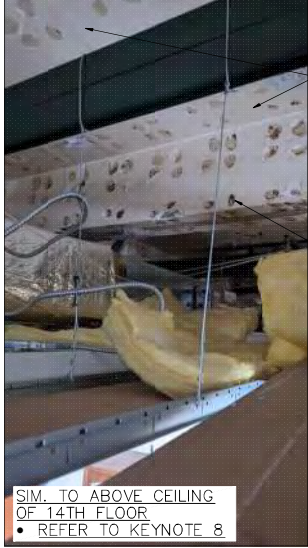
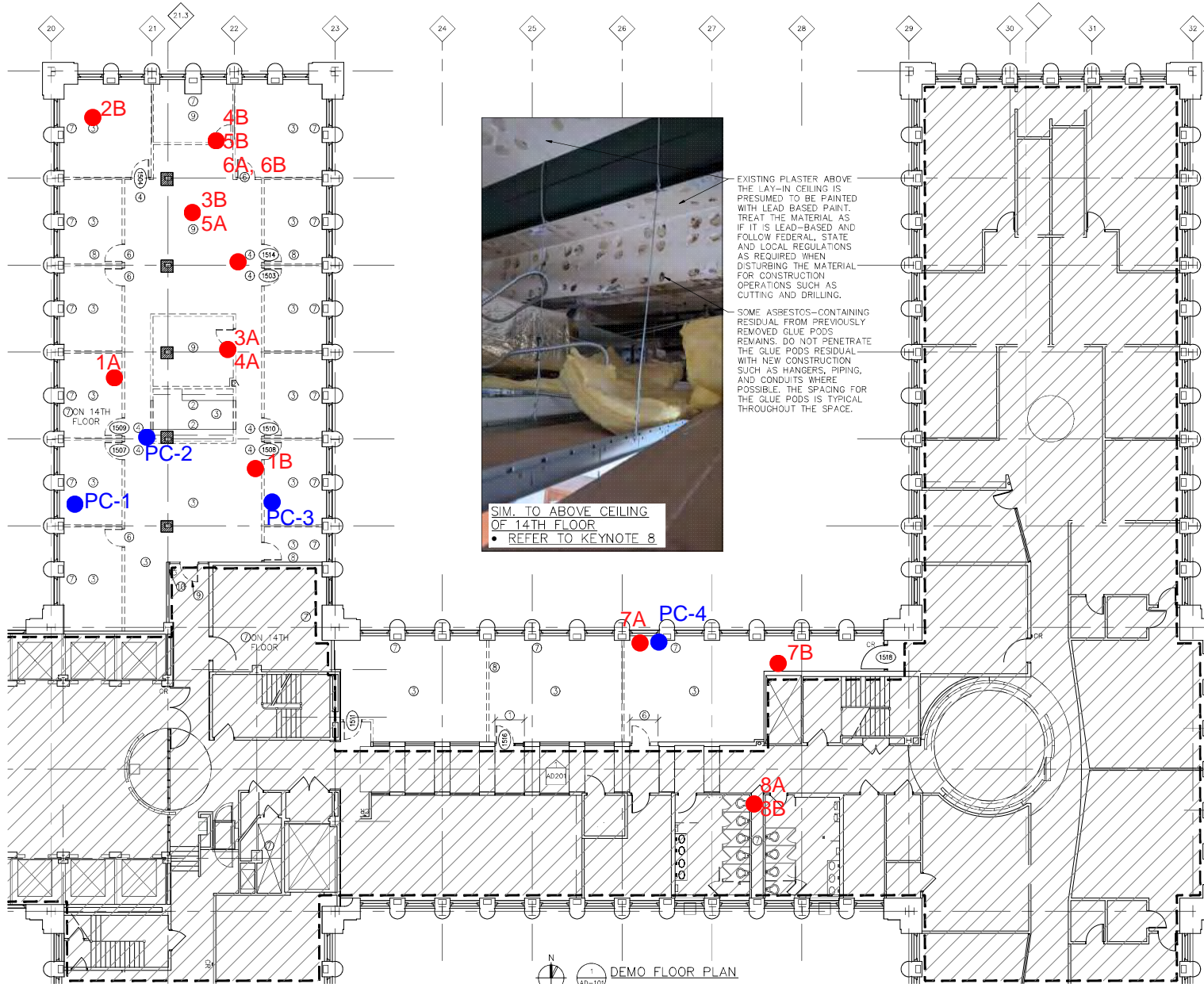
APPENDIX A

Sample Location Plan

Sample Location Plan

● Suspect asbestos sample location

● Paint chip sample location



SIM. TO ABOVE CEILING OF 14TH FLOOR
 • REFER TO KEYNOTE 8

EXISTING PLASTER ABOVE THE LAY-IN CEILING IS PRESUMED TO BE PAINTED WITH LEAD-BASED PAINT. TREAT THE MATERIAL AS IF IT IS LEAD-BASED AND FOLLOW FEDERAL, STATE AND LOCAL REGULATIONS AS REQUIRED WHEN DISTURBING THE MATERIAL FOR CONSTRUCTION OPERATIONS SUCH AS CUTTING AND DRILLING.

SOME ASBESTOS-CONTAINING RESIDUAL FROM PREVIOUSLY REMOVED GLUE PODS REMAINS. DO NOT PENETRATE THE GLUE PODS RESIDUAL WITH NEW CONSTRUCTION SUCH AS HANGERS, PIPING, AND CONDUITS WHERE POSSIBLE. THE SPACING FOR THE GLUE PODS IS TYPICAL THROUGHOUT THE SPACE.

GENERAL NOTES:

1. THERE ARE KNOWN HAZARDOUS MATERIALS (LEAD-BASED PAINT, ASBESTOS, MERCURY, ETC.) WITHIN THE PROJECT AREA. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO REVIEW THE HAZARDOUS MATERIALS TESTING REPORTS INCLUDED IN THE SPECIFICATION AND COMPLY WITH APPROPRIATE WORKING PROCEDURES.
2. CONTRACTOR SHALL COMPLY WITH THE GOVERNMENT'S RULES AND REGULATIONS.
3. CONTRACTOR SHALL PROTECT ALL EXISTING CONSTRUCTION AND FINISHES TO REMAIN WITHIN THE PREMISES AND IN ADJACENT AREAS.
4. EXISTING FINISHES ON COLUMNS AND CORE WALLS ARE TO REMAIN U.N.O. - REFER TO A-101. PATCH AND REFINISH TO ACCEPT NEW SCHEDULED FINISH.
5. INTERIOR WALLS TO BE REMOVED ARE STEEL STUD AND GYP. BD.
6. CONTRACTOR TO FIELD VERIFY ALL DIMENSIONS. ALL EXISTING CONDITIONS ARE TO BE FIELD VERIFIED BY THE G.C. AND ANY DISCREPANCIES BROUGHT TO THE ARCHITECT'S ATTENTION.
7. THE CONTRACTOR SHALL MAINTAIN EGRESS PATHS FROM CONSTRUCTION SITE AT ALL TIMES. PROVIDE TEMPORARY DOORS AS REQUIRED WHERE DOORS TO GENERAL CORRIDORS ARE NOTED TO BE REPLACED.
8. CONTRACTOR TO PROTECT SIGNAGE, DUST PROTECTION, AND FLOOR PROTECTION AS REQUIRED FROM THE PROJECT AREA THROUGH PUBLIC CORRIDORS AND ELEVATOR LOBBIES TO PROTECT EXISTING FINISHES.
9. REFER TO ED-101 FOR DEMOLITION INSTRUCTIONS REGARDING POWER AND RECEPTACLE.
10. CONTRACTOR TO PROTECT ALL EXISTING WINDOW SHADES DURING CONSTRUCTION.

KEY NOTES:

- ① REMOVE AND PROTECT DOOR, FRAME, AND SIDELITE IN ORDER TO BE REINSTALLED
- ② REMOVE BUILT-IN MILLWORK
- ③ REMOVE FLOORING THROUGHOUT BACK TO CONCRETE SUBSTRATE. COMPLETELY REMOVE EXISTING ADHESIVE USING MECHANICAL MEANS TO COMPLY WITH NEW FLOORING REQUIREMENTS AND CREATE A SMOOTH, LEVEL, AND CLEAN SURFACE TO ACCEPT NEW FLOORING.
- ④ REMOVE AND PROTECT DOOR AND FRAME IN ORDER TO BE REINSTALLED
- ⑤ SALVAGE DOOR AND FRAME AND TURN OVER TO FACILITIES
- ⑥ DEMOLISH SECTION OF WALL TO REINSTALL DOOR 1516 AND SIDELITE
- ⑦ ASBESTOS IS PRESENT IN THE AREA, INCLUDING ACM PIPE INSULATION. HANDLE ASBESTOS IN ACCORDANCE WITH STATE AND LOCAL REQUIREMENTS. REFER TO THE APPENDIX FOR TEST REPORT FROM 2013.
- ⑧ CORE FLOOR AS REQUIRED FOR THE INSTALLATION OF NEW PLUMBING WORK. COORDINATE WITH TENANTS ON 14TH FLOOR TO PERFORM NEW WORK BELOW THE 15TH FLOOR SLAB. DEMOLISH EXISTING PLASTER CEILING (PRESUMED TO HAVE LEAD-BASED PAINT) ON THE 14TH FLOOR AS REQUIRED TO ACCOMMODATE NEW WORK. THE PLASTER CEILING IS CONCEALED BY A LAY-IN CEILING. PREVIOUSLY REMOVED ASBESTOS CONTAINING GLUE PODS ABOVE THE CEILING HAVE LEFT SOME RESIDUAL A.C.M. CUTTING THE CEILING WILL DISTURB THE ACM GLUE POD RESIDUAL BUT THE CUT CAN BE MADE IN SUCH A MANNER AS TO AVOID CUTTING THROUGH THE RESIDUAL. LESS THAN 1 SQ FT OF ACM WASTE WILL BE GENERATED. CONTRACTOR IS TO FOLLOW APPROPRIATE WORKING PROCEDURES.
- ⑨ REMOVE DOOR AND SIDELITES, TURN OVER TO THE CLIENT.
- ⑩ REMOVE CARD READER FROM WALL

LEGEND:

- EXISTING WALL
- DEMO GYPSUM BOARD ON METAL STUD WALL TO PLASTER CEILING
- EXISTING GLAZING TO REMAIN
- PROJECT AREA NOT WITHIN SCOPE OF PROJECT
- EXISTING DOOR TO REMAIN
- DEMO DOOR - SALVAGE TAGGED DOORS FOR REINSTALLATION

STATE OF MICHIGAN DEPARTMENT OF TREASURY, OCC. MANAGER, AND SUPERVISOR	
PROCUREMENT AND REAL ESTATE SERVICES ADMINISTRATION	
DESIGN AND CONSTRUCTION DIVISION	
1500 EAST LANSING AVENUE, 4TH FLOOR, ANN ARBOR, MI 48106	
PROJECT: CADILLAC PLAZA 14TH FLOOR - BLDG (3) JUDICIAL SUITES	
DESIGNED BY: [FORBES]	DATE: 08/27/2014
DRAWN BY: [FORBES]	ISSUED FOR: CONSTRUCTION
CHECKED: [FORBES]	IDENTIFICATION NUMBER: PROJECT: C.F. (3) JUDICIAL SUITES CONTRACT NUMBER: 123038 FILE NO. 60922507
APPROVED: [FORBES]	SHEET NUMBER: 3 OF 35
DRAWING NUMBER: AD-101	DRAWING TITLE: DEMO FLOOR PLAN

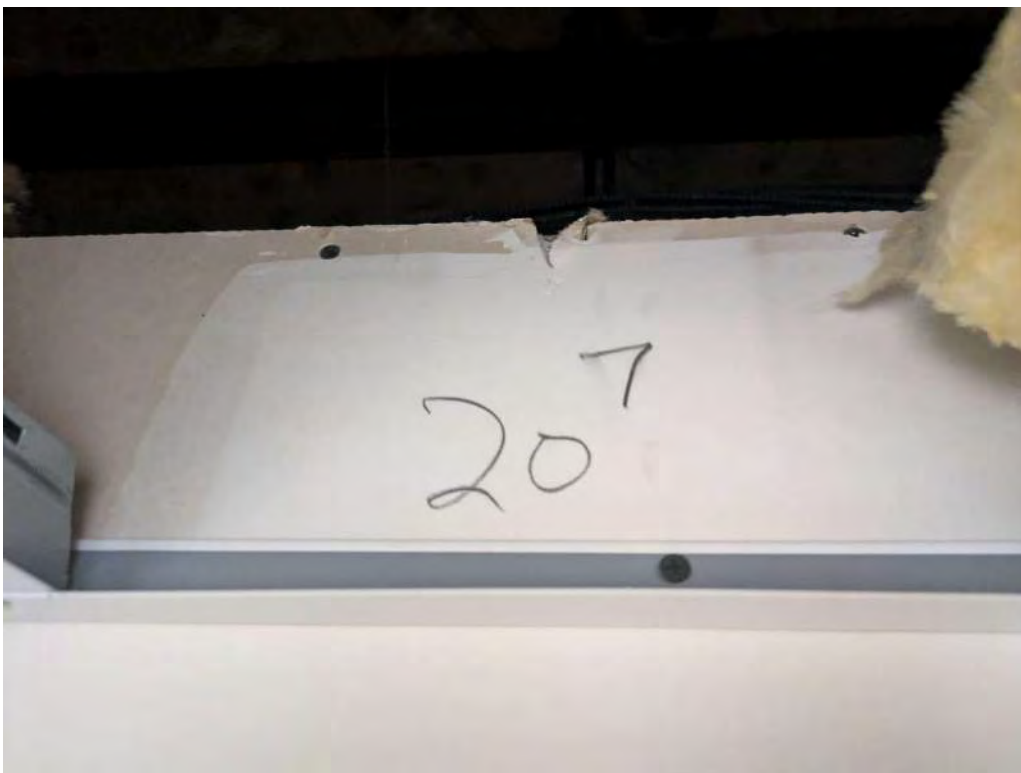
APPENDIX B

Photographic Log

**Site Photographs
Cadillac Place 15th Floor – Building Three Judicial Suites**



Photograph 1: Off-white paint in lead-containing paint (PC-1, 0.33%)



Photograph 2: Drywall/joint compound, throughout 15th floor renovation – does not contain asbestos

Site Photographs
Cadillac Place 15th Floor – Building Three Judicial Suites

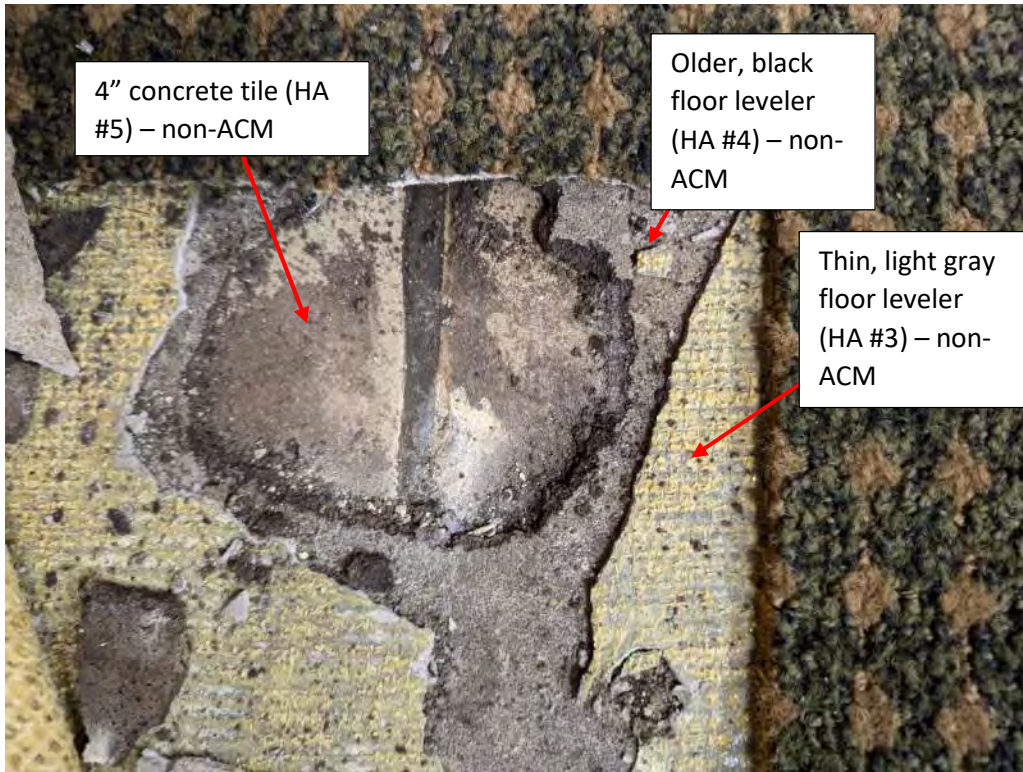


Photograph 3: Remnants of brown glue pods (HA #2) – contain asbestos

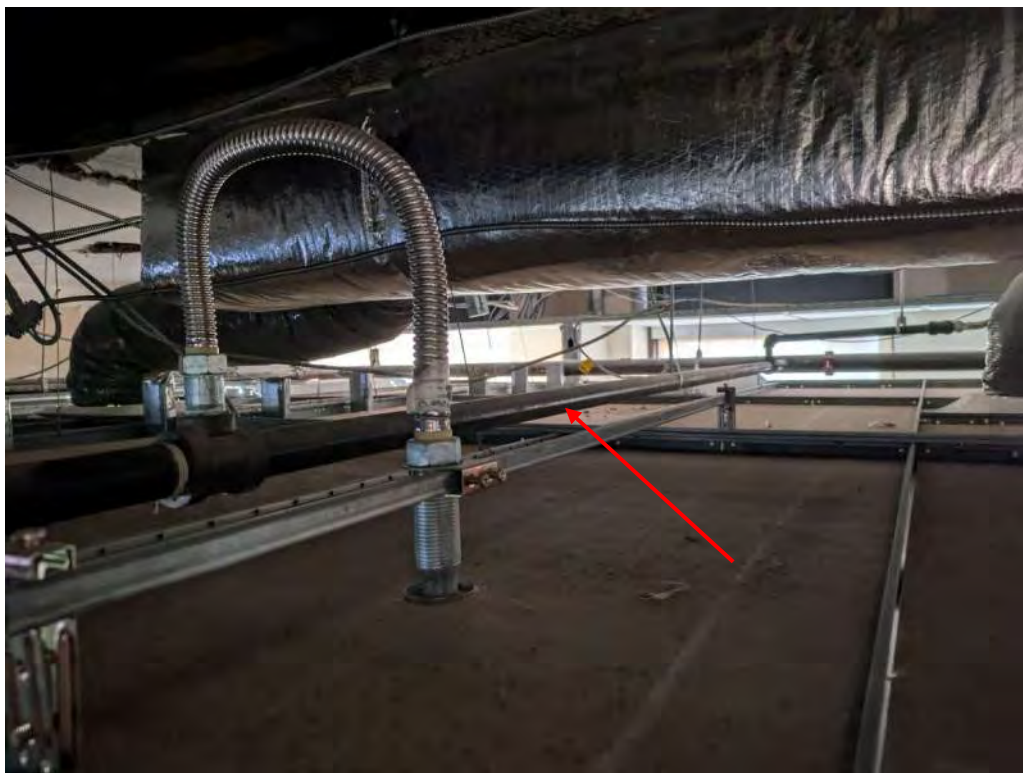


Photograph 4: Blue paint on drywall – no lead detected

Site Photographs
Cadillac Place 15th Floor – Building Three Judicial Suites



Photograph 5: Floor under carpet in north wing of the 15th Floor renovation area



Photograph 6: Piping loop on the 14th floor – not insulated

**Site Photographs
Cadillac Place 15th Floor – Building Three Judicial Suites**



Photograph 7: Piping loop on the 14th floor – not insulated



Photograph 8: View of ceiling on 14th floor (west side of North wing) – ceiling paint is LCP

Site Photographs
Cadillac Place 15th Floor – Building Three Judicial Suites



Photograph 9: View of ceiling on 14th floor (east side of North wing, facing north) – ceiling paint is LCP



Photograph 10: View of ceiling on 14th floor (east side of North wing, facing south) – ceiling paint is LCP / Asbestos-containing glue pods approximate location is below 1503

Site Photographs
Cadillac Place 15th Floor – Building Three Judicial Suites



Photograph 11: Above ceiling on 14th floor, East wing – plaster ceiling removed



Photograph 12: 14th floor – Bathroom, plumbing chase – asbestos-containing pipe and fitting insulation is present

Site Photographs
Cadillac Place 15th Floor – Building Three Judicial Suites



Photograph 13: Peach floor tile/glue (HA #7) – non-ACM, floor under is non-ACM floor leveler (HA #3)



Photograph 14: White debris on pipes and floor (HA #8) – non-ACM

Site Photographs
Cadillac Place 15th Floor – Building Three Judicial Suites



Photograph 15: ~4' length of asbestos-pipe insulation in 15th floor bathroom plumbing chase

APPENDIX C

Asbestos Summary Table and Laboratory Report

Table 1 Asbestos Sample Summary – Buildings 1: Entrance/Exit Buildings							
HA #	Material Description	Sample No.	Sample Location	Material Type	F/NF	Asbestos Result	Location and notes
1	Drywall and joint compound	1A	Office 1509	M	NF-II	Drywall: NAD Joint compound: NAD	This material was found throughout the 15 th floor renovation areas and schedule for demolition
		1B	Hallway outside of Office 1508			Drywall: NAD Joint compound: NAD	
2	Brown glue pods, remnants	2A	Open area outside of Office 1514	M	NF-II	Yes – 2% Chrysotile	This material is found throughout much of the North Wing of the 15 th floor and was observed in the area under Office 1503 on the 14 th floor.
		2B	Office 1504			Yes – 2% Chrysotile	
3	Carpet mastic // soft, light gray floor leveler // mastic	3A	Middle Storage Room	M	NF-II	Carpet mastic: NAD Floor leveler: NAD Mastic: NAD	This material is found throughout the north wing of the 15 th Floor renovation area and in Room 1516 and 1518.
		3B	Open area, north side of north wing – middle of room			Carpet mastic: NAD Floor leveler: NAD Mastic: NAD	

Notes:

TSI = Thermal systems insulation
 S = Surfacing Material
 M = Miscellaneous material

F = Friable
 NF-I = Category I, non-friable
 NF-II = Category II, non-friable

NAD = No asbestos detected
 s.f. = square foot
 l.f. = linear foot
 NQ = Not quantifiable

Table 1 Asbestos Sample Summary – Buildings 1: Entrance/Exit Buildings							
HA #	Material Description	Sample No.	Sample Location	Material Type	F/NF	Asbestos Result	Location and notes
4	Black older floor leveler (under HA #3)	4A	Middle Storage Room	M	NF-II	NAD	This material is found throughout the north wing of the 15 th Floor renovation area.
		4B	North middle Office			NAD	
5	4" concrete tile (under HA #4)	5A	Open area, north side of north wing – middle of room	M	NF-II	NAD	This material is found throughout the north wing of the 15 th Floor renovation area.
		5B	North middle office			NAD	
6	Thin darker gray floor leveler	6A	North middle office	M	NF-II	NAD	This material was observed in the North Wing of the renovation area – in the north middle office and south end of the west hallway.
		6B	North middle office			NAD	
7	12" x 12" peach floor tile and associated glue	7A	Room 1518, northwest	M	NF-I	Floor tile: No Glue: No	The material was found in Room 1518.
		7B	Room 1518, east end			Floor tile: No Glue: No	

Notes:

TSI = Thermal systems insulation
 S = Surfacing Material
 M = Miscellaneous material

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 NF-I = Category I, non-friable
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NAD = No asbestos detected
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 l.f. = linear foot
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Table 1 Asbestos Sample Summary – Buildings 1: Entrance/Exit Buildings							
HA #	Material Description	Sample No.	Sample Location	Material Type	F/NF	Asbestos Result	Location and notes
8	White mud-like debris on insulation	8A	15 th floor – Bathroom plumbing chase	M	F	NAD	Found in the plumbing chase at the entrance.
		8B	15 th floor – Bathroom plumbing chase			NAD	
9	Air cell pipe insulation	Previously identified by MTC	NA	TSI	F	Yes	Found in plumbing in bathroom plumbing chases on the 14 th and 15 th floors. This material may be located in enclosed pipe chases as well.
10	Mag pipe insulation	Previously identified by MTC	NA	TSI	F	Yes	
11	Mudded pipe fittings	Previously identified by MTC	NA	TSI	F	Yes	
12	Roofing materials	Previously identified by MTC	NA	M	NF-I	Assumed	Roof above 15 th floor

Notes:

TSI = Thermal systems insulation
 S = Surfacing Material
 M = Miscellaneous material

F = Friable
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 NF-II = Category II, non-friable

NAD = No asbestos detected
 s.f. = square foot
 l.f. = linear foot
 NQ = Not quantifiable

Certificate of Laboratory Analysis

Test Method, Polarized Light Microscopy (PLM)



Project: Cadillac Place - 15th Floor
Project #: 24-025-00

Report To:

Ms. Laura Willem
Willem Environmental Consulting
344 E. Hazelhurst Street
Ferndale, MI 48220

ARI Report # 24-113946
Date Collected: 10/30/24
Date Received: 10/31/24
Date Analyzed: 10/31/24
Date Reported: 11/05/24

Sample Information	Asbestos Type/Percent	Non-Asbestos Material
Lab ID #: 113946 - 01 Cust. #: 1A Material: Drywall Location: Office 1509 Appearance: white, fibrous, nonhomogenous Layer: 1 of 2	Asbestos Present: NO No Asbestos Observed	Cellulose - 20% Other - 80%
Lab ID #: 113946 - 01a Cust. #: 1A Material: Joint Compound Location: Office 1509 Appearance: white, nonfibrous, homogenous Layer: 2 of 2	Asbestos Present: NO No Asbestos Observed	Other - 100%
Lab ID #: 113946 - 02 Cust. #: 1B Material: Drywall Location: Hallway outside 1508 Appearance: white, fibrous, nonhomogenous Layer: 1 of 2	Asbestos Present: NO No Asbestos Observed	Cellulose - 20% Other - 80%

For Layered Samples, each component will be analyzed and reported separately.

Robert T. Letarte Jr., Laboratory Director

Test Method EPA 40 CFR - Part 763 and/or EPA 600/R-93/116 was used to analyze the above samples. Matrix interference and/or resolution limits may yield false/negative results in certain circumstances. Suspect floor tiles containing <1% should be tested with SEM or TEM. This certificate of analysis relates only to the samples as submitted and to insure the integrity of the results, may only be reproduced in full. This certificate must not be used by the customer to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government. Liability limited to cost of analysis.



NVLAP Lab Code 102118-0

APEX Research Inc., 7717 Kensington Ct., Brighton, MI 48116
(734) 449-9990, Fax (734) 449-9991

Certificate of Laboratory Analysis

Test Method, Polarized Light Microscopy (PLM)



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Date Reported: 11/05/24

Sample Information	Asbestos Type/Percent	Non-Asbestos Material
Lab ID #: 113946 - 02a Cust. #: 1B Material: Joint Compound Location: Hallway outside 1508 Appearance: white,nonfibrous,homogenous Layer: 2 of 2	Asbestos Present: NO No Asbestos Observed	Other - 100%
Lab ID #: 113946 - 03 Cust. #: 2A Material: Brown Glue Pods, Remnants Location: Open Area outside of 1514 Appearance: brown,fibrous,homogenous Layer: 1 of 1	Asbestos Present: YES Chrysotile - 2%	Other - 98%
Lab ID #: 113946 - 04 Cust. #: 2B Material: Brown Glue Pods, Remnants Location: Office 1504 Appearance: brown,fibrous,homogenous Layer: 1 of 1	Asbestos Present: YES Chrysotile - 2%	Other - 98%

For Layered Samples, each component will be analyzed and reported separately.

Robert T. Letarte Jr., Laboratory Director

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Date Analyzed: 10/31/24
Date Reported: 11/05/24

Sample Information	Asbestos Type/Percent	Non-Asbestos Material
Lab ID #: 113946 - 05 Cust. #: 3A Material: Carpet Mastic Location: Middle Storage Room Appearance: yellow,nonfibrous,homogenous Layer: 1 of 3	Asbestos Present: NO No Asbestos Observed	Other - 100%
Lab ID #: 113946 - 05a Cust. #: 3A Material: Soft Light Gray Floor Leveler Location: Middle Storage Room Appearance: grey,nonfibrous,homogenous Layer: 2 of 3	Asbestos Present: NO No Asbestos Observed	Other - 100%
Lab ID #: 113946 - 05b Cust. #: 3A Material: Carpet Mastic Location: Middle Storage Room Appearance: black,nonfibrous,homogenous Layer: 3 of 3	Asbestos Present: NO No Asbestos Observed	Cellulose - 1% Other - 99%

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Robert T. Letarte Jr., Laboratory Director

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Date Analyzed: 10/31/24
Date Reported: 11/05/24

Sample Information	Asbestos Type/Percent	Non-Asbestos Material
Lab ID #: 113946 - 06 Cust. #: 3B Material: Carpet Mastic Location: Open Area North Side - Middle Appearance: yellow,nonfibrous,homogenous Layer: 1 of 3	Asbestos Present: NO No Asbestos Observed	Other - 100%
Lab ID #: 113946 - 06a Cust. #: 3B Material: Soft Light Gray Floor Leveler Location: Open Area North Side - Middle Appearance: grey,nonfibrous,homogenous Layer: 2 of 3	Asbestos Present: NO No Asbestos Observed	Cellulose - 1% Other - 99%
Lab ID #: 113946 - 06b Cust. #: 3B Material: Carpet Mastic Location: Open Area North Side - Middle Appearance: black,nonfibrous,homogenous Layer: 3 of 3	Asbestos Present: NO No Asbestos Observed	Other - 100%

For Layered Samples, each component will be analyzed and reported separately.

Robert T. Letarte Jr., Laboratory Director

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Date Analyzed: 10/31/24
Date Reported: 11/05/24

Sample Information	Asbestos Type/Percent	Non-Asbestos Material
Lab ID #: 113946 - 07 Cust. #: 4A Material: Black Older Floor Leveler Location: Middle Storage Room Appearance: black,nonfibrous,homogenous Layer: 1 of 1	Asbestos Present: NO No Asbestos Observed	Other - 100%
Lab ID #: 113946 - 08 Cust. #: 4B Material: Black Older Floor Leveler Location: North Middle Office Appearance: black,nonfibrous,homogenous Layer: 1 of 1	Asbestos Present: NO No Asbestos Observed	Other - 100%
Lab ID #: 113946 - 09 Cust. #: 5A Material: 4" Concrete Tile Location: Open Area North Side - Middle Appearance: beige,nonfibrous,homogenous Layer: 1 of 1	Asbestos Present: NO No Asbestos Observed	Other - 100%

For Layered Samples, each component will be analyzed and reported separately.

Robert T. Letarte Jr., Laboratory Director

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Project #: 24-025-00

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Ferndale, MI 48220

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Date Analyzed: 10/31/24
Date Reported: 11/05/24

Sample Information	Asbestos Type/Percent	Non-Asbestos Material
Lab ID #: 113946 - 10 Cust. #: 5B Material: 4" Concrete Tile Location: North Middle Office Appearance: beige,nonfibrous,homogenous Layer: 1 of 1	Asbestos Present: NO No Asbestos Observed	Other - 100%
Lab ID #: 113946 - 11 Cust. #: 6A Material: Thin Darker Gray Floor Leveler Location: North Middle Office Appearance: grey,nonfibrous,homogenous Layer: 1 of 1	Asbestos Present: NO No Asbestos Observed	Other - 100%
Lab ID #: 113946 - 12 Cust. #: 6B Material: Thin Darker Gray Floor Leveler Location: North Middle Office Appearance: grey,nonfibrous,homogenous Layer: 1 of 1	Asbestos Present: NO No Asbestos Observed	Other - 100%

For Layered Samples, each component will be analyzed and reported separately.

Robert T. Letarte Jr., Laboratory Director

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Date Reported: 11/05/24

Sample Information	Asbestos Type/Percent	Non-Asbestos Material
Lab ID #: 113946 - 13 Cust. #: 7A Material: 12"x12" Peach Floor Tile Location: Room 1518, Northwest Appearance: peach,nonfibrous,homogenous Layer: 1 of 2	Asbestos Present: NO No Asbestos Observed	Other - 100%
Lab ID #: 113946 - 13a Cust. #: 7A Material: Glue Location: Room 1518, Northwest Appearance: yellow,nonfibrous,homogenous Layer: 2 of 2	Asbestos Present: NO No Asbestos Observed	Other - 100%
Lab ID #: 113946 - 14 Cust. #: 7B Material: 12"x12" Peach Floor Tile Location: Room 1518, Northwest Appearance: peach,nonfibrous,homogenous Layer: 1 of 2	Asbestos Present: NO No Asbestos Observed	Other - 100%

For Layered Samples, each component will be analyzed and reported separately.

Robert T. Letarte Jr., Laboratory Director

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Ms. Laura Willem
Willem Environmental Consulting
344 E. Hazelhurst Street
Ferndale, MI 48220

ARI Report # 24-113946
Date Collected: 10/30/24
Date Received: 10/31/24
Date Analyzed: 10/31/24
Date Reported: 11/05/24

Sample Information	Asbestos Type/Percent	Non-Asbestos Material
Lab ID #: 113946 - 14a Cust. #: 7B Material: Glue Location: Room 1518, Northwest Appearance: yellow,nonfibrous,homogenous Layer: 2 of 2	Asbestos Present: NO No Asbestos Observed	Other - 100%
Lab ID #: 113946 - 15 Cust. #: 8A Material: White Mud-like Material Insulation Location: Plumbing Chase Appearance: white,nonfibrous,homogenous Layer: 1 of 1	Asbestos Present: NO No Asbestos Observed	Other - 100%
Lab ID #: 113946 - 16 Cust. #: 8B Material: White Mud-like Material Insulation Location: Plumbing Chase Appearance: white,nonfibrous,homogenous Layer: 1 of 1	Asbestos Present: NO No Asbestos Observed	Other - 100%

For Layered Samples, each component will be analyzed and reported separately.

Robert T. Letarte Jr., Laboratory Director

Test Method EPA 40 CFR - Part 763 and/or EPA 600/R-93/116 was used to analyze the above samples. Matrix interference and/or resolution limits may yield false/negative results in certain circumstances. Suspect floor tiles containing <1% should be tested with SEM or TEM. This certificate of analysis relates only to the samples as submitted and to insure the integrity of the results, may only be reproduced in full. This certificate must not be used by the customer to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government. Liability limited to cost of analysis.



NVLAP Lab Code 102118-0

APEX Research Inc., 7717 Kensington Ct., Brighton, MI 48116
(734) 449-9990, Fax (734) 449-9991



APEX Research, Inc.

7717 Kensington Ct., Brighton, MI 48116 Phone: (734) 449 - 9990, Fax (734) 449 - 9991 www.ApexMI.com

Apex #

113946

Company: Willem Environmental Consulting, LLC
 Customer Name: Laura Willem
 Address: 344 E. Hazelhurst St.
 City, St., Zip: Ferndale, MI 48220
 Phone: (248) 546-3684 Fax: _____

Date of Survey: 10/30/24
 Project Name: Cadillac Place - 15th Floor
 Project #: 24-025-00
 Contact Person: Laura Willem
 Email: lwillem.env@gmail.com

Turn Around Time: (circle one)***Terms and conditions on the other side.

Same Day 24 Hour
 48 Hour 3-5 Day
 Other: _____ TTP yes no
Same Day cut off: 3pm Day Lead cut off: 10:30am Same (Test Till Positive)

Circle analyses required, indicate type and quantity

Asbestos: Bulk Air Other Point Count
 Lead / Cad / Chrome: Paint Air Wipe ASTM E1792? circle YES or NO
 Mold: Bulk Air Tape Other
 Smoke/Soot/Char: Bulk Wipe Tape Other

Lab ID	Customer ID #	Material/Location	Volume	Area	Results
	1A	Drywall and joint compound / Office 1509			
	1B	Drywall and joint compound / Hallway outside 1508			
	2A	Brown glue pods, remnants / Open area outside of 1514			
	2B	Brown glue pods, remnants / Office 1504			
	3A	soft light gray floor leveler and carpet mastic / middle storage room			
	3B	soft light gray floor leveler and carpet mastic / open area, north side - middle			
	4A	Black older floor leveler / middle storage room			
	4B	Black older floor leveler / north middle office			
	5A	4" concrete tile / Open area, north side - middle			
	5B	4" concrete tile / north middle office			
	6A	Thin darker gray floor leveler / North middle office			
	6B	Thin darker gray floor leveler / North middle office			
	7A	12" x 12" peach floor tile / Room 1518, northwest			
	7B	2" x 12" peach floor tile / Room 1518, east end			
	8A	White mud-like material on insulation / plumbing chase			

RECEIVED

Relinquished By: [Signature]
 Date: 10/30/24

Received By: MM
 Time/Date: 1100 OCT 31 2024

Relinquished By: _____
 Time/Date: _____

APPENDIX D

Lead Paint Chip Summary and
Laboratory Results

**Table 2:
Lead Paint Chip Sampling Summary – Buildings 1: Entrance/Exit Buildings**

Sample No.	Color	Substrate	Location	Cadmium Result (%)	Lead Result (%)	Other Locations
PC-1	Off-white	Plaster ceiling	Room 1507	<0.01	0.33	Found on ceilings throughout the North Wing of the 15 th Floor renovation areas and on the ceilings of the 14 th Floor below.
PC-2	Blue	Drywall wall	15 th Floor – outside of Break area	<0.02	<0.02	N/A
PC-3	White	Drywall wall	Room 1508	<0.01	<0.01	Throughout the 15 th Floor renovation areas
PC-4	Black	Concrete floor (under floor tile)	Room 1518 – northwest	<0.01	0.67	Assume to be found throughout Room 1518

Notes:

% = percent by weight



Certificate of Analysis - Metals in Paint



Method: EPA SW846-7130M, EPA SW846-7420M

Project: Cadillac Place - 15th Floor

Project #: 24-025-00

Report to:

Ms. Laura Willem
Willem Environmental Consulting, LLC
344 E. Hazelhurst Street
Ferndale, MI 48220

ARL Report #: 24-L26521

Date Sampled: 10/30/24

Date Received: 10/31/24

Date Analyzed: 11/01/24

Date Reported: 11/05/24

Laboratory ID:	Client ID:	Reporting Limit:	Cadmium:	Lead:
L26521-01	PC-1	0.01%	Cd - < 0.01%	Pb - 0.33%
	Off-White Ceiling Plaster / Room 1507			
L26521-02	PC-2	0.02%	Cd - < 0.02%	Pb - < 0.02%
	Blue Drywall / Outside of Break Area			
L26521-03	PC-3	0.01%	Cd - < 0.01%	Pb - < 0.01%
	White Drywall / Room 1508			
L26521-04	PC-4	0.01%	Cd - < 0.01%	Pb - 0.67%
	Black Concrete Floor / Room 1518, Northwest			

Reporting Limit of 0.01% is based on minimum sample weight of 100mg per our SOP, and may vary based on smaller sample size. APEX Research is not responsible for sample collection activities, and results apply to samples as received. Methods have been slightly modified. Samples received in acceptable condition unless otherwise noted. This certificate of analysis relates only to the samples tested and to ensure the integrity of the results, may only be reproduced in full. Liability limited to cost of analysis. APEX Research, Inc. (Laboratory ID# 227441) is accredited by the AIHA Laboratory Accreditation Programs, LLC (AIHA LAP,LLC) in the Environmental Lead Laboratory Accreditation Program for Lead in Paint as documented by the Scope of Accreditation Certificate and associated Scope. Accreditation extends to lead analyses only.

Robert T. Letarte Jr., Laboratory Director



APEX Research, Inc.

7717 Kensington Ct., Brighton, MI 48116 Phone: (734) 449 - 9990, Fax (734) 449 - 9991 www.ApexMI.com

Apex # **L26521**

Company: Willem Environmental Consulting, LLC
 Customer Name: Laura Willem
 Address: 344 E. Hazelhurst St.
 City, St., Zip: Ferndale, MI 48220
 Phone: (248) 546-3684 Fax: _____

Date of Survey: 10/30/24
 Project Name: Cadillac Place - 15th Floor
 Project #: 24-025-00
 Contact Person: Laura Willem
 Email: willem.env@gmail.com

Turn Around Time: (circle one) ***Terms and conditions on the other side.

Same Day 24 Hour
 48 Hour 3-5 Day
 Other: _____ TTP yes / no
Same Day cut off: 3pm Same (Test Till Positive)
Day Lead cut off: 10:30am

Circle analyses required, indicate type and quantity

Asbestos: Bulk Air Other Point Count
 Lead / Cad / Chrome: Paint Air Wipe ASTM E1792? circle YES or NO
 Mold: Bulk Air Tape Other
 Smoke/Soot/Char: Bulk Wipe Tape Other

Lab ID	Customer ID #	Material/Location	Volume	Area	Results
	PC-1	Off-white ceiling plaster / Room 1507			
	PC-2	Blue drywall / Outside of break area			
	PC-3	White drywall / Room 1508			
	PC-4	Black concrete floor / Room 1518, northwest			

Relinquished By: [Signature]
 Date: 10/30/24

Received By: [Signature]
 Time/Date: 11:00 OCT 31 2024

Relinquished By: _____
 Date: _____

Received By: _____
 Time/Date: _____

Revision R7.2 Date: May 11, 2023

RECEIVED APEX RESEARCH

APPENDIX 2

Prevailing Wages on DTMB Projects



STATE OF MICHIGAN
Informational Sheet: Prevailing Wages on State Projects

General Information Regarding Fringe Benefits

Certain fringe benefits **may** be credited toward the payment of the Prevailing Wage Rate:

- If a fringe benefit is paid directly to a construction mechanic
- If a fringe benefit contribution or payment is made on behalf of a construction mechanic
- If a fringe benefit, which may be provided to a construction mechanic, is pursuant to a written contract or policy
- If a fringe benefit is paid into a fund, for a construction mechanic

When a fringe benefit is not paid by an hourly rate, the hourly credit will be calculated based on the annual value of the fringe benefit divided by 2080 hours per year (52 weeks @ 40 hours per week).

The following is an example of the types of fringe benefits allowed and how an hourly credit is calculated:

Vacation	40 hours X \$14.00 per hour = \$560/2080 =	\$0.27
Dental insurance	\$31.07 monthly premium X 12 mos. = \$372.84 /2080 =	\$.18
Vision insurance	\$5.38 monthly premium X 12 mos. = \$64.56/2080 =	\$.03
Health insurance	\$230.00 monthly premium X 12 mos. = \$2,760.00/2080 =	\$1.33
Life insurance	\$27.04 monthly premium X 12 mos. = \$324.48/2080 =	\$.16
Tuition	\$500.00 annual cost/2080 =	\$.24
Bonus	4 quarterly bonus/year x \$250 = \$1000.00/2080 =	\$.48
401k Employer Contribution	\$2000.00 total annual contribution/2080 =	\$.96
Total Hourly Credit		\$3.65

Other examples of the types of fringe benefits allowed:

- Sick pay
- Holiday pay
- Accidental Death & Dismemberment insurance premiums

The following are examples of items that **will not** be credited toward the payment of the Prevailing Wage Rate

- Legally required payments, such as:
 - Unemployment Insurance payments
 - Workers' Compensation Insurance payments
 - FICA (Social Security contributions, Medicare contributions)
- Reimbursable expenses, such as:
 - Clothing allowance or reimbursement
 - Uniform allowance or reimbursement
 - Gas allowance or reimbursement
 - Travel time or payment
 - Meals or lodging allowance or reimbursement
 - Per diem allowance or payment
- Other payments to or on behalf of a construction mechanic that are not wages or fringe benefits, such as:
 - Industry advancement funds
 - Financial or material loans



STATE OF MICHIGAN
Informational Sheet: Prevailing Wages on State Projects

OVERTIME PROVISIONS for MICHIGAN PREVAILING WAGE RATE COMMERCIAL SCHEDULE

- Overtime is represented as a nine character code. Each character represents a certain period of time after the first 8 hours Monday thru Friday.

	Monday thru Friday	Saturday	Sunday & Holidays	Four 10s
First 8 Hours		4		
9th Hour	1	5	8	9
10th Hour	2	6		
Over 10 hours	3	7		

Overtime for Monday thru Friday after 8 hours:

the 1st character is for time worked in the 9th hour (8.1 - 9 hours)
the 2nd character is for time worked in the 10th hour (9.1 - 10 hours)
the 3rd character is for time worked beyond the 10th hour (10.1 and beyond)

Overtime on Saturday:

the 4th character is for time worked in the first 8 hours on Saturday (0 - 8 hours)
the 5th character is for time worked in the 9th hour on Saturday (8.1 - 9 hours)
the 6th character is for time worked in the 10th hour (9.1 - 10 hours)
the 7th character is for time worked beyond the 10th hour (10.01 and beyond)

Overtime on Sundays & Holidays

The 8th character is for time worked on Sunday or on a holiday

Four Ten Hour Days

The 9th character indicates if an optional 4-day 10-hour per day workweek can be worked **between Monday and Friday without paying overtime after 8 hours worked, unless otherwise noted in the rate schedule. To utilize a 4 ten workweek, notice is required from the employer to employee prior to the start of work on the project.**

- Overtime Indicators Used in the Overtime Provision:

H - means TIME AND ONE-HALF due
X - means TIME AND ONE-HALF due after 40 HOURS worked
D - means DOUBLE PAY due
Y - means YES an optional 4-day 10-hour per day workweek can be worked without paying overtime after 8 hours worked
N - means NO an optional 4-day 10-hour per day workweek *cannot* be worked without paying overtime after 8 hours worked

- EXAMPLES:

HHHHHHHDN - This example shows that the 1½ rate must be used for time worked after 8 hours Monday thru Friday (characters 1 - 3); for all hours worked on Saturday, 1½ rate is due (characters 4 - 7). Work done on Sundays or holidays must be paid double time (character 8). The N (character 9) indicates that 4 ten-hour days is not an acceptable workweek at regular pay.

XXXHHHHDY - This example shows that the 1½ rate must be used for time worked after 40 hours are worked Monday thru Friday (characters 1-3); for hours worked on Saturday, 1½ rate is due (characters 4 - 7). Work done on Sundays or holidays must be paid double time (character 8). The Y (character 9) indicates that 4 ten-hour days is an acceptable alternative workweek.



STATE OF MICHIGAN
Informational Sheet: Prevailing Wages on State Projects

ENGINEERS - CLASSES OF EQUIPMENT LIST

UNDERGROUND ENGINEERS

CLASS I

Backfiller Tamper, Backhoe, Batch Plant Operator, Clam-Shell, Concrete Paver (2 drums or larger), Conveyor Loader (Euclid type), Crane (crawler, truck type or pile driving), Dozer, Dragline, Elevating Grader, End Loader, Gradall (and similar type machine), Grader, Power Shovel, Roller (asphalt), Scraper (self propelled or tractor drawn), Side Broom Tractor (type D-4 or larger), Slope Paver, Trencher (over 8' digging capacity), Well Drilling Rig, Mechanic, Slip Form Paver, Hydro Excavator.

CLASS II

Boom Truck (power swing type boom), Crusher, Hoist, Pump (1 or more 6" discharge or larger gas or diesel powered by generator of 300 amps or more, inclusive of generator), Side Boom Tractor (smaller than type D-4 or equivalent), Tractor (pneu-tired, other than backhoe or front end loader), Trencher (8' digging capacity and smaller), Vac Truck.

CLASS III

Air Compressors (600 cfm or larger), Air Compressors (2 or more less than 600 cfm), Boom Truck (non-swinging, non-powered type boom), Concrete Breaker (self-propelled or truck mounted, includes compressor), Concrete Paver (1 drum, ½ yard or larger), Elevator (other than passenger), Maintenance Man, Mechanic Helper, Pump (2 or more 4" up to 6" discharge, gas or diesel powered, excluding submersible pump), Pumpcrete Machine (and similar equipment), Wagon Drill Machine, Welding Machine or Generator (2 or more 300 amp or larger, gas or diesel powered).

CLASS IV

Boiler, Concrete Saw (40HP or over), Curing Machine (self-propelled), Farm Tractor (w/attachment), Finishing Machine (concrete), Firemen, Hydraulic Pipe Pushing Machine, Mulching Equipment, Oiler (2 or more up to 4", exclude submersible), Pumps (2 or more up to 4" discharge if used 3 hrs or more a day-gas or diesel powered, excluding submersible pumps), Roller (other than asphalt), Stump Remover, Vibrating Compaction Equipment (6' wide or over), Trencher (service) Sweeper (Wayne type and similar equipment), Water Wagon, Extend-a-Boom Forklift.

HAZARDOUS WASTE ABATEMENT ENGINEERS

CLASS I

Backhoe, Batch Plant Operator, Clamshell, Concrete Breaker when attached to hoe, Concrete Cleaning Decontamination Machine Operator, Concrete Pump, Concrete Paver, Crusher, Dozer, Elevating Grader, Endloader, Farm Tractor (90 h.p. and higher), Gradall, Grader, Heavy Equipment Robotics Operator, Hydro Excavator, Loader, Pug Mill, Pumpcrete Machines, Pump Trucks, Roller, Scraper (self-propelled or tractor drawn), Side Boom Tractor, Slip Form Paver, Slope Paver, Trencher, Ultra High Pressure Waterjet Cutting Tool System Operator, Vactors, Vacuum Blasting Machine Operator, Vertical Lifting Hoist, Vibrating Compaction Equipment (self-propelled), and Well Drilling Rig.

CLASS II

Air Compressor, Concrete Breaker when not attached to hoe, Elevator, End Dumps, Equipment Decontamination Operator, Farm Tractor (less than 90 h.p.), Forklift, Generator, Heater, Mulcher, Pigs (Portable Reagent Storage Tanks), Power Screens, Pumps (water), Stationary Compressed Air Plant, Sweeper, Water Wagon and Welding Machine.



STATE OF MICHIGAN
Informational Sheet: Prevailing Wages on State Projects

CARPENTER CRAFT JURISDICTION

Michigan recognizes the Carpenters for any and all work related to weatherization that has historically been the work of the Carpenter. This work shall include, but not be limited to: all work defined under the Federal Weatherization Assistance Program.

The jurisdiction of Carpenters, as to all work that has historically and traditionally been performed consisting of the milling, fashioning, joining, assembling, erecting, fastening or dismantling of all materials of wood, plastic, metal, fiber, cork, or composition and all other substitute materials, as well as the handling, cleaning, erecting, installing and dismantling of all machinery, equipment and all materials used by Carpenters.

The jurisdiction, therefore, extends over the following divisions and subdivisions of the trade: Carpenters and Joiners, Millwrights, Pile Drivers, Bridge, Dock and Wharf Carpenters, Underpinners, Timbermen, and Core-drillers, Shipwrights, Boat Builders, Ship-hand, Stair-Builders, Millmen, Wood and Resilient Floor Decorators, Floor Finishers, Carpet-layers, Shinglers, Siders, Insulators, Acoustic and Drywall Applicators, Sharers and House Movers, Loggers, Lumber and Sawmill Workers, Reed and Rattan Workers, Shingle Weavers, Casket and Coffin Makers, Railroad Carpenters and Car Builders, regardless of material used and all those engaged in the operation of woodworking or other machinery required in fashioning, milling or manufacturing of products used in the trade, and the handling, erecting and installing materials on any of the above divisions or sub-divisions, burning, welding and rigging incidental to the trade. When the term "Carpenter and Joiner" is used, it shall mean all the subdivisions of the trade. The trade autonomy of Carpenters therefore extends over the divisions and subdivisions of the trade, which are set forth as follows:

- (a) The framing, erecting and prefabrication of roofs, partitions, floors and other parts of buildings of wood, metal, plastic or other substitutes; application of all metal flashing used for hips, valleys and chimneys; the erection of Stran Steel section or its equal. The building and setting of all forms and centers for brick and masonry. The fabrication and erection of all forms for concrete and decking, the dismantling of same (as per International Agreement) when they are to be re-used on the job or stored for re-use. The cutting and handling of all falsework for fireproofing and slabs. Where power is used in the setting or dismantling of forms, all signaling and handling shall be done by carpenters. The setting of templates for anchor bolts for structural members and for machinery, and the placing, leveling and bracing of these bolts. All framing in connection with the setting or metal columns. The setting of all bulkheads, footing forms and the setting of and fabrication of, screeds and stakes for concrete and mastic floors where the screed is notched or fitted, or made up of more than one member. The making of forms for concrete block, bulkheads, figures, posts, rails, balusters and ornaments, etc.
- (b) The handling and erecting of rough material and drywall, the handling, assembly, setting and leveling of all fixtures, display cases, all furniture such as tables, chairs, desks, coat racks, etc., all de-mountable or moveable partitions such as Von wall, E Wall, Steel Case, Herman Miller, Haworth, American Seating, Westinghouse, Lazy Boy, rosewood, etc. All rebuilding, remodeling and setting up of all kinds of partitions, finished lumber, metal and plastic trim to be erected by Carpenters shall be handled from the truck or vehicle delivering same to the job by Carpenters.



STATE OF MICHIGAN
Informational Sheet: Prevailing Wages on State Projects

CARPENTER CRAFT JURISDICTION

- (c) The building and moving of all scaffolding runways and staging where carpenters' tools are used, the building from the ground up of all scaffolds over fourteen (14) feet in height including metal and specially designed scaffolding. The building and construction of all hoists and derricks made of wood; the making of mortar boards, boxes, trestles, all shoring, razing and moving of buildings. Lift type trucks are to be considered a tool of the trade. Metal siding and metal roofing fall within the scope of jurisdiction for the carpenters.
- (d) The cutting or framing and fireproofing of the openings for pipes, conduits, ducts, etc., where they pass through floors, partitions, walls, roofs or fixtures composed in whole or in part of wood. The laying out of making and installation of all inserts and sleeves for pipes, ducts, etc., where carpenters' tools and knowledge are required. The making and installing of all wooden meter boards, crippling and backing for fixtures. The welding of studs and other fastenings to receive material being applied by carpenters.
- (e) The installation of all grounds, furring or stripping, ceilings and sidewalks, application of all types of shingling and siding, etc.
- (f) The installation of all interior and exterior trim or finish of wood, aluminum, kalamein, hollow or extruded metal, plastic, doors, transoms, thresholds, mullions and windows. The setting of jambs, bucks, window frames of wood or metal where braces or wedges are used. The installation of all wood, metal or other substitutes of casing, molding, chair rail, wainscoting, china closets, base of mop boards, wardrobes, metal partitions as per National Decisions or specific agreements, etc. The complete laying out, fabrication and erection of stairs. The making and erecting of all fixtures, cabinets, shelving, racks, louvers, etc. The mortising and application of all hardware in connection with our work. The sanding and refinishing of all wood, cork or composition floors to be sanded or scraped, filled, sized and buffed, either by hand or power machines. The assembling and setting of all seats in theaters, halls, churches, schools, auditorium, grandstands and other buildings. All bowling alley work.
- (g) The manufacture, fabrication and installation of all screens, storm sash, storm doors and garage doors; the installation of wood, canvas, plastic or metal awnings or eye shades, door shelters, jalousies, etc. The laying of wood, wood block and wood composition in floors.
- (h) The installation of all materials used in drywall construction, such as plasterboard, all types of asbestos boards, transite and other composition board. The application of all material which serves as base for acoustic tile, except plaster. All acoustical applications as per National Agreement or specific agreement.
- (i) The building and dismantling of all barricades, hand rails, guard rails, partitions and temporary partitions. The erection and dismantling of all temporary housing on construction projects.
- (j) The installation of rock wool, cork and other insulation material used for sound or weatherproofing. The removal of caulking and placing of staff bead and brick mold and all Oakum caulking, substitutes, etc., and all caulking in connection with carpentry work.
- (k) The installation of all chalk boards/marker boards.



STATE OF MICHIGAN
Informational Sheet: Prevailing Wages on State Projects

CARPENTER CRAFT JURISDICTION

- (l) The operation of all hand operated winches used to raise wooden structures.
- (m) The erection of porcelain enameled panels and siding.
- (n) The unloading and distribution of all furnished, prefabricated and built-up sections such as door bucks, window frames, cupboards, cabinets, store fixtures, counters and show cases or comparably finished or prefabricated materials, to the job sites or points of installation as used in the construction, alteration and remodeling industry.
- (o) The handling of doors, metal, wood or composite, partitions and other finished bulk materials used for trim from the point of delivery.
- (p) All processing of these materials and handling after processing.
- (q) The making up of panels and fitting them into walls, all bracing and securing, all removal of panels from the casting including all braces, walers, hairpins, etc.
- (r) The handling and setting of all metal pans and sections from the stock piles of reasonable distance as required by job needs shall be performed by carpenters. The stripping of such metal pans, panels or sections is to be performed by carpenters.
- (s) The sharpening of all carpenter hand or power tools, or those used by carpenters.
- (t) The layout, fabrication, assembling of and erection and dismantling of all displays made of wood, metal, plastic, composition board or any substitute material; the covering of same with any type of material, the crating and un-crating, the handling from the point of unloading and back to the point of loading of all displays and other materials or components.
- (u) The same shall apply to all other necessary component parts used for display purposes such as turntables, platforms, identification towers and fixtures, regardless of how constructed, assembled or erected or dismantled.
- (v) The make-up, handling, cutting and sewing of all materials used in buntings, flags, banners, decorative paper, fabrics and similar materials used in the display decorative industry for draperies and back drops. The decorative framing of trucks, trailers and autos used as floats or moving displays. The slatting of walls to hand fabrics and other decorative materials, drilling of all holes to accommodate such installations. Setting up and removal of booths constructed of steel or aluminum tubing as stanchions, railings, etc., handling and placing of furniture, appliances, etc., which are being used to complete the booth at the request of the exhibitor. Fabricating and application of leather, plastic and other like materials used for covering of booths. The handling of all materials, fabricating of same. The loading and unloading, erecting and assembling at the exhibit of show area, also in or out of storage when used in booth decorations.



STATE OF MICHIGAN
Informational Sheet: Prevailing Wages on State Projects

CARPENTER CRAFT JURISDICTION

- (w) A display shall be construed as any exhibit or medium of advertising, open to private or public showing, which is constructed of wood, metal, plastic or any other substitute to accomplish the objectives of advertising or displaying.
- (x) Handling, fitting, draping, measuring and installation of fixtures and other hardwares for draperies, all manner of making, measuring, repairing, sizing, hanging and installation of necessary fixtures and hardware for shades and Venetian blinds.
- (y) Work consisting of cutting and/or forming of all materials in preparation for installing of floors, walls and ceilings; the installation of all resilient floor and base; wall and ceiling materials to include cork, linoleum, prefabricated, laminated, rubber, asphalt, vinyl, metal, plastic, seamless floors and all other similar materials in sheet, interlocking liquid or tile form; the installation of all artificial turf, the installation, cutting and/or fitting of carpets; installation of padding, matting, linen crash and all preformed resilient floor coverings; the fitting of all devices for the attachment of carpet and other floor, wall and ceiling coverings; track sewing of carpets, drilling of holes for sockets and pins, putting in dowels and slats; and all metal trimmings used; the installation of all underlayments, sealants in preparation of floors, walls and ceilings, the unloading and handling of all materials to be installed and the removal of all materials in preparing floors when contracted for by the employer, shall be done only by employees covered under this Agreement.
- (z) The installation of all sink-tops and cabinets, to include all metal trim and covering for same. All cork, linoleum, congo-wall, linewall, veos tile, plexiglass, vinawall tile, composition tile, plastic tile, aluminum tile and rubber in sheets or tile form and the application thereof. All bolta-wall and bolta-wall tile and similar products.
- (aa) The handling and placing of all pictures and frames and the assembly of bed frames and accessories. The hanging and placing of all signage.
- (bb) The installation of all framework partitions and trim materials for toilets and bathrooms made of wood, metal, plastics or composition materials; fastening of all wooden, plastic or composition cleats to iron or any other material for accessories.
- (cc) The erection of cooling towers and tanks.
- (dd) The setting, lining, leveling and bracing of all embedded plates, rails and angles. The setting of all stay in place forms.
- (ee) Environmental: Clean room, any type of environmental chamber, walk in refrigerated coolers and all refrigerated rooms or buildings.



STATE OF MICHIGAN
Informational Sheet: Prevailing Wages on State Projects

CARPENTER CRAFT JURISDICTION

PILE DRIVING AND CAISSON DRILLING

(ff) All unloading, handling, signaling and driving of piles, whether wood, steel, pipe, beam pile, composite, concrete or molded in place, wood and steel sheeting, cofferdam work, trestle work, dock work, floating derricks, caisson work, foundation work, bridge work, whether old or new, crib work, pipe line work and submarine work. Cutting of all wood, steel or concrete pile, whether by machine or hand; welding and cutting, peeling, and heading of all wood pile, steel sheeting and wood sheeting. The erecting and dismantling of all pile driving rigs, also derricks whether on land or water; also the moving, shoring and underpinning of all buildings. The loading and unloading of all derricks, cranes and pile driving materials. The tending, maintenance and operation of all valves pertaining to the operation of driving of pile. All diving and tending essential to the completion of jurisdictional claims.

All work done in the established yards of the Company and all work not enumerated above, shall be handled and manned as the Employer decides.

The pile driver will unload all material shipped in by rail from the point that the rail car is spotted.

All cleaning and preparation of all piling prior to driving.

The welding and attachment of all boot plates, pile points, splice plates, connectors, rock crosses, driving crosses, driving rigs, point reinforcements and overboots.

The construction, reconstruction, repair, alteration, demolition and partial or complete removal of all marine work including, but not limited to, docks, piers, wharves, quays, jetties, cribs, causeways, breakwaters, lighthouses and permanent buoys, etc. (mixing and placing of concrete excepted).

The driving and pulling of all wood, steel and concrete foundation piles and sheet piling.

The heading, pointing, splicing, cutting and welding of all piles.

The placing of all wales, bolts, studs, lagging, rods and washers including the cutting, drilling, boring or breaking of all holes or openings thereof.

The removal of all materials and/or obstructions of any nature (rip-rap included) that retard or interfere with the driving of piles or with the placing of wales, bolts and rods.



STATE OF MICHIGAN
Informational Sheet: Prevailing Wages on State Projects

CARPENTER CRAFT JURISDICTION

This is to be subject to the discretion of the contractor who may choose to use blasting specialists or other demolition specialists.

The handling on the job of all materials used in the work.

The manning of all floating equipment (towing equipment excepted) engaged in the work enumerated, including deck engines, except machinery manned by Operating Engineers.

The placing of all rip-rap, fill stone, bedding stone, cover stone and concrete blocks in connection with marine construction. Work normally performed by Employers, such as soil tests, shoring, underpinning of buildings, cribbing, driving of sheet piling, marine divers, tenders, underwater construction workers and similar operations shall continue to be included in the jurisdiction of this Agreement.

All burning, cutting, welding and fabrication of pipe, H-beams, sheet pile (metal or wood), done on the job site or in the yard of the Employer shall be done by pile drivers. The driving of bearing piles, sheet piling with heavy equipment, caissons, pile caps, auger drilling and boring, the setting up for load testing for any type of piling, all layout and spotting for piling, caisson and boring work, all earth retention, ditch boarding, installing tiebacks.

ASBESTOS ABATEMENT CARPENTERS

(gg) All erection and maintenance of barriers and partitions used in the removing of asbestos or any abatement work. The abatement of any materials previously installed by the carpenter such as transite, ceiling and floor tiles. All operating and maintaining of current equipment used in any abatement work.



STATE OF MICHIGAN
Informational Sheet: Prevailing Wages on State Projects

ELECTRICIAN – SOUND AND COMMUNICATION / DATA/ VOICE JURISDICTION

The installation, testing, service and maintenance, of systems which utilize the transmission and/or transference of voice, sound, vision or digital for commercial, education, security and entertainment purposes for the following: TV monitoring and surveillance, CATV and CCTV, background-foreground music, intercom and telephone interconnect, inventory control systems, microwave transmission, multi-media, multiplex, radio page, school intercom and sound, burglar alarms, low voltage fire alarm systems, low voltage master clock systems, distributed antenna systems (DAS), IP data networks, and all surface-mounted (non-power) telecommunications wiremold. Shall additionally include the installation of all raceway systems of unlimited length in telecommunications rooms, entrance facilities, equipment rooms, and similar areas. Energy management systems. Security systems; perimeter, vibration, card access, access control and sonar/infrared monitoring equipment. Communications systems that transmit or receive information and/or control systems that are intrinsic to the above listed systems; SCADA (Supervisory Control and Data Acquisition), PCM (Pulse Code Modulation), Digital Data Systems, Broadband and Baseband and Carriers, POS (Point of Sale systems), VSAT Data Systems, RF and Remote Control Systems, Fiber Optic Data Systems and Voice and Data Infrastructure and Backbone.



STATE OF MICHIGAN

Wage and Hour Division
PO Box 30476
Lansing, MI 48909
517-284-7800

Informational Sheet: Prevailing Wages on State Funded Projects

REQUIREMENTS

Effective February 13, 2024

The purpose of establishing prevailing rates is to provide minimum rates of pay that must be paid to workers on construction projects that are financed or financially supported by the state. Prevailing rates compiled from the rates contained in collectively bargained agreements which cover the locations of the state projects. While the prevailing wage rates are compiled through surveys of collectively bargained agreements, a collective bargaining agreement is not required for contractors to be on or be awarded state projects. The prevailing rate schedule provides an hourly rate which includes wage and fringe benefit totals for designated construction mechanic classifications. The overtime rates also include wage and fringe benefit totals. Please pay special attention to the overtime and premium pay requirements. The prevailing wage is satisfied when wages plus fringe benefits are equal to or greater than the required rate.

State of Michigan responsibilities:

- The department establishes the prevailing rate for each classification of construction mechanic requested by the contracting agents prior to contracts being let out for bid on a state project.

DTMB responsibilities

- If a contract is not awarded or construction does not start within 90 days of the date of the issuance of rates, a re-determination of rates must be requested by the contracting agents.
- Rates for classifications needed but not provided on the Prevailing Rate Schedule, ***must*** be obtained ***prior*** to contracts being let out for bid on a state project.

Contractor responsibilities:

- Every contractor and subcontractor shall keep posted on the construction site, in a conspicuous place, a copy of all prevailing rates prescribed in a contract.
- Every contractor and subcontractor shall keep an accurate record showing the name and occupation of and the actual wages and benefits paid to each construction mechanic. This record shall be available for reasonable inspection by DTMB or the department.
- Each contractor or subcontractor is liable for the payment of the prevailing rate to its employees.
- The prime contractor is responsible for advising all subcontractors of the requirement to pay the prevailing rate prior to commencement of work.
- A construction mechanic ***shall only*** be paid the apprentice rate if registered with the United States Department of Labor, Bureau of Apprenticeship and Training and the rate is included in the contract.

Enforcement:

A person who has information of an alleged prevailing wage violation on a prevailing wage project may file a complaint with the State of Michigan. The department will investigate and attempt to resolve the complaint informally. During the course of an investigation, if the requested records and posting certification are not made available in compliance with contractual requirements, the Contracting Agent may consider the Contractor to be in material breach of the contract and may terminate the contract for cause at the sole discretion. There are also civil penalties for failure to be in compliance with Act 10. View the entire text of Act 10 of 2023 at michigan.gov/wagehour.



STATE OF MICHIGAN
DEPARTMENT OF LABOR AND ECONOMIC OPPORTUNITY
WAGE AND HOUR DIVISION

GRETCHEN WHITMER
GOVERNOR

SUSAN CORBIN
DIRECTOR

Prevailing Wage Rates for State Funded Projects Official Rate Schedule

ORS#:	ORS-001716
Date Issued:	01/17/2025
Contract Award By Date:	04/17/2025
Contracting Agency:	DTMB Design & Construction Division (CA-0007)
Contracting Agency Representative:	Don Klein (KleinD4@michigan.gov)
Project Number:	950/22357.MNB
Project Name:	Cadillac Place 15th Floor
Project Description:	Build Three Judicial Suites

FOR ALL AWARDED CONTRACTS ONLY

- Every Contractor and Subcontractors shall keep Posted on the Construction Site, in a conspicuous place, a copy of all applicable prevailing wage rate schedules contained in a contract.
- The Prevailing rate schedule provides an hourly rate which includes wage and fringe benefit totals for designated classifications.
- Please refer to WHD-9917 & WHD 9918 for any additional information.

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Wayne

Classification Name	Category	Last Updated
Boilermaker	Boilermaker	05/10/2024

Classification Description: Boilermaker

Wage Rates	Straight Time	Time and a Half	Double Time
Total Hourly Wage	\$72.47	\$107.55	\$142.63
Apprentice: 1st Period	\$53.53	\$79.15	\$104.75
Apprentice: 2nd Period	\$55.14	\$81.56	\$107.97
Apprentice: 3rd Period	\$56.73	\$83.94	\$111.15
Apprentice: 4th Period	\$58.31	\$86.31	\$114.31
Apprentice: 5th Period	\$59.85	\$88.62	\$117.39
Apprentice: 6th Period	\$63.03	\$93.39	\$123.75
Apprentice: 7th Period	\$66.17	\$98.10	\$130.03
Apprentice: 8th Period	\$69.32	\$102.83	\$136.33

Overtime Provisions

Over 8-hour day/40-hour week	
9th hour	\$90.82
10th hour	\$90.82
Beyond 10 hours	\$90.82
Saturday	
First 8 hours	\$90.82
9th hour	\$90.82
10th hour	\$90.82
Beyond 10 hours	\$90.82
Sunday/Holiday	
	\$109.17

Four 10-hour days allowed? - Yes

Make Up Day Allowed? - No

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Wayne

Classification Name	Category	Last Updated
Bricklayers, Stone Mason, Pointer, Cleaner & Caulker - BAC 2 - Metro Detroit	Bricklayer	09/24/2024

Classification Description: Bricklayers, Stone Mason, Pointer, Cleaner & Caulker

Wage Rates	Straight Time	Time and a Half	Double Time
Total Hourly Wage	\$65.01	\$97.53	\$130.02
Apprentice: Bricklayer Apprentice Level 5	\$52.46	\$78.71	\$104.92
Apprentice: Bricklayer Apprentice Level 6	\$54.31	\$81.48	\$108.62
Apprentice: Bricklayers Apprentice 2nd Level	\$46.91	\$70.38	\$93.82
Apprentice: Bricklayers Apprentice 4th Level	\$50.61	\$75.93	\$101.22
Apprentice: Bricklayers Apprentice Level 1	\$45.06	\$67.61	\$90.12
Apprentice: Bricklayers Apprentice Level 3	\$48.76	\$73.16	\$97.52
Apprentice: Bricklayers Apprentice Level 7&8	\$56.16	\$84.26	\$112.32

Overtime Provisions

Over 8-hour day/40-hour week	
9th hour	\$65.01
10th hour	\$65.01
Beyond 10 hours	\$65.01
Saturday	
First 8 hours	\$65.01
9th hour	\$65.01
10th hour	\$65.01
Beyond 10 hours	\$65.01
Sunday/Holiday	\$130.02

Four 10-hour days allowed? - Yes

Make Up Day Allowed? - Yes

Between Nov. 1 and Apr 30, if inclement weather, or other conditions beyond the Employer's control, Saturdays may be worked as make-up days. Make-up time shall be paid at the straight time rate until forty hrs are worked unless the standard workweek included a holiday, then 32 hrs straight time

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Wayne

Classification Name	Category	Last Updated
Carpenter/Piledriver-687-Z1	Carpenter	09/16/2024

Classification Description: Carpenter/Piledriver

Wage Rates	Straight Time	Time and a Half	Double Time
Total Hourly Wage	\$72.05	\$92.86	\$113.66
Apprentice: 1st year	\$47.22	\$59.81	\$72.39
Apprentice: 2nd year	\$53.43	\$68.07	\$82.71
Apprentice: 3rd year	\$59.64	\$76.34	\$93.03
Apprentice: 4th year	\$65.85	\$84.60	\$103.35

Overtime Provisions

Over 8-hour day/40-hour week

9th hour	\$92.86
10th hour	\$92.86
Beyond 10 hours	\$92.86

Saturday

First 8 hours	\$92.86
9th hour	\$92.86
10th hour	\$92.86
Beyond 10 hours	\$92.86

Sunday/Holiday	\$113.66
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Four 10-hour days allowed? - Yes

Make Up Day Allowed? - Yes

Yes, but Saturdays may not be used as a make-up day. One and a half (1 ½) the straight time rate applies to all Saturday hours, and those over 40 hours per week. Double time applies on all Sundays, Holidays, and all time over 12 hours per day.

Base Rate Comment: 4-10s allowed Mon-Sat

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Wayne

Classification Name	Category	Last Updated
Carpet & Resilient Floor Layer	Carpenter	05/10/2024

Classification Description: Carpet and Resilient Floor Layer, (does not include installation of prefabricated formica & parquet flooring which is to be paid carpenter rate)

Wage Rates	Straight Time	Time and a Half	Double Time
Total Hourly Wage	\$64.51	\$82.93	\$101.34
Apprentice: Apprentice 1st Year	\$42.73	\$53.88	\$65.03
Apprentice: Apprentice 2nd Year	\$48.17	\$61.14	\$74.10
Apprentice: Apprentice 3rd Year	\$53.61	\$68.39	\$83.17
Apprentice: Apprentice 4th Year	\$59.07	\$75.67	\$92.27

Overtime Provisions

Over 8-hour day/40-hour week

9th hour	\$64.51
10th hour	\$64.51
Beyond 10 hours	\$82.92

Saturday

First 8 hours	\$82.92
9th hour	\$82.92
10th hour	\$82.92
Beyond 10 hours	\$101.34

Sunday/Holiday	\$0.00
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Four 10-hour days allowed? - No

Make Up Day Allowed? - No

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Wayne

Classification Name	Category	Last Updated
Diver Tender-687-Z1	Carpenter	09/16/2024

Classification Description: Journeyman-Diver Tender

Wage Rates	Straight Time	Time and a Half	Double Time
Total Hourly Wage	\$71.16	\$91.97	\$112.77

Overtime Provisions

Over 8-hour day/40-hour week

9th hour	\$91.97
10th hour	\$91.97
Beyond 10 hours	\$91.97

Saturday

First 8 hours	\$91.97
9th hour	\$91.97
10th hour	\$91.97
Beyond 10 hours	\$91.97

Sunday/Holiday	\$112.77
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Four 10-hour days allowed? - Yes

Make Up Day Allowed? - Yes

Yes, but Saturdays may not be used as a make-up day. One and a half (1 ½) the straight time rate applies to all Saturday hours, and those over 40 hours per week. Double time applies on all Sundays, Holidays, and all time over 12 hours per day.

Overtime Rate Comment: Double time over 12 hours/day.

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Wayne

Classification Name	Category	Last Updated
Class A Laborer - Zone A	Class A Laborer	05/10/2024

Classification Description: Construction Laborer, Demolition Laborer, Mason Tender, Carpenter Tender, Drywall Handler, Concrete Laborer, Cement Finisher tender, concrete chute and concrete Bucket Handler, Concrete Laborer, Cement Finisher Tender

Wage Rates	Straight Time	Time and a Half	Double Time
Total Hourly Wage	\$50.10	\$64.48	\$78.85
Apprentice: 0-1,000 Hours	\$42.91	\$53.69	\$64.47
Apprentice: 1,001-2,000 Hours	\$44.35	\$55.85	\$67.35
Apprentice: 2,001-3,000 Hours	\$45.79	\$58.01	\$70.23
Apprentice: 3,001-4,000 Hours	\$48.66	\$62.31	\$75.97

Overtime Provisions

Over 8-hour day/40-hour week	
9th hour	\$64.48
10th hour	\$64.48
Beyond 10 hours	\$64.48
Saturday	
First 8 hours	\$64.48
9th hour	\$64.48
10th hour	\$64.48
Beyond 10 hours	\$64.48
Sunday/Holiday	
	\$78.85

Four 10-hour days allowed? - Yes

Make Up Day Allowed? - Yes

Saturday

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Wayne

Classification Name	Category	Last Updated
Communication Technician	Communication Technician	05/13/2024

Classification Description:

Wage Rates	Straight Time	Time and a Half	Double Time
Total Hourly Wage	\$67.89	\$98.24	\$128.58

Overtime Provisions

Over 8-hour day/40-hour week	
9th hour	\$98.24
10th hour	\$98.24
Beyond 10 hours	\$98.24
Saturday	
First 8 hours	\$98.24
9th hour	\$98.24
10th hour	\$98.24
Beyond 10 hours	\$98.24
Sunday/Holiday	
	\$128.58

Four 10-hour days allowed? - Yes

Make Up Day Allowed? - Yes

ONLY due to inclement weather or customer requirements may Friday be used as a make up day if the normal scheduled work week was interrupted and time lost of five (5) hours or more was incurred by workmen covered under the terms of the 6-17-C/6-876-T agreement.

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Wayne

Classification Name	Category	Last Updated
Diver-687-Z1	Diver	10/01/2024

Classification Description: Diver

Wage Rates	Straight Time	Time and a Half	Double Time
Total Hourly Wage	\$82.48	\$107.41	\$132.34

Overtime Provisions

Over 8-hour day/40-hour week

9th hour	\$107.41
10th hour	\$107.41
Beyond 10 hours	\$107.41

Saturday

First 8 hours	\$107.41
9th hour	\$107.41
10th hour	\$107.41
Beyond 10 hours	\$107.41

Sunday/Holiday	\$132.34
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Four 10-hour days allowed? - Yes

Make Up Day Allowed? - Yes

Yes, but Saturdays may not be used as a make-up day. One and a half (1 ½) the straight time rate applies to all Saturday hours, and those over 40 hours per week. Double time applies on all Sundays, Holidays, and all time over 12 hours per day.

Overtime Rate Comment: Double time due when over 12 hours worked per day

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Wayne

Classification Name	Category	Last Updated
Drywall Taper	Drywall	05/10/2024

Classification Description: Drywall Taper
Four 10s allowed Monday-Thursday

Wage Rates	Straight Time	Time and a Half	Double Time
Total Hourly Wage	\$45.91	\$59.74	\$73.56
Apprentice: 4th 6 months	\$41.76	\$53.51	\$65.26
Apprentice: First 3 months	\$32.08	\$38.99	\$45.90
Apprentice: Second 3 months	\$34.85	\$43.14	\$51.44
Apprentice: Second 6 months	\$37.62	\$47.30	\$56.98
Apprentice: Third 6 months	\$40.38	\$51.44	\$62.50

Overtime Provisions

Over 8-hour day/40-hour week	
9th hour	\$59.74
10th hour	\$59.74
Beyond 10 hours	\$73.56
Saturday	
First 8 hours	\$59.74
9th hour	\$73.56
10th hour	\$73.56
Beyond 10 hours	\$73.56
Sunday/Holiday	
	\$73.56

Four 10-hour days allowed? - Yes

Make Up Day Allowed? - Yes

Friday make-up day for bad weather or holidays

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Wayne

Classification Name	Category	Last Updated
Electrician - IW	Electrician	05/10/2024

Classification Description: Inside Wireman

Wage Rates	Straight Time	Time and a Half	Double Time
Total Hourly Wage	\$71.28	\$98.14	\$121.40
Apprentice: 1st Period	\$45.69	\$59.77	\$70.23
Apprentice: 2nd Period	\$48.01	\$63.24	\$74.87
Apprentice: 3rd Period	\$50.34	\$66.74	\$79.53
Apprentice: 4th Period	\$52.66	\$70.22	\$84.17
Apprentice: 5th Period	\$54.99	\$73.71	\$88.83
Apprentice: 6th Period	\$59.65	\$80.70	\$98.15

Overtime Provisions

Over 8-hour day/40-hour week	
9th hour	\$93.86
10th hour	\$93.86
Beyond 10 hours	\$93.86
Saturday	
First 8 hours	\$93.86
9th hour	\$93.86
10th hour	\$93.86
Beyond 10 hours	\$93.86
Sunday/Holiday	
	\$116.45

Four 10-hour days allowed? - No

Make Up Day Allowed? - No

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Wayne

Classification Name	Category	Last Updated
Electrician - SC	Electrician	05/10/2024

Classification Description: Sound and Communication Installer

Wage Rates	Straight Time	Time and a Half	Double Time
Total Hourly Wage	\$44.79	\$60.31	\$75.82
Apprentice: Period 1	\$29.28	\$37.04	\$44.79
Apprentice: Period 2	\$30.84	\$39.99	\$48.72
Apprentice: Period 3	\$32.38	\$41.68	\$50.99
Apprentice: Period 4	\$33.94	\$44.03	\$54.11
Apprentice: Period 5	\$35.48	\$46.34	\$57.19
Apprentice: Period 6	\$37.04	\$48.67	\$60.31

Overtime Provisions

Over 8-hour day/40-hour week	
9th hour	\$59.85
10th hour	\$59.85
Beyond 10 hours	\$59.85
Saturday	
First 8 hours	\$59.85
9th hour	\$59.85
10th hour	\$59.85
Beyond 10 hours	\$59.85
Sunday/Holiday	
	\$74.91

Four 10-hour days allowed? - Yes

Make Up Day Allowed? - No

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Wayne

Classification Name	Category	Last Updated
Electrician - SCT	Electrician	05/10/2024

Classification Description: Sound and Communication Technician I

Wage Rates	Straight Time	Time and a Half	Double Time
Total Hourly Wage	\$52.52	\$71.89	\$91.27

Overtime Provisions

Over 8-hour day/40-hour week

9th hour	\$71.33
10th hour	\$71.33
Beyond 10 hours	\$71.33

Saturday

First 8 hours	\$71.33
9th hour	\$71.33
10th hour	\$71.33
Beyond 10 hours	\$71.33

Sunday/Holiday	\$90.14
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Four 10-hour days allowed? - Yes

Make Up Day Allowed? - No

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Wayne

Classification Name	Category	Last Updated
Elevator Constructor Mechanic	Elevator Constructor	05/10/2024

Classification Description: Elevator Constructor Mechanic

Wage Rates	Straight Time	Time and a Half	Double Time
Total Hourly Wage	\$96.27	\$124.00	\$151.73
Apprentice: 1st Year Apprentice	\$70.42	\$85.67	\$100.92
Apprentice: 2nd Year Apprentice	\$75.97	\$94.00	\$112.02
Apprentice: 3rd Year Apprentice	\$78.74	\$98.15	\$117.56
Apprentice: 4th Year Apprentice	\$84.29	\$106.48	\$128.66

Overtime Provisions

Over 8-hour day/40-hour week	
9th hour	\$151.73
10th hour	\$151.73
Beyond 10 hours	\$151.73
Saturday	
First 8 hours	\$151.73
9th hour	\$151.73
10th hour	\$151.73
Beyond 10 hours	\$151.73
Sunday/Holiday	
	\$151.73

Four 10-hour days allowed? - Yes

Make Up Day Allowed? - Yes

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Wayne

Classification Name	Category	Last Updated
Fiber Optic Splicer	Fiber Optic Splicer	05/13/2024

Classification Description:

Wage Rates	Straight Time	Time and a Half	Double Time
Total Hourly Wage	\$67.89	\$98.24	\$128.58

Overtime Provisions

Over 8-hour day/40-hour week	
9th hour	\$98.24
10th hour	\$98.24
Beyond 10 hours	\$98.24
Saturday	
First 8 hours	\$98.24
9th hour	\$98.24
10th hour	\$98.24
Beyond 10 hours	\$98.24
Sunday/Holiday	
	\$128.58

Four 10-hour days allowed? - Yes

Make Up Day Allowed? - Yes

ONLY due to inclement weather or customer requirements may Friday be used as a make up day if the normal scheduled work week was interrupted and time lost of five (5) hours or more was incurred by workmen covered under the terms of the 6-17-C/6-876-T agreement.

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Wayne

Classification Name	Category	Last Updated
Foreman	Foreman	05/10/2024

Classification Description:

Wage Rates	Straight Time	Time and a Half	Double Time
Total Hourly Wage	\$67.89	\$98.24	\$128.58

Overtime Provisions

Over 8-hour day/40-hour week

9th hour	\$90.71
10th hour	\$90.71
Beyond 10 hours	\$90.71

Saturday

First 8 hours	\$90.71
9th hour	\$90.71
10th hour	\$90.71
Beyond 10 hours	\$90.71

Sunday/Holiday	\$113.52
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Four 10-hour days allowed? - Yes

Make Up Day Allowed? - No

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Wayne

Classification Name	Category	Last Updated
Foreman	Foreman	05/10/2024

Classification Description:

Wage Rates	Straight Time	Time and a Half	Double Time
Total Hourly Wage	\$67.89	\$98.24	\$128.58

Overtime Provisions

Over 8-hour day/40-hour week

9th hour	\$90.71
10th hour	\$90.71
Beyond 10 hours	\$90.71

Saturday

First 8 hours	\$90.71
9th hour	\$90.71
10th hour	\$90.71
Beyond 10 hours	\$90.71

Sunday/Holiday	\$113.52
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Four 10-hour days allowed? - Yes

Make Up Day Allowed? - No

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Wayne

Classification Name	Category	Last Updated
Foreman	Foreman	05/10/2024

Classification Description:

Wage Rates	Straight Time	Time and a Half	Double Time
Total Hourly Wage	\$67.89	\$98.24	\$128.58

Overtime Provisions

Over 8-hour day/40-hour week

9th hour	\$90.71
10th hour	\$90.71
Beyond 10 hours	\$90.71

Saturday

First 8 hours	\$90.71
9th hour	\$90.71
10th hour	\$90.71
Beyond 10 hours	\$90.71

Sunday/Holiday	\$113.52
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Four 10-hour days allowed? - Yes

Make Up Day Allowed? - No

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Wayne

Classification Name	Category	Last Updated
Foreman	Foreman	05/10/2024

Classification Description:

Wage Rates	Straight Time	Time and a Half	Double Time
Total Hourly Wage	\$67.89	\$98.24	\$128.58

Overtime Provisions

Over 8-hour day/40-hour week

9th hour	\$90.71
10th hour	\$90.71
Beyond 10 hours	\$90.71

Saturday

First 8 hours	\$90.71
9th hour	\$90.71
10th hour	\$90.71
Beyond 10 hours	\$90.71

Sunday/Holiday	\$113.52
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Four 10-hour days allowed? - Yes

Make Up Day Allowed? - No

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Wayne

Classification Name	Category	Last Updated
Foreman	Foreman	05/10/2024

Classification Description:

Wage Rates	Straight Time	Time and a Half	Double Time
Total Hourly Wage	\$75.47	\$109.62	\$143.74

Overtime Provisions

Over 8-hour day/40-hour week

9th hour	\$109.61
10th hour	\$109.61
Beyond 10 hours	\$109.61

Saturday

First 8 hours	\$109.61
9th hour	\$109.61
10th hour	\$109.61
Beyond 10 hours	\$109.61

Sunday/Holiday	\$143.74
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Four 10-hour days allowed? - Yes

Make Up Day Allowed? - Yes

ONLY due to inclement weather or customer requirements may Friday be used as a make up day if the normal scheduled work week was interrupted and time lost of five (5) hours or more was incurred by workmen covered under the terms of the 6-17-C/6-876-T agreement.

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Wayne

Classification Name	Category	Last Updated
Foreman	Foreman	05/10/2024

Classification Description:

Wage Rates	Straight Time	Time and a Half	Double Time
Total Hourly Wage	\$75.47	\$109.61	\$143.74

Overtime Provisions

Over 8-hour day/40-hour week

9th hour	\$101.14
10th hour	\$101.14
Beyond 10 hours	\$101.14

Saturday

First 8 hours	\$101.14
9th hour	\$101.14
10th hour	\$101.14
Beyond 10 hours	\$101.14

Sunday/Holiday	\$126.80
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Four 10-hour days allowed? - Yes

Make Up Day Allowed? - No

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Wayne

Classification Name	Category	Last Updated
Foreman	Foreman	05/10/2024

Classification Description:

Wage Rates	Straight Time	Time and a Half	Double Time
Total Hourly Wage	\$76.98	\$111.87	\$146.76

Overtime Provisions

Over 8-hour day/40-hour week

9th hour	\$103.22
10th hour	\$103.22
Beyond 10 hours	\$103.22

Saturday

First 8 hours	\$103.22
9th hour	\$103.22
10th hour	\$103.22
Beyond 10 hours	\$103.22

Sunday/Holiday

\$129.45

Four 10-hour days allowed? - Yes

Make Up Day Allowed? - No

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Wayne

Classification Name	Category	Last Updated
Glazier	Glazier	05/10/2024

Classification Description: Glazier

If 4 10 hour day workweek is scheduled, four 10s must be consecutive, M-F.

Wage Rates	Straight Time	Time and a Half	Double Time
Total Hourly Wage	\$53.55	\$70.10	\$86.65
Apprentice: 1st 6 months	\$37.00	\$45.27	\$53.55
Apprentice: 2nd 6 months	\$37.75	\$46.40	\$55.05
Apprentice: 3rd 6 months	\$41.97	\$52.73	\$63.49
Apprentice: 4th 6 months	\$43.62	\$55.21	\$66.79
Apprentice: 5th 6 months	\$45.27	\$57.68	\$70.09
Apprentice: 6th 6 months	\$46.93	\$60.17	\$73.41
Apprentice: 7th 6 months	\$48.59	\$62.66	\$76.73
Apprentice: 8th 6 months	\$51.89	\$67.61	\$83.33

Overtime Provisions

Over 8-hour day/40-hour week

9th hour	\$70.10
10th hour	\$70.10
Beyond 10 hours	\$70.10

Saturday

First 8 hours	\$70.10
9th hour	\$70.10
10th hour	\$70.10
Beyond 10 hours	\$70.10

Sunday/Holiday	\$86.65
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Four 10-hour days allowed? - Yes

Make Up Day Allowed? - No

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Wayne

Classification Name	Category	Last Updated
Heat & Frost Insulator - Spray Insulation	Heat and Frost Insulator	05/10/2024

Classification Description: Spray Insulation

Wage Rates	Straight Time	Time and a Half	Double Time
Total Hourly Wage	\$25.29	\$36.51	\$47.73

Overtime Provisions

Over 8-hour day/40-hour week	
9th hour	\$36.51
10th hour	\$36.51
Beyond 10 hours	\$36.51
Saturday	
First 8 hours	\$36.51
9th hour	\$36.51
10th hour	\$36.51
Beyond 10 hours	\$36.51
Sunday/Holiday	
	\$36.51

Four 10-hour days allowed? - No

Make Up Day Allowed? - No

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Wayne

Classification Name	Category	Last Updated
Heat & Frost Insulator Asbestos	Heat and Frost Insulator	05/10/2024

Classification Description: Heat and Frost Insulators and Asbestos Workers 4-10s must be worked a minimum of 2 weeks consecutively, Monday thru Thursday. Hours worked in excess of 10 will be paid at double time. Hours worked on the fifth day, Monday thru Friday @ time and half

Wage Rates	Straight Time	Time and a Half	Double Time
Total Hourly Wage	\$62.65	\$78.41	\$94.16
Apprentice: 1st Year	\$46.90	\$54.78	\$62.66
Apprentice: 2nd Year	\$50.05	\$59.50	\$68.96
Apprentice: 3rd Year	\$53.20	\$64.23	\$75.26
Apprentice: 4th Year	\$56.35	\$68.96	\$81.56

Overtime Provisions

Over 8-hour day/40-hour week	
9th hour	\$78.41
10th hour	\$78.41
Beyond 10 hours	\$78.41
Saturday	
First 8 hours	\$78.41
9th hour	\$78.41
10th hour	\$78.41
Beyond 10 hours	\$78.41
Sunday/Holiday	
	\$94.16

Four 10-hour days allowed? - Yes

Make Up Day Allowed? - No

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Wayne

Classification Name	Category	Last Updated
Ironworker - Rigger Machinery Mover	Ironworker	01/07/2025

Classification Description: Rigging Work

Wage Rates	Straight Time	Time and a Half	Double Time
Total Hourly Wage	\$78.78	\$96.21	\$113.63
Apprentice: Level 1	\$54.18	\$65.03	\$75.87
Apprentice: Level 2	\$54.18	\$65.03	\$75.87
Apprentice: Level 3	\$57.29	\$69.02	\$80.75
Apprentice: Level 4	\$60.00	\$72.45	\$84.89
Apprentice: Level 5	\$63.12	\$76.45	\$89.78
Apprentice: Level 6	\$65.82	\$79.86	\$93.90
Apprentice: Level 7	\$68.94	\$83.87	\$98.80
Apprentice: Level 8	\$72.05	\$87.87	\$103.69

Overtime Provisions

Over 8-hour day/40-hour week

9th hour	\$96.21
10th hour	\$96.21
Beyond 10 hours	\$113.63

Saturday

First 8 hours	\$96.21
9th hour	\$96.21
10th hour	\$96.21
Beyond 10 hours	\$113.63

Sunday/Holiday	\$113.63
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Four 10-hour days allowed? - No

Make Up Day Allowed? - No

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Wayne

Classification Name	Category	Last Updated
Reinforced Ironworker	Ironworker	01/07/2025

Classification Description: Reinforced Iron Work

Wage Rates	Straight Time	Time and a Half	Double Time
Total Hourly Wage	\$65.70	\$82.42	\$99.13
Apprentice: Level 1	\$54.67	\$66.54	\$78.41
Apprentice: Level 2	\$57.24	\$69.61	\$81.98
Apprentice: Level 3	\$59.13	\$71.84	\$84.54
Apprentice: Level 4	\$62.02	\$75.56	\$89.10
Apprentice: Level 5	\$64.92	\$79.30	\$93.67
Apprentice: Level 6	\$72.26	\$88.98	\$105.69
Apprentice: Level 7	\$72.26	\$88.98	\$105.69
Apprentice: Level 8	\$72.26	\$88.98	\$105.69

Overtime Provisions

Over 8-hour day/40-hour week

9th hour	\$82.41
10th hour	\$82.41
Beyond 10 hours	\$99.13

Saturday

First 8 hours	\$82.41
9th hour	\$82.41
10th hour	\$82.41
Beyond 10 hours	\$99.13

Sunday/Holiday	\$99.13
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Four 10-hour days allowed? - No

Make Up Day Allowed? - Yes

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Wayne

Classification Name	Category	Last Updated
Structural Ironworker	Ironworker	01/07/2025

Classification Description: Structural, ornamental, welder and pre-cast

Wage Rates	Straight Time	Time and a Half	Double Time
Total Hourly Wage	\$78.91	\$105.80	\$132.69
Apprentice: Level 1	\$54.18	\$65.03	\$75.87
Apprentice: Level 2	\$55.00	\$66.20	\$77.40
Apprentice: Level 3	\$57.29	\$69.02	\$80.75
Apprentice: Level 4	\$60.00	\$72.45	\$84.89
Apprentice: Level 5	\$63.12	\$76.45	\$89.78
Apprentice: Level 6	\$65.82	\$79.86	\$93.90
Apprentice: Level 7	\$68.94	\$83.87	\$98.80
Apprentice: Level 8	\$72.05	\$87.87	\$103.69

Overtime Provisions

Over 8-hour day/40-hour week	
9th hour	\$96.69
10th hour	\$96.69
Beyond 10 hours	\$114.46
Saturday	
First 8 hours	\$96.69
9th hour	\$96.69
10th hour	\$96.69
Beyond 10 hours	\$114.46
Sunday/Holiday	
	\$114.46

Four 10-hour days allowed? - Yes

Make Up Day Allowed? - Yes

Friday

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Wayne

Classification Name	Category	Last Updated
Journeyman Signal Technician	Journeyman Signal Technician	05/13/2024

Classification Description:

Wage Rates	Straight Time	Time and a Half	Double Time
Total Hourly Wage	\$67.89	\$98.24	\$128.58
Apprentice: Apprentice 1st 6 months	\$43.61	\$61.82	\$80.02
Apprentice: Apprentice 2nd 6 months	\$46.65	\$66.38	\$86.10
Apprentice: Apprentice 3rd 6 months	\$49.68	\$70.92	\$92.16
Apprentice: Apprentice 4th 6 months	\$52.71	\$75.47	\$98.22
Apprentice: Apprentice 5th 6 months	\$55.75	\$80.03	\$104.30
Apprentice: Apprentice 6th 6months	\$61.82	\$89.13	\$116.44

Overtime Provisions

Over 8-hour day/40-hour week	
9th hour	\$98.24
10th hour	\$98.24
Beyond 10 hours	\$98.24
Saturday	
First 8 hours	\$98.24
9th hour	\$98.24
10th hour	\$98.24
Beyond 10 hours	\$98.24
Sunday/Holiday	
	\$128.58

Four 10-hour days allowed? - Yes

Make Up Day Allowed? - Yes

ONLY due to inclement weather or customer requirements may Friday be used as a make up day if the normal scheduled work week was interrupted and time lost of five (5) hours or more was incurred by workmen covered under the terms of the 6-17-C/6-876-T agreement.

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Wayne

Classification Name	Category	Last Updated
Journeyman Specialist	Journeyman Specialist	05/13/2024

Classification Description:

Wage Rates	Straight Time	Time and a Half	Double Time
Total Hourly Wage	\$76.98	\$111.88	\$146.76

Overtime Provisions

Over 8-hour day/40-hour week	
9th hour	\$111.87
10th hour	\$111.87
Beyond 10 hours	\$111.87
Saturday	
First 8 hours	\$111.87
9th hour	\$111.87
10th hour	\$111.87
Beyond 10 hours	\$111.87
Sunday/Holiday	
	\$146.76

Four 10-hour days allowed? - Yes

Make Up Day Allowed? - Yes

ONLY due to inclement weather or customer requirements may Friday be used as a make up day if the normal scheduled work week was interrupted and time lost of five (5) hours or more was incurred by workmen covered under the terms of the 6-17-C/6-876-T agreement.

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Wayne

Classification Name	Category	Last Updated
Labor Crew Foreman	Labor Crew Foreman	05/13/2024

Classification Description:

Wage Rates	Straight Time	Time and a Half	Double Time
Total Hourly Wage	\$61.86	\$89.19	\$116.52

Overtime Provisions

Over 8-hour day/40-hour week

9th hour	\$89.19
10th hour	\$89.19
Beyond 10 hours	\$89.19

Saturday

First 8 hours	\$89.19
9th hour	\$89.19
10th hour	\$89.19
Beyond 10 hours	\$89.19

Sunday/Holiday	\$116.52
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Four 10-hour days allowed? - Yes

Make Up Day Allowed? - Yes

ONLY due to inclement weather or customer requirements may Friday be used as a make up day if the normal scheduled work week was interrupted and time lost of five (5) hours or more was incurred by workmen covered under the terms of the 6-17-C/6-876-T agreement.

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Wayne

Classification Name	Category	Last Updated
Asbestos & Lead Abatement Laborer	Laborer	05/10/2024

Classification Description: Asbestos & Lead Abatement Laborer

4 ten hour days @ straight time allowed Monday-Saturday, must be consecutive calendar days

Wage Rates	Straight Time	Time and a Half	Double Time
Total Hourly Wage	\$50.60	\$65.37	\$80.13
Apprentice: Trainee 600 hours +1 year	\$34.07	\$18.89	\$20.54

Overtime Provisions

Over 8-hour day/40-hour week

9th hour	\$65.37
10th hour	\$65.37
Beyond 10 hours	\$65.37

Saturday

First 8 hours	\$65.37
9th hour	\$65.37
10th hour	\$65.37
Beyond 10 hours	\$65.37

Sunday/Holiday

\$80.13

Four 10-hour days allowed? - Yes

Make Up Day Allowed? - No

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Wayne

Classification Name	Category	Last Updated
Laborer - A-B	Laborer	05/10/2024

Classification Description: Signal man (on sewer & caisson work); air,electric or gasoline tool operator (including concrete vibrator operator,acetylene torch & air hammer operator); scaffold builder, caisson worker

Wage Rates	Straight Time	Time and a Half	Double Time
Total Hourly Wage	\$50.40	\$64.93	\$79.45

Overtime Provisions	
Over 8-hour day/40-hour week	
9th hour	\$64.93
10th hour	\$64.93
Beyond 10 hours	\$64.93
Saturday	
First 8 hours	\$64.93
9th hour	\$64.93
10th hour	\$64.93
Beyond 10 hours	\$64.93
Sunday/Holiday	\$79.45

Four 10-hour days allowed? - Yes

Make Up Day Allowed? - Yes

Saturday

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Wayne

Classification Name	Category	Last Updated
Laborer - A-C	Laborer	05/10/2024

Classification Description: Lansing Burner, Blaster & Powder Man; Air, electric Gasoline Tool Operator (Blast furnace work or battery work)

Wage Rates	Straight Time	Time and a Half	Double Time
Total Hourly Wage	\$50.96	\$65.77	\$80.57

Overtime Provisions	
Over 8-hour day/40-hour week	
9th hour	\$65.77
10th hour	\$65.77
Beyond 10 hours	\$65.77
Saturday	
First 8 hours	\$65.77
9th hour	\$65.77
10th hour	\$65.77
Beyond 10 hours	\$65.77
Sunday/Holiday	\$80.57

Four 10-hour days allowed? - Yes

Make Up Day Allowed? - Yes

Saturday,

If conditions beyond the employer/employee's control prevent one or more hours of working during Mon-Fri, the employer may choose to work up to 10 hour straight time weekdays.

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Wayne

Classification Name	Category	Last Updated
Laborer - A-D	Laborer	05/10/2024

Classification Description: Furnance battery heater tender, burning bar & oxy-acetylene gun

Wage Rates	Straight Time	Time and a Half	Double Time	Overtime Provisions
Total Hourly Wage	\$50.67	\$65.33	\$79.99	Over 8-hour day/40-hour week
				9th hour \$65.33
				10th hour \$65.33
				Beyond 10 hours \$65.33
				Saturday
				First 8 hours \$65.33
				9th hour \$65.33
				10th hour \$65.33
				Beyond 10 hours \$65.33
				Sunday/Holiday \$79.99

Four 10-hour days allowed? - Yes

Make Up Day Allowed? - Yes

Saturday

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Wayne

Classification Name	Category	Last Updated
Laborer - A-E	Laborer	05/10/2024

Classification Description: Cleaner/sweeper laborer, furniture laborer

Wage Rates	Straight Time	Time and a Half	Double Time
Total Hourly Wage	\$44.65	\$56.30	\$67.95

Overtime Provisions

Over 8-hour day/40-hour week

9th hour	\$56.30
10th hour	\$56.30
Beyond 10 hours	\$56.30

Saturday

First 8 hours	\$56.30
9th hour	\$56.30
10th hour	\$56.30
Beyond 10 hours	\$56.30

Sunday/Holiday	\$67.95
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Four 10-hour days allowed? - Yes

Make Up Day Allowed? - Yes

Saturday

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Wayne

Classification Name	Category	Last Updated
Laborer - A-F	Laborer	05/10/2024

Classification Description: Expediter man, topman and/or bottom man (blast furnace work or battery work)

Wage Rates	Straight Time	Time and a Half	Double Time
Total Hourly Wage	\$51.51	\$66.69	\$81.87

Overtime Provisions

Over 8-hour day/40-hour week

9th hour	\$66.59
10th hour	\$66.59
Beyond 10 hours	\$66.59

Saturday

First 8 hours	\$66.59
9th hour	\$66.59
10th hour	\$66.59
Beyond 10 hours	\$66.59

Sunday/Holiday	\$81.67
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Four 10-hour days allowed? - Yes

Make Up Day Allowed? - No

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Wayne

Classification Name	Category	Last Updated
Laborer - A-W	Laborer	05/10/2024

Classification Description: Laborer -Wall and ceiling material handler, plasterer tender, mortar mixer and plastering machine operator

Wage Rates	Straight Time	Time and a Half	Double Time
Total Hourly Wage	\$46.90	\$59.78	\$72.65
Apprentice: 0-1,000 Hours	\$40.46	\$55.20	\$69.93
Apprentice: 1,001-2,000 Hours	\$41.75	\$57.13	\$72.50
Apprentice: 2,001-3,000 Hours	\$43.04	\$59.06	\$75.08
Apprentice: 3,001-4,000 Hours	\$45.61	\$62.92	\$80.23

Overtime Provisions

Over 8-hour day/40-hour week

9th hour	\$59.78
10th hour	\$59.78
Beyond 10 hours	\$59.78

Saturday

First 8 hours	\$59.78
9th hour	\$59.78
10th hour	\$59.78
Beyond 10 hours	\$59.78

Sunday/Holiday	\$72.65
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Four 10-hour days allowed? - Yes

Make Up Day Allowed? - Yes

Saturday make up day due to conditions beyond control or holiday

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Wayne

Classification Name	Category	Last Updated
Laborer - Class 1 - RZ1	Laborer	06/20/2024

Classification Description: Laborer Road Class 1: Asphalt Shoveler or loader, asphalt plant misc., asphalt raker tender, burlap man, carpenters' tender, yard man, guard rail builder's tender, Earth Retention barrier and wall and M.S.E. Wall installers Tender, Highway and median barrier installers tender (including sound, retaining and crash barriers), fence erector's tender, dumper (wagon, Truck, etc.), joint filling labor, misc., unskilled labor, sprinkler labor, form setting labor, form stripper, pavement reinforcing, handling and placing (e.g., wire mesh, steel mats, dowel bars, etc.), mason's or bricklayer's tender on manholes, manhole builder, headwalls, etc., waterproofing, (other than buildings) seal coating and slurry mix, shoring, underpinning, bridge painting, etc., (spray, roller and brush), sandblasting, pressure grouting, bridge pin and hanger removal, Material Recycling Laborer, Horizontal Paver Laborer (brick, concrete, clay, stone and asphalt), Ground Stabilization and Modification Laborer, grouting, waterblasting, Top Man, and railroad track and trestle laborer, sign installer and remote control operated equipment.

Wage Rates	Straight Time	Time and a Half	Double Time
Total Hourly Wage	\$47.82	\$62.33	\$76.83
Apprentice: 0-1,000 hours	\$41.33	\$52.21	\$63.09
Apprentice: 1,001-2,000 hours	\$42.78	\$54.39	\$65.99
Apprentice: 2,001-3,000	\$44.23	\$56.56	\$68.89
Apprentice: 3,001-4,000 hours	\$47.13	\$60.91	\$74.69

Overtime Provisions

Over 8-hour day/40-hour week	
9th hour	\$62.33
10th hour	\$62.33
Beyond 10 hours	\$62.33
Saturday	
First 8 hours	\$62.33
9th hour	\$62.33
10th hour	\$62.33
Beyond 10 hours	\$62.33
Sunday/Holiday	
	\$76.83

Four 10-hour days allowed? - Yes

Make Up Day Allowed? - No

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Wayne

Classification Name	Category	Last Updated
Laborer - Class 2 - RZ1	Laborer	06/20/2024

Classification Description: Laborer Road Class 2: Mixer operator, (less than 5 sacks), air or electric tool operator (jack hammer, etc.), spreader, boxman (asphalt, stone, gravel, etc.), concrete paddler, power chain saw operator, paving batch truck dumper, tunnel mucker (highway work only), concrete saw operator (under 40 hp), dry pack machine, and roto-mill grounds person.

Wage Rates	Straight Time	Time and a Half	Double Time
Total Hourly Wage	\$48.07	\$62.64	\$77.21
Apprentice: 0-1,000 hours	\$41.43	\$52.36	\$63.29
Apprentice: 1,001-2,000 hours	\$42.88	\$54.54	\$66.19
Apprentice: 2,001-3,000 hours	\$44.34	\$56.73	\$69.11
Apprentice: 3,001-4,000 hours	\$47.25	\$61.09	\$74.93

Overtime Provisions

Over 8-hour day/40-hour week

9th hour	\$62.64
10th hour	\$62.64
Beyond 10 hours	\$62.64

Saturday

First 8 hours	\$62.64
9th hour	\$62.64
10th hour	\$62.64
Beyond 10 hours	\$62.64

Sunday/Holiday	\$77.21
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Four 10-hour days allowed? - Yes

Make Up Day Allowed? - No

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Wayne

Classification Name	Category	Last Updated
Laborer - Class 3 - RZ1	Laborer	06/20/2024

Classification Description: Laborer Road Class 3: Tunnel miner (highway work only), finishers tenders, guard rail builder, highway and median barrier installer, Earth Retention Barrier and wall and M.S.E. wall installer (including sound, retaining and crash barriers), fence erector, bottom man, powder man, wagon drill, and air track operator, curb and side rail setter's tender, diamond and core drills (per agreement between the Laborers and Operating Engineers International Union dated February 3, 1954), grade checker and certified welder.

Wage Rates	Straight Time	Time and a Half	Double Time
Total Hourly Wage	\$48.25	\$62.91	\$77.57
Apprentice: 0-1,000 hours	\$41.56	\$52.55	\$63.55
Apprentice: 1,001-2,000 hours	\$43.03	\$54.76	\$66.49
Apprentice: 2,001-3,000 hours	\$44.49	\$56.95	\$69.41
Apprentice: 3,001-4,000 hours	\$47.42	\$61.35	\$75.27

Overtime Provisions

Over 8-hour day/40-hour week	
9th hour	\$62.91
10th hour	\$62.91
Beyond 10 hours	\$62.91
Saturday	
First 8 hours	\$62.91
9th hour	\$62.91
10th hour	\$62.91
Beyond 10 hours	\$62.91
Sunday/Holiday	
	\$77.57

Four 10-hour days allowed? - Yes

Make Up Day Allowed? - No

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Wayne

Classification Name	Category	Last Updated
Laborer - Class 4 - RZ1	Laborer	05/10/2024

Classification Description: Laborer Road Class 4: asphalt raker

Wage Rates	Straight Time	Time and a Half	Double Time
Total Hourly Wage	\$48.33	\$62.53	\$77.23
Apprentice: 0-1,000 hours	\$41.62	\$52.15	\$63.17
Apprentice: 1,001-2,000 hours	\$43.09	\$54.35	\$66.11
Apprentice: 2,001-3,000 hours	\$44.56	\$56.55	\$69.05
Apprentice: 3,001-4,000 hours	\$47.50	\$60.97	\$74.93

Overtime Provisions

Over 8-hour day/40-hour week	
9th hour	\$63.03
10th hour	\$63.03
Beyond 10 hours	\$63.03
Saturday	
First 8 hours	\$63.03
9th hour	\$63.03
10th hour	\$63.03
Beyond 10 hours	\$63.03
Sunday/Holiday	
	\$77.73

Four 10-hour days allowed? - Yes

Make Up Day Allowed? - No

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Wayne

Classification Name	Category	Last Updated
Laborer - Class 5 - RZ1	Laborer	05/10/2024

Classification Description: Laborer Road Class 5: pipe layers, oxy-gun

Wage Rates	Straight Time	Time and a Half	Double Time
Total Hourly Wage	\$48.54	\$63.35	\$78.15
Apprentice: 0-1,000 hours	\$41.78	\$52.89	\$63.99
Apprentice: 1,001-2,000 hours	\$43.26	\$55.11	\$66.95
Apprentice: 2,001-3,000 hours	\$44.74	\$57.33	\$69.91
Apprentice: 3,001-4,000 hours	\$47.70	\$61.77	\$75.83

Overtime Provisions

Over 8-hour day/40-hour week

9th hour	\$63.34
10th hour	\$63.34
Beyond 10 hours	\$63.34

Saturday

First 8 hours	\$63.34
9th hour	\$63.34
10th hour	\$63.34
Beyond 10 hours	\$63.34

Sunday/Holiday	\$78.15
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Four 10-hour days allowed? - Yes

Make Up Day Allowed? - No

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Wayne

Classification Name	Category	Last Updated
Laborer - Class 6 - RZ1	Laborer	05/10/2024

Classification Description: Laborer Road Class 6: line form setter for curb or pavement, asphalt screed checker/screw man on asphalt paving machines

Wage Rates	Straight Time	Time and a Half	Double Time
Total Hourly Wage	\$48.84	\$63.80	\$78.75
Apprentice: 0-1,000 hours	\$42.00	\$53.22	\$64.43
Apprentice: 1,001-2,000 hours	\$43.50	\$55.47	\$67.43
Apprentice: 2,001-3,000 hours	\$44.99	\$57.70	\$70.41
Apprentice: 3,001-4,000 hours	\$47.98	\$62.19	\$76.39

Overtime Provisions

Over 8-hour day/40-hour week

9th hour	\$63.80
10th hour	\$63.80
Beyond 10 hours	\$63.80

Saturday

First 8 hours	\$63.80
9th hour	\$63.80
10th hour	\$63.80
Beyond 10 hours	\$63.80

Sunday/Holiday	\$78.75
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Four 10-hour days allowed? - Yes

Make Up Day Allowed? - No

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Wayne

Classification Name	Category	Last Updated
Laborer - Class 7 - RZ1	Laborer	06/20/2024

Classification Description: Laborer Road Class 7: Concrete Specialist - The Classification of Concrete Specialist shall include the finishing and troweling, of cast in place or precast concrete by any and all methods. Laborers who have the necessary skills to be classified as a Concrete Specialist and perform the work shall be paid the following wage and fringe benefit scale.

Wage Rates	Straight Time	Time and a Half	Double Time
Total Hourly Wage	\$49.91	\$65.40	\$80.89
Apprentice: 0-1,000 hours	\$42.80	\$54.42	\$66.03
Apprentice: 1,001-2,000 hours	\$44.35	\$56.74	\$69.13
Apprentice: 2,001-3,000 hours	\$45.90	\$59.06	\$72.23
Apprentice: 3,001-4,000 hours	\$47.78	\$64.72	\$81.66

Overtime Provisions

Over 8-hour day/40-hour week

9th hour	\$65.40
10th hour	\$65.40
Beyond 10 hours	\$65.40

Saturday

First 8 hours	\$65.40
9th hour	\$65.40
10th hour	\$65.40
Beyond 10 hours	\$65.40

Sunday/Holiday	\$80.89
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Four 10-hour days allowed? - Yes

Make Up Day Allowed? - No

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Wayne

Classification Name	Category	Last Updated
Laborer - Hazardous - Class A - Z1	Laborer - Hazardous	05/10/2024

Classification Description: Class A performing work in conjunction with site preparation and other preliminary work prior to actual removal, handling, or containment of hazardous waste substances not requiring use of personal protective equipment required by state or federal regulat

Wage Rates	Straight Time	Time and a Half	Double Time
Total Hourly Wage	\$46.90	\$64.85	\$82.80
Apprentice: 0-1,000 work hours	\$40.46	\$55.19	\$69.92
Apprentice: 1,001-2,000 work hours	\$41.75	\$57.13	\$72.50
Apprentice: 2,001-3,000 work hours	\$43.04	\$59.07	\$75.08
Apprentice: 3,001-4,000 work hours	\$45.61	\$62.92	\$80.22

Overtime Provisions

Over 8-hour day/40-hour week

9th hour	\$59.78
10th hour	\$59.78
Beyond 10 hours	\$59.78

Saturday

First 8 hours	\$59.78
9th hour	\$59.78
10th hour	\$59.78
Beyond 10 hours	\$59.78

Sunday/Holiday	\$72.65
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Four 10-hour days allowed? - Yes

Make Up Day Allowed? - Yes

4 10s allowed M-Th or T-F; inclement weather makeup day Friday

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Wayne

Classification Name	Category	Last Updated
Laborer - Hazardous - Class B - Z1	Laborer - Hazardous	05/10/2024

Classification Description: Class B performing work in conjunction with the removal, handling, or containment of hazardous waste substances when the use of personal protective equipment levels "A", "B" or "C" is required.

Wage Rates	Straight Time	Time and a Half	Double Time
Total Hourly Wage	\$47.90	\$66.35	\$84.80
Apprentice: 0-1,000 work hours	\$41.21	\$56.32	\$71.42
Apprentice: 1,001-2,000 work hours	\$42.55	\$58.33	\$74.10
Apprentice: 2,001-3,000 work hours	\$43.89	\$60.34	\$76.78
Apprentice: 3,001-4,000 work hours	\$46.56	\$64.35	\$82.12

Overtime Provisions	
Over 8-hour day/40-hour week	
9th hour	\$61.28
10th hour	\$61.28
Beyond 10 hours	\$61.28
Saturday	
First 8 hours	\$61.28
9th hour	\$61.28
10th hour	\$61.28
Beyond 10 hours	\$61.28
Sunday/Holiday	\$74.65

Four 10-hour days allowed? - Yes

Make Up Day Allowed? - Yes

4 10s allowed M-Th or T-F; inclement weather makeup day Friday

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Wayne

Classification Name	Category	Last Updated
Class A	Laborer - Landscape	08/02/2024

Classification Description: Irrigation Foremen and Construction Foremen. Skilled Landscape Operator includes air, gas and diesel equipment operators, lawn sprinkler installers, skid steer/track loaders, mini excavators, off-road dump vehicle, articulated haulers, hydroseeder, backhoe loaders, wheel loaders, excavators, ride and walk-behind trenchers and telescope handlers.

Wage Rates	Straight Time	Time and a Half	Double Time
Total Hourly Wage	\$37.22	\$50.00	\$62.78

Overtime Provisions

Over 8-hour day/40-hour week	
9th hour	\$37.22
10th hour	\$37.22
Beyond 10 hours	\$37.22
Saturday	
First 8 hours	\$37.22
9th hour	\$37.22
10th hour	\$37.22
Beyond 10 hours	\$37.22
Sunday/Holiday	
	\$37.22

Four 10-hour days allowed? - Yes

Make Up Day Allowed? - No

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Wayne

Classification Name	Category	Last Updated
Class B	Laborer - Landscape	08/02/2024

Classification Description: Skilled Landscape Laborer includes small power tool operator, lawn sprinkler installers' tender, irrigation installers' tender and material mover.

Wage Rates	Straight Time	Time and a Half	Double Time
Total Hourly Wage	\$35.00	\$48.17	\$61.34

Overtime Provisions

Over 8-hour day/40-hour week

9th hour	\$35.00
10th hour	\$35.00
Beyond 10 hours	\$35.00

Saturday

First 8 hours	\$35.00
9th hour	\$35.00
10th hour	\$35.00
Beyond 10 hours	\$35.00

Sunday/Holiday	\$35.00
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Four 10-hour days allowed? - Yes

Make Up Day Allowed? - No

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Wayne

Classification Name	Category	Last Updated
Class D	Laborer - Landscape	08/02/2024

Classification Description: Inexperienced Landscape Laborer is defined as an individual who has not worked ninety (90) calendar days under the terms and conditions of this or a similar collective bargaining agreement. An Inexperienced Laborer may be employed by the Contractor Foreman. The ratio may be utilized by the Contractor on a company-wide basis or a project basis. The ratio may be modified by mutual agreement of the Local Union having jurisdiction and the Contractor. The Local Union having jurisdiction on the project shall have first opportunity to refer new employees. See Article 3, Section 3.6.

Wage Rates	Straight Time	Time and a Half	Double Time
Total Hourly Wage	\$21.74	\$32.61	\$43.48

Overtime Provisions	
Over 8-hour day/40-hour week	
9th hour	\$21.74
10th hour	\$21.74
Beyond 10 hours	\$21.74
Saturday	
First 8 hours	\$21.74
9th hour	\$21.74
10th hour	\$21.74
Beyond 10 hours	\$21.74
Sunday/Holiday	\$21.74

Four 10-hour days allowed? - No

Make Up Day Allowed? - No

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Wayne

Classification Name	Category	Last Updated
Laborer - Landscape - Class B1 - Z1	Laborer - Landscape	05/10/2024

Classification Description: Class B1: Landscape Operator includes air, gas, and diesel equipment operator, lawn sprinkler installer, skidsteer, mini excavators, backhoe loaders, ride and walk behind trenchers, off road dump vehicle, articulated haulers, hydroseeder, wheel loaders

Wage Rates	Straight Time	Time and a Half	Double Time
Total Hourly Wage	\$32.40	\$42.43	\$52.95

Overtime Provisions

Over 8-hour day/40-hour week

9th hour	\$42.93
10th hour	\$42.93
Beyond 10 hours	\$42.93

Saturday

First 8 hours	\$42.93
9th hour	\$42.93
10th hour	\$42.93
Beyond 10 hours	\$42.93

Sunday/Holiday	\$53.45
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Four 10-hour days allowed? - Yes

Make Up Day Allowed? - No

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Wayne

Classification Name	Category	Last Updated
Laborer - Landscape - Class B1 - Z1	Laborer - Landscape	05/10/2024

Classification Description: Class B1: Landscape Operator includes air, gas, and diesel equipment operator, lawn sprinkler installer, skidsteer, mini excavators, backhoe loaders, ride and walk behind trenchers, off road dump vehicle, articulated haulers, hydroseeder, wheel loaders

Wage Rates	Straight Time	Time and a Half	Double Time
Total Hourly Wage	\$34.62	\$46.26	\$57.89

Overtime Provisions

Over 8-hour day/40-hour week

9th hour	\$11.35
10th hour	\$46.26
Beyond 10 hours	\$46.26

Saturday

First 8 hours	\$46.26
9th hour	\$46.26
10th hour	\$46.26
Beyond 10 hours	\$46.26

Sunday/Holiday	\$57.89
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Four 10-hour days allowed? - Yes

Make Up Day Allowed? - No

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Wayne

Classification Name	Category	Last Updated
Laborer - Landscape - Class B2 - Z1	Laborer - Landscape	05/10/2024

Classification Description: Class B2: Skilled Landscape Laborer: small power tool operator, lawn sprinkler installers' tender, irrigation installers' tender, material mover

Wage Rates	Straight Time	Time and a Half	Double Time
Total Hourly Wage	\$30.40	\$39.93	\$49.45

Overtime Provisions

Over 8-hour day/40-hour week

9th hour	\$39.93
10th hour	\$39.93
Beyond 10 hours	\$39.93

Saturday

First 8 hours	\$39.93
9th hour	\$39.93
10th hour	\$39.93
Beyond 10 hours	\$39.93

Sunday/Holiday	\$49.45
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Four 10-hour days allowed? - Yes

Make Up Day Allowed? - No

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Wayne

Classification Name	Category	Last Updated
Laborer Underground - Tunnel, Shaft & Caisson - Class I - Z1	Laborer Underground - Tunnel, Shaft & Caisson	05/10/2024

Classification Description: Class I - Tunnel, shaft and caisson laborer, dump man, shanty man, hog house tender, testing man (on gas), and watchman.

Wage Rates	Straight Time	Time and a Half	Double Time
Total Hourly Wage	\$41.17	\$51.66	\$62.14
Apprentice: 0-1,000 work hours	\$34.45	\$43.16	\$51.85
Apprentice: 1,001-2,000 work hours	\$36.54	\$46.29	\$56.03
Apprentice: 2,001-3,000 work hours	\$37.57	\$47.84	\$58.09
Apprentice: 3,001-4,000 work hours	\$39.64	\$50.94	\$62.23

Overtime Provisions

Over 8-hour day/40-hour week	
9th hour	\$51.66
10th hour	\$51.66
Beyond 10 hours	\$51.66
Saturday	
First 8 hours	\$51.66
9th hour	\$51.66
10th hour	\$51.66
Beyond 10 hours	\$51.66
Sunday/Holiday	
	\$62.14

Four 10-hour days allowed? - Yes

Make Up Day Allowed? - No

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Wayne

Classification Name	Category	Last Updated
Laborer Underground - Tunnel, Shaft & Caisson - Class II - Z1	Laborer Underground - Tunnel, Shaft & Caisson	05/10/2024

Classification Description: Class II - Manhole, headwall, catch basin builder, bricklayer tender, mortar man, material mixer, fence erector, and guard rail builder.

Wage Rates	Straight Time	Time and a Half	Double Time
Total Hourly Wage	\$41.28	\$51.82	\$62.36
Apprentice: 0-1,000 work hours	\$35.58	\$44.85	\$54.11
Apprentice: 1,001-2,000 work hours	\$36.62	\$46.41	\$56.19
Apprentice: 2,001-3,000 work hours	\$37.66	\$47.97	\$58.27
Apprentice: 3,001-4,000 work hours	\$39.74	\$51.09	\$62.43

Overtime Provisions

Over 8-hour day/40-hour week	
9th hour	\$51.82
10th hour	\$51.82
Beyond 10 hours	\$51.82
Saturday	
First 8 hours	\$51.82
9th hour	\$51.82
10th hour	\$51.82
Beyond 10 hours	\$51.82
Sunday/Holiday	
	\$62.36

Four 10-hour days allowed? - Yes

Make Up Day Allowed? - No

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Wayne

Classification Name	Category	Last Updated
Laborer Underground - Tunnel, Shaft & Caisson - Class III - Z1	Laborer Underground - Tunnel, Shaft & Caisson	05/10/2024

Classification Description: Class III - Air tool operator (jack hammer man, bush hammer man and grinding man), first bottom man, second bottom man, cage tender, car pusher, carrier man, concrete man, concrete form man, concrete repair man, cement invert laborer, cement finisher, con

Wage Rates	Straight Time	Time and a Half	Double Time
Total Hourly Wage	\$41.34	\$51.91	\$62.48
Apprentice: 0-1,000 work hours	\$35.63	\$44.92	\$54.21
Apprentice: 1,001-2,000 work hours	\$36.67	\$46.48	\$56.29
Apprentice: 2,001-3,000 work hours	\$37.71	\$48.04	\$58.37
Apprentice: 3,001-4,000 work hours	\$39.80	\$51.18	\$62.55

Overtime Provisions

Over 8-hour day/40-hour week	
9th hour	\$51.91
10th hour	\$51.91
Beyond 10 hours	\$51.91
Saturday	
First 8 hours	\$51.91
9th hour	\$51.91
10th hour	\$51.91
Beyond 10 hours	\$51.91
Sunday/Holiday	
	\$62.48

Four 10-hour days allowed? - Yes

Make Up Day Allowed? - No

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Wayne

Classification Name	Category	Last Updated
Laborer Underground - Tunnel, Shaft & Caisson - Class IV - Z1	Laborer Underground - Tunnel, Shaft & Caisson	05/10/2024

Classification Description: Class IV - Tunnel, shaft and caisson mucker, bracer man, liner plate man, long haul dinky driver and well point man.

Wage Rates	Straight Time	Time and a Half	Double Time
Total Hourly Wage	\$41.52	\$52.18	\$62.84
Apprentice: 0-1,000 work hours	\$35.76	\$45.12	\$54.47
Apprentice: 1,001-2,000 work hours	\$36.82	\$46.71	\$56.59
Apprentice: 2,001-3,000 work hours	\$37.87	\$48.28	\$58.69
Apprentice: 3,001-4,000 work hours	\$39.97	\$51.44	\$62.89

Overtime Provisions

Over 8-hour day/40-hour week	
9th hour	\$52.18
10th hour	\$52.18
Beyond 10 hours	\$52.18
Saturday	
First 8 hours	\$52.18
9th hour	\$52.18
10th hour	\$52.18
Beyond 10 hours	\$52.18
Sunday/Holiday	
	\$62.84

Four 10-hour days allowed? - Yes

Make Up Day Allowed? - No

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Wayne

Classification Name	Category	Last Updated
Laborer Underground - Tunnel, Shaft & Caisson - Class V - Z1	Laborer Underground - Tunnel, Shaft & Caisson	05/10/2024

Classification Description: Class V - Tunnel, shaft and caisson miner, drill runner, keyboard operator, power knife operator, reinforced steel or mesh man (e.g. wire mesh, steel mats, dowel bars)

Wage Rates	Straight Time	Time and a Half	Double Time
Total Hourly Wage	\$41.77	\$52.56	\$63.34
Apprentice: 0-1,000 work hours	\$35.95	\$45.40	\$54.85
Apprentice: 1,001-2,000 work hours	\$37.02	\$47.01	\$56.99
Apprentice: 2,001-3,000 work hours	\$38.08	\$48.60	\$59.11
Apprentice: 3,001-4,000 work hours	\$40.21	\$51.80	\$63.37

Overtime Provisions

Over 8-hour day/40-hour week	
9th hour	\$52.56
10th hour	\$52.56
Beyond 10 hours	\$52.56
Saturday	
First 8 hours	\$52.56
9th hour	\$52.56
10th hour	\$52.56
Beyond 10 hours	\$52.56
Sunday/Holiday	
	\$63.34

Four 10-hour days allowed? - Yes

Make Up Day Allowed? - No

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Wayne

Classification Name	Category	Last Updated
Laborer Underground - Tunnel, Shaft & Caisson - Class VI - Z1	Laborer Underground - Tunnel, Shaft & Caisson	05/10/2024

Classification Description: Class VI - Dynamite man and powder man.

Wage Rates	Straight Time	Time and a Half	Double Time
Total Hourly Wage	\$41.90	\$54.33	\$66.75
Apprentice: 0-1,000 work hours	\$36.20	\$45.78	\$55.35
Apprentice: 1,001-2,000 work hours	\$37.28	\$47.40	\$57.51
Apprentice: 2,001-3,000 work hours	\$38.36	\$49.02	\$59.67
Apprentice: 3,001-4,000 work hours	\$40.52	\$52.26	\$63.99

Overtime Provisions

Over 8-hour day/40-hour week	
9th hour	\$52.85
10th hour	\$52.85
Beyond 10 hours	\$52.85
Saturday	
First 8 hours	\$52.85
9th hour	\$52.85
10th hour	\$52.85
Beyond 10 hours	\$52.85
Sunday/Holiday	
	\$63.80

Four 10-hour days allowed? - Yes

Make Up Day Allowed? - No

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Wayne

Classification Name	Category	Last Updated
Laborer Underground - Tunnel, Shaft & Caisson - Class VII - Z1	Laborer Underground - Tunnel, Shaft & Caisson	05/10/2024

Classification Description: Class VII - Restoration laborer, seeding, sodding, planting, cutting, mulching and topsoil grading and the restoration of property such as replacing mail boxes, wood chips, planter boxes and flagstones.

Wage Rates	Straight Time	Time and a Half	Double Time
Total Hourly Wage	\$35.58	\$43.17	\$50.76
Apprentice: 0-1,000 work hours	\$31.39	\$38.56	\$45.73
Apprentice: 1,001-2,000 work hours	\$32.15	\$39.70	\$47.25
Apprentice: 2,001-3,000 work hours	\$32.91	\$40.84	\$48.77
Apprentice: 3,001-4,000 work hours	\$34.43	\$43.12	\$51.81

Overtime Provisions

Over 8-hour day/40-hour week	
9th hour	\$43.17
10th hour	\$43.17
Beyond 10 hours	\$43.17
Saturday	
First 8 hours	\$43.17
9th hour	\$43.17
10th hour	\$43.17
Beyond 10 hours	\$43.17
Sunday/Holiday	
	\$50.76

Four 10-hour days allowed? - Yes

Make Up Day Allowed? - No

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Wayne

Classification Name	Category	Last Updated
Laborer -Underground Open Cut - Class I - Z1	Laborer -Underground Open Cut, Class I	05/10/2024

Classification Description: Construction Laborer

Wage Rates	Straight Time	Time and a Half	Double Time
Total Hourly Wage	\$36.91	\$47.01	\$57.10
Apprentice: 0-1,000 work hours	\$35.39	\$44.56	\$53.73
Apprentice: 1,001-2,000 work hours	\$36.42	\$46.11	\$55.79
Apprentice: 2,001-3,000 work hours	\$37.44	\$47.64	\$57.83
Apprentice: 3,001-4,000 work hours	\$39.49	\$50.72	\$61.93

Overtime Provisions

Over 8-hour day/40-hour week	
9th hour	\$47.01
10th hour	\$47.01
Beyond 10 hours	\$47.01
Saturday	
First 8 hours	\$47.01
9th hour	\$47.01
10th hour	\$47.01
Beyond 10 hours	\$47.01
Sunday/Holiday	
	\$57.10

Four 10-hour days allowed? - Yes

Make Up Day Allowed? - No

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Wayne

Classification Name	Category	Last Updated
Laborer -Underground Open Cut - Class II - Z1	Laborer -Underground Open Cut, Class II	05/10/2024

Classification Description: Mortar and material mixer, concrete form man, signal man, well point man, manhole, headwall and catch basin builder, guard rail builders, headwall, seawall, breakwall, dock builder and fence erector.

Wage Rates	Straight Time	Time and a Half	Double Time
Total Hourly Wage	\$37.05	\$47.22	\$57.38
Apprentice: 0-1,000 work hours	\$35.47	\$44.68	\$53.89
Apprentice: 1,001-2,000 work hours	\$36.50	\$46.23	\$55.95
Apprentice: 2,001-3,000 work hours	\$37.54	\$47.79	\$58.03
Apprentice: 3,001-4,000 work hours	\$39.60	\$50.88	\$62.15

Overtime Provisions

Over 8-hour day/40-hour week	
9th hour	\$47.22
10th hour	\$47.22
Beyond 10 hours	\$47.22
Saturday	
First 8 hours	\$47.22
9th hour	\$47.22
10th hour	\$47.22
Beyond 10 hours	\$47.22
Sunday/Holiday	
	\$57.38

Four 10-hour days allowed? - Yes

Make Up Day Allowed? - No

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Wayne

Classification Name	Category	Last Updated
Laborer -Underground Open Cut - Class III - Z1	Laborer -Underground Open Cut, Class III	05/10/2024

Classification Description: Air, gasoline and electric tool operator, vibrator operator, drillers, pump man, tar kettle operator, bracers, rodder, reinforced steel or mesh man (e.g. wire mesh, steel mats, dowel bars, etc.), cement finisher, welder, pipe jacking and boring man, wagon

Wage Rates	Straight Time	Time and a Half	Double Time
Total Hourly Wage	\$40.68	\$52.50	\$64.31
Apprentice: 0-1,000 work hours	\$35.51	\$44.74	\$53.97
Apprentice: 1,001-2,000 work hours	\$36.54	\$46.29	\$56.03
Apprentice: 2,001-3,000 work hours	\$37.58	\$47.85	\$58.11
Apprentice: 3,001-4,000 work hours	\$39.65	\$50.96	\$62.25

Overtime Provisions

Over 8-hour day/40-hour week	
9th hour	\$51.02
10th hour	\$51.02
Beyond 10 hours	\$51.02
Saturday	
First 8 hours	\$51.02
9th hour	\$51.02
10th hour	\$51.02
Beyond 10 hours	\$51.02
Sunday/Holiday	
	\$61.36

Four 10-hour days allowed? - Yes

Make Up Day Allowed? - No

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Wayne

Classification Name	Category	Last Updated
Laborer -Underground Open Cut - Class IV - Z1	Laborer -Underground Open Cut, Class IV	05/10/2024

Classification Description: Trench or excavating grade man.

Wage Rates	Straight Time	Time and a Half	Double Time
Total Hourly Wage	\$40.76	\$52.62	\$64.47
Apprentice: 0-1,000 work hours	\$35.57	\$44.84	\$54.09
Apprentice: 1,001-2,000 work hours	\$36.61	\$46.40	\$56.17
Apprentice: 2,001-3,000 work hours	\$37.65	\$47.96	\$58.25
Apprentice: 3,001-4,000 work hours	\$39.72	\$51.06	\$62.39

Overtime Provisions

Over 8-hour day/40-hour week	
9th hour	\$51.14
10th hour	\$51.14
Beyond 10 hours	\$51.14
Saturday	
First 8 hours	\$51.14
9th hour	\$51.14
10th hour	\$51.14
Beyond 10 hours	\$51.14
Sunday/Holiday	
	\$61.52

Four 10-hour days allowed? - Yes

Make Up Day Allowed? - No

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Wayne

Classification Name	Category	Last Updated
Laborer -Underground Open Cut - Class V - Z1	Laborer -Underground Open Cut, Class V	05/10/2024

Classification Description: Pipe Layer (including crock, metal pipe, mulitplate or other conduits)

Wage Rates	Straight Time	Time and a Half	Double Time	Overtime Provisions
Total Hourly Wage	\$40.82	\$52.71	\$64.59	Over 8-hour day/40-hour week
Apprentice: 0-1,000 work hours	\$35.62	\$44.91	\$54.19	9th hour \$51.23
Apprentice: 1,001-2,000 work hours	\$36.66	\$46.47	\$56.27	10th hour \$51.23
Apprentice: 2,001-3,000 work hours	\$37.70	\$48.03	\$58.35	Beyond 10 hours \$51.23
Apprentice: 3,001-4,000 work hours	\$39.78	\$51.15	\$62.51	Saturday
				First 8 hours \$51.23
				9th hour \$51.23
				10th hour \$51.23
				Beyond 10 hours \$51.23
				Sunday/Holiday \$61.64

Four 10-hour days allowed? - Yes
Make Up Day Allowed? - No

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Wayne

Classification Name	Category	Last Updated
Laborer -Underground Open Cut - Class VI - Z1	Laborer -Underground Open Cut, Class VI	05/10/2024

Classification Description: Grouting man, top man assistant, audio visual television operations and all other operations in connection with closed circuit television inspection, pipe cleaning and pipe relining work and the installation and repair of water service pipe and appurtenan

Wage Rates	Straight Time	Time and a Half	Double Time
Total Hourly Wage	\$38.27	\$48.88	\$59.49
Apprentice: 0-1,000 work hours	\$33.70	\$42.03	\$50.35
Apprentice: 1,001-2,000 work hours	\$34.62	\$43.41	\$52.19
Apprentice: 2,001-3,000 work hours	\$35.53	\$44.78	\$54.01
Apprentice: 3,001-4,000 work hours	\$37.36	\$47.52	\$57.67

Overtime Provisions

Over 8-hour day/40-hour week

9th hour	\$47.41
10th hour	\$47.41
Beyond 10 hours	\$47.41

Saturday

First 8 hours	\$47.41
9th hour	\$47.41
10th hour	\$47.41
Beyond 10 hours	\$47.41

Sunday/Holiday	\$56.54
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Four 10-hour days allowed? - Yes

Make Up Day Allowed? - No

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Wayne

Classification Name	Category	Last Updated
Laborer -Underground Open Cut - Class VII - Z1	Laborer -Underground Open Cut, Class VII	05/10/2024

Classification Description: Restoration laborer, seeding, sodding, planting, cutting, mulching and topsoil grading and the restoration of property such as replacing mail boxes, wood chips, planter boxes, flagstones etc.

Wage Rates	Straight Time	Time and a Half	Double Time
Total Hourly Wage	\$34.89	\$43.81	\$52.73
Apprentice: 0-1,000 work hours	\$31.17	\$38.24	\$45.29
Apprentice: 1,001-2,000 work hours	\$31.91	\$39.34	\$46.77
Apprentice: 2,001-3,000 work hours	\$32.66	\$40.47	\$48.27
Apprentice: 3,001-4,000 work hours	\$34.15	\$42.70	\$51.25

Overtime Provisions

Over 8-hour day/40-hour week	
9th hour	\$42.34
10th hour	\$42.34
Beyond 10 hours	\$42.34
Saturday	
First 8 hours	\$42.34
9th hour	\$42.34
10th hour	\$42.34
Beyond 10 hours	\$42.34
Sunday/Holiday	
	\$49.78

Four 10-hour days allowed? - Yes

Make Up Day Allowed? - No

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Wayne

Classification Name	Category	Last Updated
Class I	Operating Engineer	05/10/2024

Classification Description: Class I - diver/wet tender, engineer, blaster, leverman

Wage Rates	Straight Time	Time and a Half	Double Time
Total Hourly Wage	\$82.82	\$107.82	\$132.82

Overtime Provisions

Over 8-hour day/40-hour week

9th hour	\$32.82
10th hour	\$107.82
Beyond 10 hours	\$107.82

Saturday

First 8 hours	\$107.82
9th hour	\$107.82
10th hour	\$107.82
Beyond 10 hours	\$107.82

Sunday/Holiday

\$132.82

Four 10-hour days allowed? - No

Make Up Day Allowed? - No

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Wayne

Classification Name	Category	Last Updated
Class II (A)	Operating Engineer	05/10/2024

Classification Description: Class II (A) - Crane/backhoe operator, material handler, all self-propelled drill rigs, mechanic/welder, hydraulic dredge, diver tender

Wage Rates	Straight Time	Time and a Half	Double Time
Total Hourly Wage	\$81.32	\$105.57	\$129.82

Overtime Provisions

Over 8-hour day/40-hour week

9th hour	\$32.82
10th hour	\$105.57
Beyond 10 hours	\$105.57

Saturday

First 8 hours	\$105.57
9th hour	\$105.57
10th hour	\$105.57
Beyond 10 hours	\$105.57

Sunday/Holiday	\$129.82
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Four 10-hour days allowed? - No

Make Up Day Allowed? - No

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Wayne

Classification Name	Category	Last Updated
Class II (B)	Operating Engineer	05/10/2024

Classification Description: Class II (B) - friction, lattice boom, tug or tug boat operator

Wage Rates	Straight Time	Time and a Half	Double Time
Total Hourly Wage	\$84.32	\$110.07	\$135.82

Overtime Provisions

Over 8-hour day/40-hour week

9th hour	\$110.07
10th hour	\$110.07
Beyond 10 hours	\$110.07

Saturday

First 8 hours	\$110.07
9th hour	\$110.07
10th hour	\$110.07
Beyond 10 hours	\$110.07

Sunday/Holiday	\$135.82
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Four 10-hour days allowed? - No

Make Up Day Allowed? - No

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Wayne

Classification Name	Category	Last Updated
Class III	Operating Engineer	05/10/2024

Classification Description: Class III - Deck equip. operator, maintenance of crane or excavator, tug/launch operator, loader/dozer on barge/deck machinery, truck-able tug, lead surveyor, ROV operator, AB deckhand, welder

Wage Rates	Straight Time	Time and a Half	Double Time	Overtime Provisions
Total Hourly Wage	\$76.82	\$98.82	\$120.82	Over 8-hour day/40-hour week
				9th hour \$98.82
				10th hour \$98.82
				Beyond 10 hours \$98.82
				Saturday
				First 8 hours \$98.82
				9th hour \$98.82
				10th hour \$98.82
				Beyond 10 hours \$98.82
				Sunday/Holiday \$120.82

Four 10-hour days allowed? - No

Make Up Day Allowed? - No

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Wayne

Classification Name	Category	Last Updated
Class IV	Operating Engineer	05/10/2024

Classification Description: Class IV - Deck equipment operator, machineryman/fireman, off road trucks, deck hand, tug engineer, assistant tug operator, blaster helper, deck hand, jet machine, subsea plow, trencher, tug engineer

Wage Rates	Straight Time	Time and a Half	Double Time
Total Hourly Wage	\$72.32	\$92.07	\$111.82

Overtime Provisions	
Over 8-hour day/40-hour week	
9th hour	\$32.82
10th hour	\$92.07
Beyond 10 hours	\$92.07
Saturday	
First 8 hours	\$92.07
9th hour	\$92.07
10th hour	\$92.07
Beyond 10 hours	\$92.07
Sunday/Holiday	\$111.82

Four 10-hour days allowed? - No

Make Up Day Allowed? - No

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Wayne

Classification Name	Category	Last Updated
Extended Boom Forklift Operator - Over 5,000	Operating Engineer	05/10/2024

Classification Description: Extended boom forklift/forktruck over 5,000lb capacity, 1 drum hoist

Wage Rates	Straight Time	Time and a Half	Double Time
Total Hourly Wage	\$41.43	\$54.43	\$67.42

Overtime Provisions

Over 8-hour day/40-hour week	
9th hour	\$54.43
10th hour	\$54.43
Beyond 10 hours	\$67.42
Saturday	
First 8 hours	\$54.43
9th hour	\$54.43
10th hour	\$54.43
Beyond 10 hours	\$67.42
Sunday/Holiday	
	\$67.42

Four 10-hour days allowed? - Yes

Make Up Day Allowed? - No

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Wayne

Classification Name	Category	Last Updated
Extended Boom Forklift Operator - Over 5,000	Operating Engineer	05/10/2024

Classification Description: Extended boom forklift/forktruck over 5,000lb capacity, 1 drum hoist

Wage Rates	Straight Time	Time and a Half	Double Time
Total Hourly Wage	\$58.82	\$73.32	\$87.81

Overtime Provisions

Over 8-hour day/40-hour week

9th hour	\$73.32
10th hour	\$73.32
Beyond 10 hours	\$87.81

Saturday

First 8 hours	\$73.32
9th hour	\$73.32
10th hour	\$73.32
Beyond 10 hours	\$87.81

Sunday/Holiday	\$87.81
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Four 10-hour days allowed? - Yes

Make Up Day Allowed? - No

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Wayne

Classification Name	Category	Last Updated
Extended Boom Forklift Operator - Over 5,000	Operating Engineer	05/10/2024

Classification Description: Extended boom forklift/forktruck over 5,000lb capacity, 1 drum hoist

Wage Rates	Straight Time	Time and a Half	Double Time
Total Hourly Wage	\$64.70	\$81.75	\$98.80

Overtime Provisions

Over 8-hour day/40-hour week	
9th hour	\$81.75
10th hour	\$81.75
Beyond 10 hours	\$98.80
Saturday	
First 8 hours	\$81.75
9th hour	\$81.75
10th hour	\$81.75
Beyond 10 hours	\$98.80
Sunday/Holiday	
	\$98.80

Four 10-hour days allowed? - Yes

Make Up Day Allowed? - No

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Wayne

Classification Name	Category	Last Updated
Extended Boom Forklift Operator - Over 5,000	Operating Engineer	05/10/2024

Classification Description: Extended boom forklift/forktruck over 5,000lb capacity, 1 drum hoist

Wage Rates	Straight Time	Time and a Half	Double Time
Total Hourly Wage	\$69.61	\$88.88	\$108.15

Overtime Provisions

Over 8-hour day/40-hour week	
9th hour	\$88.88
10th hour	\$88.88
Beyond 10 hours	\$108.15
Saturday	
First 8 hours	\$88.88
9th hour	\$88.88
10th hour	\$88.88
Beyond 10 hours	\$108.15
Sunday/Holiday	
	\$108.15

Four 10-hour days allowed? - Yes

Make Up Day Allowed? - No

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Wayne

Classification Name	Category	Last Updated
Extended Boom Forklift Operator - Over 5,000	Operating Engineer	05/10/2024

Classification Description: Extended boom forklift/forktruck over 5,000lb capacity, 1 drum hoist

Wage Rates	Straight Time	Time and a Half	Double Time
Total Hourly Wage	\$63.29	\$79.73	\$96.16

Overtime Provisions

Over 8-hour day/40-hour week	
9th hour	\$79.73
10th hour	\$79.73
Beyond 10 hours	\$96.16
Saturday	
First 8 hours	\$79.73
9th hour	\$79.73
10th hour	\$79.73
Beyond 10 hours	\$96.16
Sunday/Holiday	
	\$96.16

Four 10-hour days allowed? - Yes

Make Up Day Allowed? - No

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Wayne

Classification Name	Category	Last Updated
Fireman or Oiler	Operating Engineer	08/01/2024

Classification Description: Fireman or Oiler

Wage Rates	Straight Time	Time and a Half	Double Time
Total Hourly Wage	\$59.08	\$75.85	\$92.62

Overtime Provisions

Over 8-hour day/40-hour week

9th hour	\$59.08
10th hour	\$59.08
Beyond 10 hours	\$88.24

Saturday

First 8 hours	\$59.08
9th hour	\$88.24
10th hour	\$88.24
Beyond 10 hours	\$88.24

Sunday/Holiday	\$88.24
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Four 10-hour days allowed? - Yes

Make Up Day Allowed? - No

Overtime Rate Comment: Monday-Friday-Double time after 12hrs/day
Saturday-Double time starts after 40 hrs otherwise first 8 are time and a half

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Wayne

Classification Name	Category	Last Updated
Journeyman - Class I	Operating Engineer	05/17/2024

Classification Description: Journeyman - Class I

Asphalt Transfer Machine (Shuttle Buggy)

Concrete/Asphalt Pavers

Excavators Installing Utilities over 20 feet in depth

GPS or Electronic Grade Equipment (employee must be able to set up and use it on machine themselves, and employee can install it and calibrate it on their own)

Hydraulic/Lattice Lifting Cranes over 25 tons

Mechanic

**On bridge construction projects when a Class I Crane Operator is erecting structural components as part of a composite crew with Structural Ironworkers, the Base Rate and Vacation and Holiday pay shall be at the Crane Operator rate as set forth in the current agreement between the Union and the Great Lakes Fabricators and Erectors Association.

Wage Rates	Straight Time	Time and a Half	Double Time
Total Hourly Wage	\$69.17	\$88.16	\$107.14
Apprentice: Apprentice Engineer 0-6 months	\$56.03	\$71.32	\$86.60
Apprentice: Apprentice Engineer 13-18	\$60.40	\$77.87	\$95.34
Apprentice: Apprentice Engineer 19-24 months	\$62.21	\$80.59	\$98.96
Apprentice: Apprentice Engineer 25-30 months	\$64.76	\$84.42	\$104.06
Apprentice: Apprentice Engineer 31-36 months	\$67.08	\$87.90	\$108.70
Apprentice: Apprentice Engineer 7-12 months	\$58.21	\$74.58	\$90.96

Overtime Provisions

Over 8-hour day/40-hour week	
9th hour	\$88.16
10th hour	\$88.16
Beyond 10 hours	\$88.16
Saturday	
First 8 hours	\$88.16
9th hour	\$88.16
10th hour	\$88.16
Beyond 10 hours	\$88.16
Sunday/Holiday	\$107.14

Four 10-hour days allowed? - Yes

Make Up Day Allowed? - Yes

In the event work is unable to be performed on account of weather, Monday through Thursday, the Friday work may be scheduled for ten (10) hours, at straight time, as a make-up day.

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Wayne

Classification Name	Category	Last Updated
Journeyman - Class II	Operating Engineer	05/17/2024

Classification Description: Journeyman - Class II

- Air Compressors in Manifold with throttle valve +750 cfm
- Asphalt Bituminous Compactor / Roller
- Asphalt Planner self-propelled
- Asphalt Plant on project including operating from on site or operating remotely
- Asphalt Screed or Screw (per Employer Past Practice)
- Auto Grade or similar type machine
- Backhoe on Farm Type Tractor 45 H.P. & over
- Ballast Jack Tamper
- Ballast Regulator (R.R.)
- Batch Plant (concrete-central mix)
- Bituminous Paver (self-propelled)
- Blade Grader
- Bull Dozer
- Caisson Drilling Machine
- Cherry Picker – 15 ton or over
- Chip Spreader
- Concrete Batch or Drum Mix Plant on project including operating from on site or operating remotely
- Concrete Belt Placer (Formless)
- Concrete Cure / Finish Machine (burlap, tinning or grooving)
- Concrete Mixer 21 cu. Ft. Or over
- Concrete Pump (Truck Mount)
- Concrete Pump (3 inch and over)
- Concrete / Asphalt Saw Power Driven (3 yrs experience or more)
- Conveyor Loader (Euclid type)
- Core Drilling Machine
- Curb-Barrier Wall Machine CMI type
- Directional Drill / Boring Machine
- Dredge Engineer
- Dredge
- Drilling Machine on which the drill is an integral part
- Earth Mover – rubber tired – (paddle wheel, Cat 619, 631, TS-24 or similar type)
- Earth Mover rubber tired-tandem

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Wage Rates	Straight Time	Time and a Half	Double Time
Total Hourly Wage	\$68.02	\$86.51	\$104.99

Overtime Provisions

Over 8-hour day/40-hour week

9th hour	\$86.50
10th hour	\$86.50
Beyond 10 hours	\$86.50

Saturday

First 8 hours	\$86.50
9th hour	\$86.50
10th hour	\$86.50
Beyond 10 hours	\$86.50

Sunday/Holiday	\$104.99
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Four 10-hour days allowed? - Yes

Make Up Day Allowed? - No

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Wayne

Classification Name	Category	Last Updated
Journeyman - Class III	Operating Engineer	05/17/2024

Classification Description: Journeyman - Class III
Air Compressor with Throttle Valve or Clever Brooks type comb.
Backhoe less than 1 cyd. Including Farm Type
Bituminous Plant Engineer
Chemical / Grout Machine 21 cft. Or larger
Cherry Picker under 15 ton
Chip Spreader (self-propelled)
Crusher
Concrete Barrier Moving Machine (per Employer Past Practice)
Concrete Pump
Concrete Spreader--Power Driven
End Loader under 1-1/2 cu yd.
Grease Truck
Gunit Machine
Lowboy (per Employer Past Practice)
Mesh or Steel Placer (motorized)
Multiple Tamping Machine (R.R.)
Refrigerating Machine--Freezing operation
Roller-Waterbound Macadam, Bituminous Macadam, Brick
Ross Carrier
Self-propelled convey transfer devise.
Side Boom Tractor (smaller than D-4 type or equivalent)
Sweeper (Wayne type and similar equipment)
Macadam, Brick Surface
Trench Machine 24" and under
Tube Float (motorized)

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Wage Rates	Straight Time	Time and a Half	Double Time
Total Hourly Wage	\$61.29	\$76.85	\$92.41

Overtime Provisions

Over 8-hour day/40-hour week

9th hour	\$30.17
10th hour	\$76.85
Beyond 10 hours	\$76.85

Saturday

First 8 hours	\$76.85
9th hour	\$76.85
10th hour	\$76.85
Beyond 10 hours	\$76.85

Sunday/Holiday	\$92.41
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Four 10-hour days allowed? - Yes

Make Up Day Allowed? - No

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Wayne

Classification Name	Category	Last Updated
Journeyman - Class IV	Operating Engineer	05/17/2024

Classification Description: Journeyman - Class IV

- Air Compressor
- All mulching equipment
- All Walk Behind or Remote Control Powered Equipment (autonomous equipment)
- Assistant to Engineer Automatic Dry Batch Plant Belt Spreader (motorized including transfer device by remote, wireless or cable)
- Bituminous Distributor
- Bituminous Patching Machine
- Broom & Belt Machine
- Chair Cart (self-propelled)
- Concrete Pumps (under 3")
- Concrete Breaker
- Curb Machine
- Curing Equipment (self-propelled)
- Deck Hand
- Digger Post Hole (power-driven)
- Dump Truck
- End Dumps (per Employer Past Practice)
- End Loader (under ¾ yard capacity)
- Farm Tractor-incl. farm tractor with all attachments except backhoe and incl. highlift end loaders of 1 cu. Yard capacity or less
- Fireman (on boiler)
- Fork Lift – under 10 ton
- Form Grader (if motorized)
- Georgia Buggy – Power wheel barrel ¾ yard with a seat
- Generator (15 kw or greater)
- Greaser Helper
- Guard Post Driver (power driven)

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Wage Rates	Straight Time	Time and a Half	Double Time
Total Hourly Wage	\$60.73	\$76.05	\$91.36

Overtime Provisions

Over 8-hour day/40-hour week

9th hour	\$76.05
10th hour	\$76.05
Beyond 10 hours	\$76.05

Saturday

First 8 hours	\$76.05
9th hour	\$76.05
10th hour	\$76.05
Beyond 10 hours	\$76.05

Sunday/Holiday	\$91.36
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Four 10-hour days allowed? - Yes

Make Up Day Allowed? - No

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Wayne

Classification Name	Category	Last Updated
Journeyman - Class V	Operating Engineer	05/17/2024

Classification Description: Journeyman - Class V
 Concrete/Asphalt Saw - Power Driven (Less than 3 yrs. experience)
 Density/Soil Engineer
 Directional Boring Utility Man
 Discharge Pumps 4" or less (1-4 units)
 Dumper (Wagon, Truck, Etc.)-½ yard or less
 Fence Erector/Power Driven
 Light Plants (1 to 5 units)
 Paving Batch Truck Dumper
 Roto Mill Utility Grade Control
 Sign Installer/Sign Installer with Remote Control Operated Equipment
 Top Man, And Railroad Track and Trestle Engineer
 Utility Engineer
 Water Blasting Utility Engineer
 1 to 4 pcs. of minor equip.

Wage Rates	Straight Time	Time and a Half	Double Time
Total Hourly Wage	\$42.35	\$55.33	\$68.31

Overtime Provisions

Over 8-hour day/40-hour week	
9th hour	\$55.33
10th hour	\$55.33
Beyond 10 hours	\$55.33
Saturday	
First 8 hours	\$55.33
9th hour	\$55.33
10th hour	\$55.33
Beyond 10 hours	\$55.33
Sunday/Holiday	
	\$68.31

Four 10-hour days allowed? - Yes

Make Up Day Allowed? - No

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Wayne

Classification Name	Category	Last Updated
Operating Engineer - 324 A140	Operating Engineer	05/10/2024

Classification Description: Crane with boom & jib or leads 140' or longer

Work in excess of 12 per day M-F shall be paid at double time.

Wage Rates	Straight Time	Time and a Half	Double Time
Total Hourly Wage	\$77.59	\$100.24	\$122.89

Overtime Provisions

Over 8-hour day/40-hour week

9th hour	\$100.24
10th hour	\$100.24
Beyond 10 hours	\$100.24

Saturday

First 8 hours	\$100.24
9th hour	\$100.24
10th hour	\$100.24
Beyond 10 hours	\$100.24

Sunday/Holiday	\$122.89
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Four 10-hour days allowed? - Yes

Make Up Day Allowed? - No

Overtime Rate Comment: Double time after 12 hours Mon-Sat

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Wayne

Classification Name	Category	Last Updated
Operating Engineer - 324 A220	Operating Engineer	05/10/2024

Classification Description: Crane with boom & jib or leads 220' or longer
 Work in excess of 12 per day M-F shall be paid at double time.

Wage Rates	Straight Time	Time and a Half	Double Time
Total Hourly Wage	\$77.86	\$100.63	\$123.40

Overtime Provisions

Over 8-hour day/40-hour week

9th hour	\$100.63
10th hour	\$100.63
Beyond 10 hours	\$100.63

Saturday

First 8 hours	\$100.63
9th hour	\$100.63
10th hour	\$100.63
Beyond 10 hours	\$100.63

Sunday/Holiday	\$123.40
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Four 10-hour days allowed? - Yes

Make Up Day Allowed? - No

Overtime Rate Comment: Double time after 12 hours Mon-Sat

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Wayne

Classification Name	Category	Last Updated
Operating Engineer - 324 B120	Operating Engineer	06/20/2024

Classification Description: Crane Operator w/120' of Boom or Longer w/Oiler

Wage Rates	Straight Time	Time and a Half	Double Time
Total Hourly Wage	\$77.41	\$99.99	\$122.56

Overtime Provisions

Over 8-hour day/40-hour week

9th hour	\$99.98
10th hour	\$99.98
Beyond 10 hours	\$99.98

Saturday

First 8 hours	\$99.98
9th hour	\$99.98
10th hour	\$99.98
Beyond 10 hours	\$99.98

Sunday/Holiday	\$122.56
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Four 10-hour days allowed? - Yes

Make Up Day Allowed? - No

Overtime Rate Comment: Double time after 12 Mon-Sat

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Wayne

Classification Name	Category	Last Updated
Operating Engineer - 324 GM	Operating Engineer	06/20/2024

Classification Description: Ground Man/Light Plants/Welder/Pumps Under 6"

Wage Rates	Straight Time	Time and a Half	Double Time
Total Hourly Wage	\$43.83	\$57.87	\$71.91

Overtime Provisions

Over 8-hour day/40-hour week

9th hour	\$57.87
10th hour	\$57.87
Beyond 10 hours	\$57.87

Saturday

First 8 hours	\$57.87
9th hour	\$57.87
10th hour	\$57.87
Beyond 10 hours	\$57.87

Sunday/Holiday	\$71.91
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Four 10-hour days allowed? - Yes

Make Up Day Allowed? - No

Overtime Rate Comment: Double time after 12 Mon-Sat

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Wayne

Classification Name	Category	Last Updated
Operating Engineer - Below 5,000lb Capacity	Operating Engineer	06/20/2024

Classification Description: Ind. forklift/forktruck under 5,000lb capacity
power jacks/power packs, composite crew only

Wage Rates	Straight Time	Time and a Half	Double Time
Total Hourly Wage	\$67.10	\$85.19	\$103.28

Overtime Provisions

Over 8-hour day/40-hour week	
9th hour	\$85.19
10th hour	\$85.19
Beyond 10 hours	\$85.19
Saturday	
First 8 hours	\$85.19
9th hour	\$85.19
10th hour	\$85.19
Beyond 10 hours	\$85.19
Sunday/Holiday	
	\$103.28

Four 10-hour days allowed? - Yes

Make Up Day Allowed? - No

Overtime Rate Comment: Double time after 12 Mon-Sat

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Wayne

Classification Name	Category	Last Updated
Operating Engineer - Crane Operator w/Oiler	Operating Engineer	06/20/2024

Classification Description: Crane Operator w/Oiler

Wage Rates	Straight Time	Time and a Half	Double Time
Total Hourly Wage	\$77.05	\$99.47	\$121.89

Overtime Provisions

Over 8-hour day/40-hour week	
9th hour	\$99.47
10th hour	\$99.47
Beyond 10 hours	\$99.47
Saturday	
First 8 hours	\$99.47
9th hour	\$99.47
10th hour	\$99.47
Beyond 10 hours	\$99.47
Sunday/Holiday	
	\$121.89

Four 10-hour days allowed? - Yes

Make Up Day Allowed? - No

Overtime Rate Comment: Double time after 12 Mon-Sat

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Wayne

Classification Name	Category	Last Updated
Operating Engineer - Crane, TDH, Excavator	Operating Engineer	06/20/2024

Classification Description: Crane Operator, Job Mechanic, Three Drum Hoist and Excavator

Wage Rates	Straight Time	Time and a Half	Double Time
Total Hourly Wage	\$76.05	\$98.04	\$120.02
Apprentice: Apprentice Engineer 0-6 months	\$60.84	\$78.54	\$96.24
Apprentice: Apprentice Engineer 13-18 months	\$65.90	\$86.13	\$106.36
Apprentice: Apprentice Engineer 19-24 months	\$68.42	\$89.92	\$111.40
Apprentice: Apprentice Engineer 25-30 months	\$70.95	\$93.71	\$116.46
Apprentice: Apprentice Engineer 31-36 months	\$73.48	\$97.50	\$121.52
Apprentice: Apprentice Engineer 7-12 months	\$63.40	\$82.38	\$101.36

Overtime Provisions

Over 8-hour day/40-hour week	
9th hour	\$98.03
10th hour	\$98.03
Beyond 10 hours	\$98.03
Saturday	
First 8 hours	\$98.03
9th hour	\$98.03
10th hour	\$98.03
Beyond 10 hours	\$98.03
Sunday/Holiday	
	\$120.02

Four 10-hour days allowed? - Yes

Make Up Day Allowed? - No

Overtime Rate Comment: Double time after 12 Mon-Sat

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Wayne

Classification Name	Category	Last Updated
Operating Engineer - CW	Operating Engineer	05/10/2024

Classification Description: Compressor or welding machine
 Work in excess of 12 per day M-F shall be paid at double time.

Wage Rates	Straight Time	Time and a Half	Double Time
Total Hourly Wage	\$54.86	\$69.72	\$84.58

Overtime Provisions

Over 8-hour day/40-hour week

9th hour	\$67.78
10th hour	\$67.78
Beyond 10 hours	\$67.78

Saturday

First 8 hours	\$67.78
9th hour	\$80.70
10th hour	\$80.70
Beyond 10 hours	\$80.70

Sunday/Holiday	\$80.70
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Four 10-hour days allowed? - Yes

Make Up Day Allowed? - No

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Wayne

Classification Name	Category	Last Updated
Operating Engineer - F	Operating Engineer	05/10/2024

Classification Description: Forklift, lull, extend-a-boom forklift
 Work in excess of 12 per day M-F shall be paid at double time.

Wage Rates	Straight Time	Time and a Half	Double Time
Total Hourly Wage	\$63.36	\$79.81	\$96.25

Overtime Provisions

Over 8-hour day/40-hour week

9th hour	\$79.81
10th hour	\$79.81
Beyond 10 hours	\$79.81

Saturday

First 8 hours	\$79.81
9th hour	\$96.25
10th hour	\$96.25
Beyond 10 hours	\$96.25

Sunday/Holiday

\$96.25

Four 10-hour days allowed? - Yes

Make Up Day Allowed? - No

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Wayne

Classification Name	Category	Last Updated
Operating Engineer - FO	Operating Engineer	05/10/2024

Classification Description: Fireman or oiler

Work in excess of 12 per day M-F shall be paid at double time.

Wage Rates	Straight Time	Time and a Half	Double Time
Total Hourly Wage	\$53.83	\$68.18	\$82.52

Overtime Provisions

Over 8-hour day/40-hour week

9th hour	\$66.31
10th hour	\$66.31
Beyond 10 hours	\$66.31

Saturday

First 8 hours	\$66.31
9th hour	\$78.78
10th hour	\$78.78
Beyond 10 hours	\$78.78

Sunday/Holiday	\$78.78
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Four 10-hour days allowed? - Yes

Make Up Day Allowed? - No

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Wayne

Classification Name	Category	Last Updated
Operating Engineer - FSM	Operating Engineer	05/10/2024

Classification Description: Forklift or Straight Mast

Four 10 hour days may be scheduled M-Th or T-F. Work not performed due to weather on M-Th may be scheduled on Friday

Wage Rates	Straight Time	Time and a Half	Double Time
Total Hourly Wage	\$57.50	\$71.40	\$85.29

Overtime Provisions

Over 8-hour day/40-hour week	
9th hour	\$71.40
10th hour	\$71.40
Beyond 10 hours	\$71.40
Saturday	
First 8 hours	\$71.40
9th hour	\$85.29
10th hour	\$85.29
Beyond 10 hours	\$85.29
Sunday/Holiday	
	\$85.29

Four 10-hour days allowed? - Yes

Make Up Day Allowed? - Yes

Friday

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Wayne

Classification Name	Category	Last Updated
Operating Engineer - I	Operating Engineer	05/10/2024

Classification Description: Lull or Extend-a-Boom Forklift

Four 10 hour days may be scheduled M-Th or T-F. Work not performed due to weather on M-Th may be scheduled on Friday

Wage Rates	Straight Time	Time and a Half	Double Time
Total Hourly Wage	\$59.73	\$77.09	\$94.45

Overtime Provisions

Over 8-hour day/40-hour week

9th hour	\$74.83
10th hour	\$74.83
Beyond 10 hours	\$74.83

Saturday

First 8 hours	\$74.83
9th hour	\$89.92
10th hour	\$89.92
Beyond 10 hours	\$89.92

Sunday/Holiday	\$89.92
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Four 10-hour days allowed? - Yes

Make Up Day Allowed? - Yes

Friday

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Wayne

Classification Name	Category	Last Updated
Operating Engineer - OE 324 A120	Operating Engineer	01/09/2025

Classification Description: Crane with boom & jib or leads 120' or longer

Wage Rates	Straight Time	Time and a Half	Double Time
Total Hourly Wage	\$76.41	\$98.55	\$120.69

Overtime Provisions

Over 8-hour day/40-hour week

9th hour	\$98.55
10th hour	\$98.55
Beyond 10 hours	\$98.55

Saturday

First 8 hours	\$98.55
9th hour	\$98.55
10th hour	\$98.55
Beyond 10 hours	\$98.55

Sunday/Holiday	\$120.69
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Four 10-hour days allowed? - Yes

Make Up Day Allowed? - No

Overtime Rate Comment: Double time over 12 Mon-Sat

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Wayne

Classification Name	Category	Last Updated
Operating Engineer - os120	Operating Engineer	05/10/2024

Classification Description: Crane with main boom & jib 120' or longer

Four 10 hour days may be scheduled Monday-Thursday or Tuesday-Friday. Worked not performed due to weather, Monday-Thursday may be scheuled Friday

Wage Rates	Straight Time	Time and a Half	Double Time
Total Hourly Wage	\$63.27	\$82.40	\$101.53

Overtime Provisions

Over 8-hour day/40-hour week	
9th hour	\$79.91
10th hour	\$79.91
Beyond 10 hours	\$79.91
Saturday	
First 8 hours	\$79.91
9th hour	\$96.54
10th hour	\$96.54
Beyond 10 hours	\$96.54
Sunday/Holiday	
	\$96.54

Four 10-hour days allowed? - Yes

Make Up Day Allowed? - Yes

Friday

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Wayne

Classification Name	Category	Last Updated
Operating Engineer - RC	Operating Engineer	05/10/2024

Classification Description: Regular crane, job mechanic, concrete pump with boom

Work in excess of 12 per day M-F shall be paid at double time.

Wage Rates	Straight Time	Time and a Half	Double Time
Total Hourly Wage	\$64.85	\$84.71	\$104.56

Overtime Provisions

Over 8-hour day/40-hour week

9th hour	\$82.12
10th hour	\$82.12
Beyond 10 hours	\$82.12

Saturday

First 8 hours	\$82.12
9th hour	\$99.38
10th hour	\$99.38
Beyond 10 hours	\$99.38

Sunday/Holiday	\$99.38
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Four 10-hour days allowed? - Yes

Make Up Day Allowed? - No

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Wayne

Classification Name	Category	Last Updated
Operating Engineer - Skidsteer Operator	Operating Engineer	06/20/2024

Classification Description: Skidsteer forklift when working with fence and Door companies

Wage Rates	Straight Time	Time and a Half	Double Time
Total Hourly Wage	\$65.69	\$83.17	\$100.65

Overtime Provisions

Over 8-hour day/40-hour week	
9th hour	\$83.17
10th hour	\$83.17
Beyond 10 hours	\$83.17
Saturday	
First 8 hours	\$83.17
9th hour	\$83.17
10th hour	\$83.17
Beyond 10 hours	\$83.17
Sunday/Holiday	
	\$100.65

Four 10-hour days allowed? - Yes

Make Up Day Allowed? - No

Overtime Rate Comment: Double time after 12 Mon-Sat

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Wayne

Classification Name	Category	Last Updated
Operating Engineer - TDH, Backhoe	Operating Engineer	06/20/2024

Classification Description: Hoisting Operator, Two Drum Hoist, Rubber Tire Backhoe

Wage Rates	Straight Time	Time and a Half	Double Time
Total Hourly Wage	\$75.41	\$97.11	\$118.82

Overtime Provisions

Over 8-hour day/40-hour week

9th hour	\$97.11
10th hour	\$97.11
Beyond 10 hours	\$97.11

Saturday

First 8 hours	\$97.11
9th hour	\$97.11
10th hour	\$97.11
Beyond 10 hours	\$97.11

Sunday/Holiday	\$118.82
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Four 10-hour days allowed? - Yes

Make Up Day Allowed? - No

Overtime Rate Comment: Double time after 12 Mon-Sat

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Wayne

Classification Name	Category	Last Updated
Operating Engineer-Boom and Jib or Leads 120' or longer	Operating Engineer	08/01/2024

Classification Description: Engineer when operating Crane with Boom and Jib or Leads 120' or longer

Wage Rates	Straight Time	Time and a Half	Double Time
Total Hourly Wage	\$70.96	\$93.68	\$116.38

Overtime Provisions

Over 8-hour day/40-hour week	
9th hour	\$70.96
10th hour	\$70.96
Beyond 10 hours	\$90.70
Saturday	
First 8 hours	\$90.70
9th hour	\$110.45
10th hour	\$110.45
Beyond 10 hours	\$110.45
Sunday/Holiday	
	\$110.45

Four 10-hour days allowed? - Yes

Make Up Day Allowed? - No

Overtime Rate Comment: Monday-Friday-Double time after 12hrs/day
Saturday-Double time starts after 40 hrs otherwise first 8 are time and a half

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Wayne

Classification Name	Category	Last Updated
Operating Engineer-Boom and Jib or Leads 140' or longer	Operating Engineer	08/01/2024

Classification Description: Engineer when operating Crane with Boom and Jib or Leads 140' or longer

Wage Rates	Straight Time	Time and a Half	Double Time
Total Hourly Wage	\$71.78	\$94.91	\$118.02

Overtime Provisions

Over 8-hour day/40-hour week

9th hour	\$71.78
10th hour	\$71.78
Beyond 10 hours	\$91.89

Saturday

First 8 hours	\$71.78
9th hour	\$111.99
10th hour	\$111.99
Beyond 10 hours	\$111.99

Sunday/Holiday	\$111.99
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Four 10-hour days allowed? - Yes

Make Up Day Allowed? - No

Overtime Rate Comment: Monday-Friday-Double time after 12hrs/day
Saturday-Double time starts after 40 hrs otherwise first 8 are time and a half

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Wayne

Classification Name	Category	Last Updated
Operating Engineer-Boom and Jib or Leads 220' or longer	Operating Engineer	08/01/2024

Classification Description: Engineer when operating Crane with Boom and Jib or Leads 220' or longer

Wage Rates	Straight Time	Time and a Half	Double Time	Overtime Provisions
Total Hourly Wage	\$72.08	\$95.36	\$118.62	Over 8-hour day/40-hour week
				9th hour \$92.31
				10th hour \$92.31
				Beyond 10 hours \$92.31
				Saturday
				First 8 hours \$72.08
				9th hour \$112.55
				10th hour \$112.55
				Beyond 10 hours \$112.55
				Sunday/Holiday \$112.55

Four 10-hour days allowed? - Yes

Make Up Day Allowed? - No

Overtime Rate Comment: Monday-Friday-Double time after 12hrs/day
Saturday-Double time starts after 40 hrs otherwise first 8 are time and a half

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Wayne

Classification Name	Category	Last Updated
Operating Engineer-Boom and Jib or Leads 300' or longer	Operating Engineer	08/01/2024

Classification Description: Engineer when operating Crane with Boom and Jib or Leads 300' or longer

Wage Rates	Straight Time	Time and a Half	Double Time	Overtime Provisions
Total Hourly Wage	\$73.58	\$97.60	\$121.62	Over 8-hour day/40-hour week
				9th hour \$73.58
				10th hour \$73.58
				Beyond 10 hours \$73.58
				Saturday
				First 8 hours \$73.58
				9th hour \$115.35
				10th hour \$115.35
				Beyond 10 hours \$115.35
				Sunday/Holiday \$115.35

Four 10-hour days allowed? - Yes

Make Up Day Allowed? - No

Overtime Rate Comment: Mon-Fri-Double time after 12 hrs/day
Sat-time and a half first 8 hours unless over 40, then double time

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Wayne

Classification Name	Category	Last Updated
Operating Engineer-Boom and Jib or Leads 400' or longer	Operating Engineer	08/01/2024

Classification Description: Engineer when operating Crane with Boom and Jib or Leads 400' or longer

Wage Rates	Straight Time	Time and a Half	Double Time	Overtime Provisions
Total Hourly Wage	\$75.08	\$96.62	\$118.16	Over 8-hour day/40-hour week
Apprentice: Apprentice Engineer 1 - 999 Hours	\$56.05	\$71.31	\$86.56	9th hour \$75.08
Apprentice: Apprentice Engineer 1,000 - 1,999 Hours	\$58.22	\$74.56	\$90.90	10th hour \$75.08
Apprentice: Apprentice Engineer 2,000 - 2,999 Hours	\$60.56	\$78.07	\$95.58	Beyond 10 hours \$96.62
Apprentice: Apprentice Engineer 3,000 - 3,999 hours	\$62.58	\$81.11	\$99.62	Saturday
Apprentice: Apprentice Engineer 4,000 - 4,999 hours	\$64.77	\$84.39	\$104.00	First 8 hours \$75.08
Apprentice: Apprentice Engineer 4,999 - 5,999 hours	\$68.03	\$89.28	\$110.52	9th hour \$118.16
				10th hour \$118.16
				Beyond 10 hours \$118.16
				Sunday/Holiday \$118.16

Four 10-hour days allowed? - Yes

Make Up Day Allowed? - No

Overtime Rate Comment: Monday-Friday-Double time after 12hrs/day
Saturday-Double time starts after 40 hrs otherwise first 8 are time and a half

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Wayne

Classification Name	Category	Last Updated
Operating Engineer-Compressor or Welding Machine	Operating Engineer	08/01/2024

Classification Description: Engineer operating Compressor or Welding Machine

Wage Rates	Straight Time	Time and a Half	Double Time
Total Hourly Wage	\$60.11	\$77.40	\$94.68

Overtime Provisions

Over 8-hour day/40-hour week	
9th hour	\$60.11
10th hour	\$60.11
Beyond 10 hours	\$90.17
Saturday	
First 8 hours	\$60.11
9th hour	\$90.17
10th hour	\$90.17
Beyond 10 hours	\$90.17
Sunday/Holiday	
	\$90.17

Four 10-hour days allowed? - Yes

Make Up Day Allowed? - No

Overtime Rate Comment: Monday-Friday-Double time after 12hrs/day
Saturday-Double time starts after 40 hrs otherwise first 8 are time and a half

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Wayne

Classification Name	Category	Last Updated
Operating Engineer-Forklift	Operating Engineer	08/01/2024

Classification Description: Lull or Extend-A-Boom Forklift

Wage Rates	Straight Time	Time and a Half	Double Time
Total Hourly Wage	\$67.42	\$88.36	\$109.30

Overtime Provisions

Over 8-hour day/40-hour week

9th hour	\$67.42
10th hour	\$67.42
Beyond 10 hours	\$103.84

Saturday

First 8 hours	\$67.42
9th hour	\$103.84
10th hour	\$103.84
Beyond 10 hours	\$103.84

Sunday/Holiday	\$103.84
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Four 10-hour days allowed? - Yes

Make Up Day Allowed? - No

Overtime Rate Comment: Monday-Friday-Double time after 12hrs/day
Saturday-Double time starts after 40 hrs otherwise first 8 are time and a half

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Wayne

Classification Name	Category	Last Updated
Regular Crane Operator	Operating Engineer	08/01/2024

Classification Description: Job Mechanic, Concrete Pump with Boom, and High/Long Reach Shear

Wage Rates	Straight Time	Time and a Half	Double Time
Total Hourly Wage	\$70.10	\$92.38	\$114.66

Overtime Provisions

Over 8-hour day/40-hour week

9th hour	\$70.10
10th hour	\$70.10
Beyond 10 hours	\$89.47

Saturday

First 8 hours	\$89.47
9th hour	\$108.85
10th hour	\$108.85
Beyond 10 hours	\$108.85

Sunday/Holiday

\$108.85

Four 10-hour days allowed? - Yes

Make Up Day Allowed? - No

Overtime Rate Comment: Monday-Friday-Double time after 12hrs/day
Saturday-Double time starts after 40 hrs otherwise first 8 are time and a half

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Wayne

Classification Name	Category	Last Updated
Regular Engineer	Operating Engineer	08/01/2024

Classification Description: Hydro Excavator, Remote Controlled Concrete Breaker, and Concrete Saw operator

Wage Rates	Straight Time	Time and a Half	Double Time
Total Hourly Wage	\$69.13	\$90.93	\$112.72

Overtime Provisions

Over 8-hour day/40-hour week

9th hour	\$69.13
10th hour	\$69.13
Beyond 10 hours	\$88.08

Saturday

First 8 hours	\$69.13
9th hour	\$107.03
10th hour	\$107.03
Beyond 10 hours	\$107.03

Sunday/Holiday	\$107.03
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Four 10-hour days allowed? - Yes

Make Up Day Allowed? - No

Overtime Rate Comment: Monday-Friday-Double time after 12hrs/day
Saturday-Double time starts after 40 hrs otherwise first 8 are time and a half

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Wayne

Classification Name	Category	Last Updated
Marine Construction and Dredging Class I - OE324	Operating Engineer - Marine Construction	01/16/2025

Classification Description: Craft Foreman, Diver/Wet Tender, Engineer, Engineer (hydraulic dredge), Blaster

Wage Rates	Straight Time	Time and a Half	Double Time	Overtime Provisions
Total Hourly Wage	\$84.30	\$110.05	\$135.80	Over 8-hour day/40-hour week
				9th hour \$110.05
				10th hour \$110.05
				Beyond 10 hours \$110.05
				Saturday
				First 8 hours \$110.05
				9th hour \$110.05
				10th hour \$110.05
				Beyond 10 hours \$110.05
				Sunday/Holiday \$135.80

Four 10-hour days allowed? - No

Make Up Day Allowed? - No

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Wayne

Classification Name	Category	Last Updated
Marine Construction and Dredging Class II A - OE324	Operating Engineer - Marine Construction	01/16/2025

Classification Description: Crane, Backhoe, Material Handler, All Self-Propelled Drill Rigs, Mechanic/Welder, Asst. Engineer (hydraulic dredge), Leverman (hydraulic dredge), Diver Tender.

Wage Rates	Straight Time	Time and a Half	Double Time
Total Hourly Wage	\$82.80	\$107.80	\$132.80

Overtime Provisions

Over 8-hour day/40-hour week	
9th hour	\$107.80
10th hour	\$107.80
Beyond 10 hours	\$107.80
Saturday	
First 8 hours	\$107.80
9th hour	\$107.80
10th hour	\$107.80
Beyond 10 hours	\$107.80
Sunday/Holiday	
	\$132.80

Four 10-hour days allowed? - No

Make Up Day Allowed? - No

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Wayne

Classification Name	Category	Last Updated
Marine Construction and Dredging Class II B - OE324	Operating Engineer - Marine Construction	01/16/2025

Classification Description: Friction, Lattice Boom, or Crane License Cert., Endorse Tug or Tow Boat Operator

Wage Rates	Straight Time	Time and a Half	Double Time
Total Hourly Wage	\$85.80	\$112.30	\$138.80

Overtime Provisions

Over 8-hour day/40-hour week	
9th hour	\$112.30
10th hour	\$112.30
Beyond 10 hours	\$112.30
Saturday	
First 8 hours	\$112.30
9th hour	\$112.30
10th hour	\$112.30
Beyond 10 hours	\$112.30
Sunday/Holiday	
	\$138.80

Four 10-hour days allowed? - No

Make Up Day Allowed? - No

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Wayne

Classification Name	Category	Last Updated
Marine Construction and Dredging Class III - OE324	Operating Engineer - Marine Construction	01/16/2025

Classification Description: Deck Equipment Operator, (Machineryman), Maintenance of Crane, Tug/Launch Operator, Loader/Dozer on Barge, Deck Machinery, etc.

Wage Rates	Straight Time	Time and a Half	Double Time
Total Hourly Wage	\$78.30	\$101.05	\$123.80

Overtime Provisions

Over 8-hour day/40-hour week	
9th hour	\$101.05
10th hour	\$101.05
Beyond 10 hours	\$101.05
Saturday	
First 8 hours	\$101.05
9th hour	\$101.05
10th hour	\$101.05
Beyond 10 hours	\$101.05
Sunday/Holiday	
	\$123.80

Four 10-hour days allowed? - No

Make Up Day Allowed? - No

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Wayne

Classification Name	Category	Last Updated
Marine Construction and Dredging Class IV - OE324	Operating Engineer - Marine Construction	01/16/2025

Classification Description: Deck Equipment Operator, Machineryman/Fireman, (4 equipment units or more), Off Road Trucks, Deck Hand, Tug/Engineer, Crane Maint. (50 ton and under/Backhoe 115,000 lbs. or less), Asst. Tug Operator, Blaster Helper.

Wage Rates	Straight Time	Time and a Half	Double Time
Total Hourly Wage	\$73.35	\$93.85	\$114.35

Overtime Provisions

Over 8-hour day/40-hour

week

9th hour	\$93.85
10th hour	\$93.85
Beyond 10 hours	\$93.85

Saturday

First 8 hours	\$93.85
9th hour	\$93.85
10th hour	\$93.85
Beyond 10 hours	\$93.85

Sunday/Holiday

\$114.35

Four 10-hour days allowed? - No

Make Up Day Allowed? - No

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Wayne

Classification Name	Category	Last Updated
Crane Operator - 324 B400	Operating Engineer Steel Work	06/20/2024

Classification Description: Crane Operator w/400' Boom or Longer w/Oiler

Wage Rates	Straight Time	Time and a Half	Double Time
Total Hourly Wage	\$81.86	\$106.37	\$130.88

Overtime Provisions

Over 8-hour day/40-hour week	
9th hour	\$106.37
10th hour	\$106.37
Beyond 10 hours	\$106.37
Saturday	
First 8 hours	\$106.37
9th hour	\$106.37
10th hour	\$106.37
Beyond 10 hours	\$106.37
Sunday/Holiday	
	\$130.88

Four 10-hour days allowed? - Yes

Make Up Day Allowed? - No

Overtime Rate Comment: Double time over 12 hours Mon-Sat

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Wayne

Classification Name	Category	Last Updated
Operating Engineer - 324 A300	Operating Engineer Steel Work	06/20/2024

Classification Description: Crane with boom & jib or leads 300' or longer
Work in excess of 12 per day M-F shall be paid at double time.

Wage Rates	Straight Time	Time and a Half	Double Time
Total Hourly Wage	\$79.36	\$102.78	\$126.20

Overtime Provisions

Over 8-hour day/40-hour week

9th hour	\$102.78
10th hour	\$102.78
Beyond 10 hours	\$102.78

Saturday

First 8 hours	\$102.78
9th hour	\$102.78
10th hour	\$102.78
Beyond 10 hours	\$102.78

Sunday/Holiday	\$126.20
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Four 10-hour days allowed? - Yes

Make Up Day Allowed? - No

Overtime Rate Comment: Double time over 12 hours Mon-Sat.

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Wayne

Classification Name	Category	Last Updated
Operating Engineer - 324 A400	Operating Engineer Steel Work	06/20/2024

Classification Description: Crane with boom & jib or leads 400' or longer
 Work in excess of 12 per day M-F shall be paid at double time.

Wage Rates	Straight Time	Time and a Half	Double Time
Total Hourly Wage	\$80.86	\$104.94	\$129.01

Overtime Provisions

Over 8-hour day/40-hour week	
9th hour	\$104.93
10th hour	\$104.93
Beyond 10 hours	\$104.93
Saturday	
First 8 hours	\$104.93
9th hour	\$104.93
10th hour	\$104.93
Beyond 10 hours	\$104.93
Sunday/Holiday	
	\$129.01

Four 10-hour days allowed? - Yes

Make Up Day Allowed? - No

Overtime Rate Comment: Double time over 12 hours/day Mon-Sat

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Wayne

Classification Name	Category	Last Updated
Operating Engineer - 324 A50	Operating Engineer Steel Work	06/20/2024

Classification Description: Tower Crane & Derrick Operator 50' or More

Wage Rates	Straight Time	Time and a Half	Double Time
Total Hourly Wage	\$77.14	\$99.59	\$122.05

Overtime Provisions

Over 8-hour day/40-hour week

9th hour	\$99.59
10th hour	\$99.59
Beyond 10 hours	\$99.59

Saturday

First 8 hours	\$99.59
9th hour	\$99.59
10th hour	\$99.59
Beyond 10 hours	\$99.59

Sunday/Holiday	\$122.05
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Four 10-hour days allowed? - Yes

Make Up Day Allowed? - No

Overtime Rate Comment: Double time after 12 Mon-Sat

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Wayne

Classification Name	Category	Last Updated
Operating Engineer - 324 B140	Operating Engineer Steel Work	06/20/2024

Classification Description: Crane Operator w/140' of /Boom or Longer w/Oiler

Wage Rates	Straight Time	Time and a Half	Double Time
Total Hourly Wage	\$78.59	\$101.68	\$124.76

Overtime Provisions

Over 8-hour day/40-hour week	
9th hour	\$101.67
10th hour	\$101.67
Beyond 10 hours	\$101.67
Saturday	
First 8 hours	\$101.67
9th hour	\$101.67
10th hour	\$101.67
Beyond 10 hours	\$101.67
Sunday/Holiday	
	\$124.76

Four 10-hour days allowed? - Yes

Make Up Day Allowed? - No

Overtime Rate Comment: Double time after 12 Mon-Sat

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Wayne

Classification Name	Category	Last Updated
Operating Engineer - 324 B220	Operating Engineer Steel Work	06/20/2024

Classification Description: Crane Operator w/220' of Boom or Longer w/Oiler

Wage Rates	Straight Time	Time and a Half	Double Time
Total Hourly Wage	\$78.86	\$100.76	\$123.97

Overtime Provisions

Over 8-hour day/40-hour week

9th hour	\$102.06
10th hour	\$102.06
Beyond 10 hours	\$102.06

Saturday

First 8 hours	\$102.06
9th hour	\$102.06
10th hour	\$102.06
Beyond 10 hours	\$102.06

Sunday/Holiday	\$125.27
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Four 10-hour days allowed? - Yes

Make Up Day Allowed? - No

Overtime Rate Comment: Double time after 12 hours Mon-Sat

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Wayne

Classification Name	Category	Last Updated
Operating Engineer - 324 B300	Operating Engineer Steel Work	06/20/2024

Classification Description: Crane Operator w/300' of Boom or Longer w/Oiler

Wage Rates	Straight Time	Time and a Half	Double Time
Total Hourly Wage	\$80.36	\$104.22	\$128.07

Overtime Provisions

Over 8-hour day/40-hour week

9th hour	\$104.22
10th hour	\$104.22
Beyond 10 hours	\$104.22

Saturday

First 8 hours	\$104.22
9th hour	\$104.22
10th hour	\$104.22
Beyond 10 hours	\$104.22

Sunday/Holiday	\$128.07
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Four 10-hour days allowed? - Yes

Make Up Day Allowed? - No

Overtime Rate Comment: Double time over 12 hours Mon-Sat

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Wayne

Classification Name	Category	Last Updated
Operating Engineer - 324 B50	Operating Engineer Steel Work	06/20/2024

Classification Description: Tower Crane & Derrick Operator 50' or more w/Oiler

Wage Rates	Straight Time	Time and a Half	Double Time
Total Hourly Wage	\$78.14	\$101.03	\$123.92

Overtime Provisions

Over 8-hour day/40-hour week

9th hour	\$101.03
10th hour	\$101.03
Beyond 10 hours	\$101.03

Saturday

First 8 hours	\$101.03
9th hour	\$101.03
10th hour	\$101.03
Beyond 10 hours	\$101.03

Sunday/Holiday	\$123.92
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Four 10-hour days allowed? - Yes

Make Up Day Allowed? - No

Overtime Rate Comment: Double time after 12 Mon-Sat

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Wayne

Classification Name	Category	Last Updated
Operating Engineer - 324 PRE60118	Operating Engineer Steel Work	06/20/2024

Classification Description: Oiler/pumps over 6" **Applies to Operators who have previously worked under this classification PRIOR to 6/1/18**

Wage Rates	Straight Time	Time and a Half	Double Time
Total Hourly Wage	\$61.22	\$76.76	\$92.29

Overtime Provisions

Over 8-hour day/40-hour

week

9th hour	\$76.75
10th hour	\$76.75
Beyond 10 hours	\$76.75

Saturday

First 8 hours	\$76.75
9th hour	\$76.75
10th hour	\$76.75
Beyond 10 hours	\$76.75

Sunday/Holiday

\$92.29

Four 10-hour days allowed? - Yes

Make Up Day Allowed? - No

Overtime Rate Comment: Double time after 12 Mon-Sat

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Wayne

Classification Name	Category	Last Updated
Operating Engineer - EF	Operating Engineer Steel Work	05/10/2024

Classification Description: Extended boom forklift over 5,000 lb capacity, 1 Drum Hoist

Wage Rates	Straight Time	Time and a Half	Double Time
Total Hourly Wage	\$72.21	\$92.53	\$112.84

Overtime Provisions

Over 8-hour day/40-hour week

9th hour	\$92.53
10th hour	\$92.53
Beyond 10 hours	\$112.84

Saturday

First 8 hours	\$92.53
9th hour	\$92.53
10th hour	\$92.53
Beyond 10 hours	\$112.84

Sunday/Holiday	\$112.84
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Four 10-hour days allowed? - Yes

Make Up Day Allowed? - Yes

4 10s allowed M-Th with Friday makeup day because of bad weather

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Wayne

Classification Name	Category	Last Updated
Operating Engineer Steel Work - SW120	Operating Engineer Steel Work	05/10/2024

Classification Description: Crane w/ 120' boom or longer

Wage Rates	Straight Time	Time and a Half	Double Time
Total Hourly Wage	\$74.14	\$95.24	\$116.33

Overtime Provisions

Over 8-hour day/40-hour week	
9th hour	\$95.24
10th hour	\$95.24
Beyond 10 hours	\$116.33
Saturday	
First 8 hours	\$95.24
9th hour	\$95.24
10th hour	\$95.24
Beyond 10 hours	\$116.33
Sunday/Holiday	
	\$116.33

Four 10-hour days allowed? - Yes

Make Up Day Allowed? - Yes

4 10s allowed M-Th with Friday makeup day because of bad weather

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Wayne

Classification Name	Category	Last Updated
Operating Engineer Steel Work - SW120	Operating Engineer Steel Work	05/10/2024

Classification Description: Crane w/ 120' boom or longer w/ Oiler

Wage Rates	Straight Time	Time and a Half	Double Time
Total Hourly Wage	\$75.01	\$96.54	\$118.07

Overtime Provisions

Over 8-hour day/40-hour week	
9th hour	\$96.54
10th hour	\$96.54
Beyond 10 hours	\$118.07
Saturday	
First 8 hours	\$96.54
9th hour	\$96.54
10th hour	\$96.54
Beyond 10 hours	\$118.07
Sunday/Holiday	
	\$118.07

Four 10-hour days allowed? - Yes

Make Up Day Allowed? - Yes

4 10s allowed M-Th with Friday makeup day because of bad weather

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Wayne

Classification Name	Category	Last Updated
Operating Engineer Steel Work - SW140	Operating Engineer Steel Work	05/10/2024

Classification Description: Crane w/ 140' boom or longer

Wage Rates	Straight Time	Time and a Half	Double Time
Total Hourly Wage	\$75.19	\$96.80	\$118.41

Overtime Provisions

Over 8-hour day/40-hour week	
9th hour	\$96.80
10th hour	\$96.80
Beyond 10 hours	\$118.41
Saturday	
First 8 hours	\$96.80
9th hour	\$96.80
10th hour	\$96.80
Beyond 10 hours	\$118.41
Sunday/Holiday	
	\$118.41

Four 10-hour days allowed? - Yes

Make Up Day Allowed? - Yes

4 10s allowed M-Th with Friday makeup day because of bad weather

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Wayne

Classification Name	Category	Last Updated
Operating Engineer Steel Work - SW140	Operating Engineer Steel Work	05/10/2024

Classification Description: Crane w/ 140' boom or longer W/ Oiler

Wage Rates	Straight Time	Time and a Half	Double Time
Total Hourly Wage	\$76.19	\$98.24	\$120.28

Overtime Provisions

Over 8-hour day/40-hour week	
9th hour	\$98.24
10th hour	\$98.24
Beyond 10 hours	\$120.28
Saturday	
First 8 hours	\$98.24
9th hour	\$98.24
10th hour	\$98.24
Beyond 10 hours	\$120.28
Sunday/Holiday	
	\$120.28

Four 10-hour days allowed? - Yes

Make Up Day Allowed? - Yes

4 10s allowed M-Th with Friday makeup day because of bad weather

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Wayne

Classification Name	Category	Last Updated
Operating Engineer Steel Work - SW220	Operating Engineer Steel Work	05/10/2024

Classification Description: Boom & Jib 220' or longer

Wage Rates	Straight Time	Time and a Half	Double Time
Total Hourly Wage	\$76.46	\$98.62	\$120.78

Overtime Provisions

Over 8-hour day/40-hour week

9th hour	\$98.62
10th hour	\$98.62
Beyond 10 hours	\$120.78

Saturday

First 8 hours	\$98.62
9th hour	\$98.62
10th hour	\$98.62
Beyond 10 hours	\$120.78

Sunday/Holiday	\$120.78
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Four 10-hour days allowed? - Yes

Make Up Day Allowed? - Yes

4 10s allowed M-Th with Friday makeup day because of bad weather

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Wayne

Classification Name	Category	Last Updated
Operating Engineer Steel Work - SW220	Operating Engineer Steel Work	05/10/2024

Classification Description: Crane w/ 220' boom or longer w/ Oiler

Wage Rates	Straight Time	Time and a Half	Double Time
Total Hourly Wage	\$74.01	\$95.11	\$116.20

Overtime Provisions

Over 8-hour day/40-hour week	
9th hour	\$95.11
10th hour	\$95.11
Beyond 10 hours	\$116.20
Saturday	
First 8 hours	\$95.11
9th hour	\$95.11
10th hour	\$95.11
Beyond 10 hours	\$116.20
Sunday/Holiday	
	\$116.20

Four 10-hour days allowed? - Yes

Make Up Day Allowed? - Yes

4 10s allowed M-Th with Friday makeup day because of bad weather

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Wayne

Classification Name	Category	Last Updated
Operating Engineer Steel Work - SW300	Operating Engineer Steel Work	05/10/2024

Classification Description: Boom & Jib 300' or longer

Wage Rates	Straight Time	Time and a Half	Double Time
Total Hourly Wage	\$76.96	\$99.34	\$121.72

Overtime Provisions

Over 8-hour day/40-hour week	
9th hour	\$99.34
10th hour	\$99.34
Beyond 10 hours	\$121.72
Saturday	
First 8 hours	\$99.34
9th hour	\$99.34
10th hour	\$99.34
Beyond 10 hours	\$121.72
Sunday/Holiday	
	\$121.72

Four 10-hour days allowed? - Yes

Make Up Day Allowed? - Yes

4 10s allowed M-Th with Friday makeup day because of bad weather

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Wayne

Classification Name	Category	Last Updated
Operating Engineer Steel Work - SW300	Operating Engineer Steel Work	05/10/2024

Classification Description: Crane w/ 300' boom or longer w/ Oiler

Wage Rates	Straight Time	Time and a Half	Double Time
Total Hourly Wage	\$77.96	\$100.78	\$123.59

Overtime Provisions

Over 8-hour day/40-hour week

9th hour	\$100.78
10th hour	\$100.78
Beyond 10 hours	\$123.59

Saturday

First 8 hours	\$100.78
9th hour	\$100.78
10th hour	\$100.78
Beyond 10 hours	\$123.59

Sunday/Holiday	\$123.59
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Four 10-hour days allowed? - Yes

Make Up Day Allowed? - Yes

4 10s allowed M-Th with Friday makeup day because of bad weather

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Wayne

Classification Name	Category	Last Updated
Operating Engineer Steel Work - SW400	Operating Engineer Steel Work	05/10/2024

Classification Description: Boom & Jib 400' or longer

Wage Rates	Straight Time	Time and a Half	Double Time
Total Hourly Wage	\$78.46	\$101.49	\$124.52

Overtime Provisions

Over 8-hour day/40-hour week	
9th hour	\$101.49
10th hour	\$101.49
Beyond 10 hours	\$124.52
Saturday	
First 8 hours	\$101.49
9th hour	\$101.49
10th hour	\$101.49
Beyond 10 hours	\$124.52
Sunday/Holiday	
	\$124.52

Four 10-hour days allowed? - Yes

Make Up Day Allowed? - Yes

4 10s allowed M-Th with Friday makeup day because of bad weather

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Wayne

Classification Name	Category	Last Updated
Operating Engineer Steel Work - SW400	Operating Engineer Steel Work	05/10/2024

Classification Description: Crane w/ 400' boom or longer w/ Oiler

Wage Rates	Straight Time	Time and a Half	Double Time
Total Hourly Wage	\$79.46	\$102.93	\$126.39

Overtime Provisions

Over 8-hour day/40-hour week

9th hour	\$102.93
10th hour	\$102.93
Beyond 10 hours	\$126.39

Saturday

First 8 hours	\$102.93
9th hour	\$102.93
10th hour	\$102.93
Beyond 10 hours	\$126.39

Sunday/Holiday	\$126.39
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Four 10-hour days allowed? - Yes

Make Up Day Allowed? - Yes

4 10s allowed M-Th with Friday makeup day because of bad weather

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Wayne

Classification Name	Category	Last Updated
Operating Engineer Steel Work - SWCO	Operating Engineer Steel Work	05/10/2024

Classification Description: Crane Operator, Job Mechanic, 3 Drum Hoist & Excavator

Wage Rates	Straight Time	Time and a Half	Double Time
Total Hourly Wage	\$73.65	\$94.59	\$115.53
Apprentice: 0-999 hours	\$59.16	\$76.02	\$92.88
Apprentice: 1,000-1,999 hours	\$61.56	\$79.63	\$97.68
Apprentice: 2,000-2,999 hours	\$63.96	\$83.22	\$102.48
Apprentice: 3,000-3,999 hours	\$66.38	\$84.18	\$101.98
Apprentice: 4,000-4,999 hours	\$68.78	\$90.46	\$112.12
Apprentice: 5,000 hours	\$71.20	\$91.09	\$110.99

Overtime Provisions

Over 8-hour day/40-hour week	
9th hour	\$94.59
10th hour	\$94.59
Beyond 10 hours	\$115.53
Saturday	
First 8 hours	\$94.59
9th hour	\$94.59
10th hour	\$94.59
Beyond 10 hours	\$115.53
Sunday/Holiday	
	\$115.53

Four 10-hour days allowed? - Yes

Make Up Day Allowed? - Yes

4 10s allowed M-Th with Friday makeup day because of bad weather

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Wayne

Classification Name	Category	Last Updated
Operating Engineer Steel Work - SWCO-Operating Engineer Steel Work		05/10/2024

Classification Description: Crane Operator w/ Oiler

Wage Rates	Straight Time	Time and a Half	Double Time
Total Hourly Wage	\$74.65	\$96.03	\$117.40

Overtime Provisions

Over 8-hour day/40-hour week	
9th hour	\$96.03
10th hour	\$96.03
Beyond 10 hours	\$117.40
Saturday	
First 8 hours	\$96.03
9th hour	\$96.03
10th hour	\$96.03
Beyond 10 hours	\$117.40
Sunday/Holiday	
	\$117.40

Four 10-hour days allowed? - Yes

Make Up Day Allowed? - Yes

4 10s allowed M-Th with Friday makeup day because of bad weather

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Wayne

Classification Name	Category	Last Updated
Operating Engineer Steel Work - SWCW	Operating Engineer Steel Work	05/10/2024

Classification Description: Compressor or Welder Operator

Wage Rates	Straight Time	Time and a Half	Double Time
Total Hourly Wage	\$37.03	\$49.48	\$61.92

Overtime Provisions

Over 8-hour day/40-hour week	
9th hour	\$47.85
10th hour	\$47.85
Beyond 10 hours	\$58.67
Saturday	
First 8 hours	\$47.85
9th hour	\$47.85
10th hour	\$47.85
Beyond 10 hours	\$58.67
Sunday/Holiday	
	\$58.67

Four 10-hour days allowed? - Yes

Make Up Day Allowed? - Yes

4 10s allowed M-Th with Friday makeup day because of bad weather

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Wayne

Classification Name	Category	Last Updated
Operating Engineer Steel Work - SWHO	Operating Engineer Steel Work	05/10/2024

Classification Description: Hoisting Operator, 2 Drum Hoist, & Rubber Tire Backhoe

Wage Rates	Straight Time	Time and a Half	Double Time
Total Hourly Wage	\$73.01	\$93.67	\$114.33

Overtime Provisions

Over 8-hour day/40-hour week	
9th hour	\$93.67
10th hour	\$93.67
Beyond 10 hours	\$114.33
Saturday	
First 8 hours	\$93.67
9th hour	\$93.67
10th hour	\$93.67
Beyond 10 hours	\$114.33
Sunday/Holiday	
	\$114.33

Four 10-hour days allowed? - Yes

Make Up Day Allowed? - Yes

4 10s allowed M-Th with Friday makeup day because of bad weather

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Wayne

Classification Name	Category	Last Updated
Operating Engineer Steel Work - SWO	Operating Engineer Steel Work	05/10/2024

Classification Description: Oiler

Wage Rates	Straight Time	Time and a Half	Double Time
Total Hourly Wage	\$53.42	\$67.61	\$81.80

Overtime Provisions

Over 8-hour day/40-hour week	
9th hour	\$65.74
10th hour	\$65.74
Beyond 10 hours	\$78.06
Saturday	
First 8 hours	\$65.74
9th hour	\$65.74
10th hour	\$65.74
Beyond 10 hours	\$78.06
Sunday/Holiday	
	\$78.06

Four 10-hour days allowed? - Yes

Make Up Day Allowed? - Yes

4 10s allowed M-Th with Friday makeup day because of bad weather

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Wayne

Classification Name	Category	Last Updated
Operating Engineer Steel Work - SWTD50	Operating Engineer Steel Work	05/10/2024

Classification Description: Tower Crane & Derrick where work is 50' or more

Wage Rates	Straight Time	Time and a Half	Double Time
Total Hourly Wage	\$74.74	\$96.16	\$117.57

Overtime Provisions

Over 8-hour day/40-hour week	
9th hour	\$96.16
10th hour	\$96.16
Beyond 10 hours	\$117.57
Saturday	
First 8 hours	\$96.16
9th hour	\$96.16
10th hour	\$96.16
Beyond 10 hours	\$117.57
Sunday/Holiday	
	\$117.57

Four 10-hour days allowed? - Yes

Make Up Day Allowed? - Yes

4 10s allowed M-Th with Friday makeup day because of bad weather

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Wayne

Classification Name	Category	Last Updated
Operating Engineer Steel Work - SWTD50 O	Operating Engineer Steel Work	05/10/2024

Classification Description: Tower Crane & Derrick 50' or more w/ Oiler

Wage Rates	Straight Time	Time and a Half	Double Time
Total Hourly Wage	\$75.84	\$97.69	\$119.54

Overtime Provisions

Over 8-hour day/40-hour week	
9th hour	\$97.69
10th hour	\$97.69
Beyond 10 hours	\$119.54
Saturday	
First 8 hours	\$97.69
9th hour	\$97.69
10th hour	\$97.69
Beyond 10 hours	\$119.54
Sunday/Holiday	
	\$119.54

Four 10-hour days allowed? - Yes

Make Up Day Allowed? - Yes

4 10s allowed M-Th with Friday makeup day because of bad weather

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Wayne

Classification Name	Category	Last Updated
Operating Engineer Underground-324- Class I	Operating Engineer Underground	10/31/2024

Classification Description: Class I Equipment--Air Compressors in Manifold with throttle valve Auto Grade or similar type machine
Backfill Tamper Backhoe
Backhoe on Farm Type Tractor 45 H.P. & over. Ballast Regulator (R.R.)
Batch Plant (concrete - central mix) Batch Plant Operator (concrete) Blade Grader Operator
Bulldozer
Caisson Drilling Machine Cherry Picker--15 ton or over Clamshell
Concrete/Asphalt Saw Operator - Power Driven (3yrs experience or more) Concrete Belt Placer (Formless)
Concrete Cure/Finish Machine Operator
Concrete Mixer 21 cu. ft. or over Concrete Paver [two (2) drums or larger] Concrete Pump (Truck Mount)
Concrete Pump (3 inch and over) Concrete Pump with Boom Operator Conveyor Loader Operator (Euclid type) Core Drilling
Machine
Crane (Crawler, truck type or pile driving)
Crane or De1Tick with any attachment incl. clamshell, dragline, shovel, backhoe, etc. Directional Drill/Boring Machine Operator
Dozer Dragline
Dredge Engineer Dredge Operator
Drilling Machine on which the drill is an integral part
Earth Mover--rubber tired--(paddle wheel, 619, 631, TS-24 or similar type) Earth Mover rubber tired--tandem (\$.50 cents per hr.
added for each bowl) Elevating
Grader Operator
End Loader
End Loader Operator (1½ yard capacity and over)
Excavator
Farm type tractor with attached pan
Finishing Machine Operator (Asphalt or Concrete) Foreman/Operating Engineer
Forklift (10 ton or over)
GPS or Electronic Grade on motorized equipment Gradall and similar type machine
Grader
Gravel Processing plant (portable) Operator of Guard Rail Post Driver Haul Units (off-highway) Helicopter crew
Highlift Shovel--1-1 /2 cu. yd. or over Hoisting Engineer
Horizontal Directional Drill Hydraulic Boom Truck
Hydro demolition equipment (water blaster) Hydro Excavator
Loader--Self-propelled (Belt-Chain- Wheel) (Holland or similar type) Locomotive and/or Dinkey Engine
Mechanic Milling Machine
Mucking Machine
Operator of Guard Rail Post Driver Paver Operator - Concrete
Pile Driver--Skid or Crawler Power Shovel
Rock Breaking Plant
Rock Crushing Plant (Portable)
Root Rake, Tractor Mounted Sand Blaster Vacuum Roto Mill
Scraper Self-Propelled or Tractor Drawn

Self-propelled Widener or Gravel distributing shoulder machine Shovel Operator
 Side Boom Tractor (type D-4 or equivalent or larger) Slope Paver
 Stump Remover Tractor Mounted Surface Heater & Planer
 Surface Roller with Dozer Blade
 Swinging Boom Truck (over 12-ton capacity) Tilling Machine or (Roto Grader)
 Tractor Operator
 Tractor--Boom, Winch or Hoe Head Tractor--Push
 Tractor with Scoop Tractor Mounted Spreader Tree Mover
 Trench Machine (ladder or wheel type) Trencher (over 8ft. digging capacity) Tugboat Operator
 Tunnel Boring Machine Tunnel Shield
 Vacuum Machine/Truck Operator Well Drilling Machine
 Well Drilling Rig
 Winch Truck with A Frame

Wage Rates	Straight Time	Time and a Half	Double Time
Total Hourly Wage	\$68.12	\$87.01	\$105.89
Apprentice: Apprentice Engineer 0-999 hours	\$54.36	\$69.57	\$84.77
Apprentice: Apprentice Engineer 1,000-1,999 hours	\$56.53	\$72.83	\$89.11
Apprentice: Apprentice Engineer 2,000-2,999 hours	\$58.69	\$76.06	\$93.43
Apprentice: Apprentice Engineer 3,000-3,999 hours	\$60.87	\$79.33	\$97.79
Apprentice: Apprentice Engineer 4,000-4,999 hours	\$64.22	\$84.36	\$104.49
Apprentice: Apprentice Engineer 5,000-5,999 hours	\$65.06	\$85.62	\$106.17

Four 10-hour days allowed? - Yes

Make Up Day Allowed? - Yes

In the event work is unable to be performed on account of weather Monday through Thursday, then Friday work may be scheduled for the ten (10) hours, at straight-time.

Overtime Provisions

Over 8-hour day/40-hour week	
9th hour	\$87.00
10th hour	\$87.00
Beyond 10 hours	\$87.00
Saturday	
First 8 hours	\$87.00
9th hour	\$87.00
10th hour	\$87.00
Beyond 10 hours	\$87.00
Sunday/Holiday	
	\$105.89

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Wayne

Classification Name	Category	Last Updated
Operating Engineer Underground-324- Class II	Operating Engineer Underground	10/31/2024

Classification Description: Class II Equipment

Air Compressor with Throttle Valve or Clever Brooks type comb. Backhoe (with 3/8-yard bucket or less)
Backhoe on Farm Type Tractor under 45 H.P.
Batch Plant (concrete-dry batch)
Boom Truck (power swing type boom)
Cherry Picker under 15 ton
Crusher
Crusher Operator
Concrete Pump
Concrete Mesh Depressor--independently operated Concrete Spreader--Power Driven
End Dumps when operated by an Operating Engineer End Loader under 1-1/2 cu yd.
Gunit Machine
Head Greaser
Hoist
Lowboy Operator
Mesh or Steel Placer (motorized)
Multiple Tamping Machine (R.R.)
Power Curing Spraying Machine (Formless)
P.C.C. Concrete Belt Placer (form type)
Pull Grader--Power Control
Pump Operator (6" discharge or over, gas diesel, powered or generator of 300 amp or larger)
Refrigerating Machine--Freezing operation Ross Carrier
Self-propelled convey transfer devise. Sheepfoot Roller (self-propelled)
Side Boom Tractor (smaller than D-4 type or equivalent)
Sweeper (Wayne type and similar equipment)
Telescoping laser finish machine (laser screed)
Tractor (pneu-tired, other than backhoe or front-end loader)
Trencher (8ft. digging capacity and smaller)
Trench Machine 24" and under
Tube Float (motorized)
Vac Truck
Washing Plant Operator Welder

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Wage Rates	Straight Time	Time and a Half	Double Time
Total Hourly Wage	\$64.00	\$83.38	\$102.75

Overtime Provisions

Over 8-hour day/40-hour week

9th hour	\$80.82
10th hour	\$80.82
Beyond 10 hours	\$80.82

Saturday

First 8 hours	\$80.82
9th hour	\$80.82
10th hour	\$80.82
Beyond 10 hours	\$80.82

Sunday/Holiday	\$97.65
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Four 10-hour days allowed? - Yes

Make Up Day Allowed? - Yes

In the event work is unable to be performed on account of weather Monday through Thursday, then Friday work may be scheduled for the ten (10) hours, at straight-time.

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Wayne

Classification Name	Category	Last Updated
Operating Engineer Underground-324- Class III	Operating Engineer Underground	10/31/2024

Classification Description: Class III Equipment

- Air Compressor (600 CFM or larger)
- Air Compressor [two (2) or more - less than 600 CFM] Base Paver (Jersey or similar type machine)
- Boom Truck (Non swinging, Non powered type boom) Concrete Breaker
- Concrete Finishing Machine
- Concrete Paver (1 drum - 1/2 yard or larger) Curb Machine
- Elevator (other than passenger) Hoist (one drum)
- Jacks - Hydraulic Power-driven multiple jack system Maintenance Man
- Mechanics Helper Paving Breaker
- Power Broom Self-propelled
- Pump [two (2) or more 4 inch up to 6-inch discharge gas or diesel powered-excluding submersible pumps)
- Pumpcrete Machine and similar equipment Roller (Earth & Sub-base material) Screening Plant Operator
- Spike Machine (R.R.)
- Tamper-Multiple Vibrating-Earth and Sub-base material Tractor with Drill--50 H.P. or over Well Point System Wagon Drill (multiple)
- Welding Machine or Generator [two (2) or more 300 amp. Or larger -gas or diesel powered]
- Well Point System
- Widener (Apsco or similar type)

Wage Rates	Straight Time	Time and a Half	Double Time
Total Hourly Wage	\$63.27	\$82.28	\$101.29

Overtime Provisions

Over 8-hour day/40-hour week	
9th hour	\$79.78
10th hour	\$79.78
Beyond 10 hours	\$79.78
Saturday	
First 8 hours	\$79.78
9th hour	\$79.78
10th hour	\$79.78
Beyond 10 hours	\$79.78
Sunday/Holiday	\$96.29

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Four 10-hour days allowed? - Yes

Make Up Day Allowed? - Yes

In the event work is unable to be performed on account of weather Monday through Thursday, then Friday work may be scheduled for the ten (10) hours, at straight-time.

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Wayne

Classification Name	Category	Last Updated
Operating Engineer Underground-324- Class IV	Operating Engineer Underground	10/31/2024

Classification Description: Class IV Equipment

Air Compressor Operator (over 250 CFM)
All Mulching Equipment
All Walk Behind or Remote-Control Powered Equipment (autonomous equipment)
Assistant to Engineer Automatic Dry Batch Plant
Belt Spreader (motorized including transfer device by remote, wireless or cable) Boiler
Boom or Winch truck operator
Broom & Belt Machine
Chair Cart (Self-propelled) Concrete Pumps (under 3")
Curing Equipment Operator (self-propelled)
Deck Hand
Digger Post Hole (Power-driven)
End loader Operator (under 3/4-yard capacity)
Extend A Boom Forklift--under 10 Ton
Farm Tractor with attachments Finishing Machine (concrete)
Forklift under 10 ton
Form Grader (if motorized)
Georgia Buggy -Power wheel barrel I ¾ yard with a seat Generator (15 kw or greater)
Greaser Helper
Hydraulic pipe pushing machine Mechanical Heater
Mechanics Helper
Outboard or Inboard Motorboat Power Bin Operator
Pug Mill
Pumps - [two (2) or more up to 4 in. discharge if used three (3) hours or more a day - gas or diesel powered- excluding submersible pumps]
Roller (other than asphalt)
Seaman Tiller
Skid Steer
Stump Remover (Grinder)
Sweeper (Wayne type and similar equipment) Tamper
Trencher (service)
Vibratory Compaction Equipment Operator (6 ft. wide or over)
Walk Behind Forklift
Water Wagon

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Wage Rates	Straight Time	Time and a Half	Double Time
Total Hourly Wage	\$62.70	\$81.43	\$100.15

Overtime Provisions

Over 8-hour day/40-hour week

9th hour	\$78.96
10th hour	\$78.96
Beyond 10 hours	\$78.96

Saturday

First 8 hours	\$78.96
9th hour	\$78.96
10th hour	\$78.96
Beyond 10 hours	\$78.96

Sunday/Holiday	\$95.22
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Four 10-hour days allowed? - Yes

Make Up Day Allowed? - Yes

In the event work is unable to be performed on account of weather Monday through Thursday, then Friday work may be scheduled for the ten (10) hours, at straight-time.

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Wayne

Classification Name	Category	Last Updated
Operating Engineer Underground-324- Class V	Operating Engineer Underground	10/31/2024

Classification Description: Class V Equipment

Concrete/Asphalt Saw Operator- Power Driven (Less than 3 yrs. experience) Density/Soil Engineer
 Directional Boring Utility Man
 Discharge Pumps 4" or less (1 - 4 units) Dump Truck Operator
 Dumper (Wagon, Truck, Etc.) - or trade Fence Erector /Power Driven
 Guard Post Driver Operator (power driven) Hydra Seeder
 Light Plants (1 to 5 units) Oiler Fireman
 Operator of minor equip.
 Roto Mill Utility Grade Control Operator
 Scissor lifts and basket lifts where used for material hoisting
 Sign Installer/Sign Installer with Remote Control Operated Equipment
 Straw Blower or Brush Mulcher
 Top Man, And Railroad Track and Trestle Engineer Utility Engineer
 Water Blasting Utility Engineer

Wage Rates	Straight Time	Time and a Half	Double Time
Total Hourly Wage	\$39.95	\$53.88	\$67.80

Overtime Provisions

Over 8-hour day/40-hour week	
9th hour	\$52.06
10th hour	\$52.06
Beyond 10 hours	\$52.06
Saturday	
First 8 hours	\$52.06
9th hour	\$52.06
10th hour	\$52.06
Beyond 10 hours	\$52.06
Sunday/Holiday	
	\$64.17

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Four 10-hour days allowed? - Yes

Make Up Day Allowed? - Yes

In the event work is unable to be performed on account of weather Monday through Thursday, then Friday work may be scheduled for the ten (10) hours, at straight-time.

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Wayne

Classification Name	Category	Last Updated
Pipe and Manhole Rehab - 1	Pipe and Manhole Rehab	05/10/2024

Classification Description: General Laborer for rehab work or normal cleaning and cctv work-top man, scaffold man, CCTV assistant, jetter-vac assistant

Wage Rates	Straight Time	Time and a Half	Double Time
Total Hourly Wage	\$28.20	\$38.20	\$48.19

Overtime Provisions

Over 8-hour day/40-hour week

9th hour	\$38.20
10th hour	\$38.20
Beyond 10 hours	\$38.20

Saturday

First 8 hours	\$38.20
9th hour	\$38.20
10th hour	\$38.20
Beyond 10 hours	\$38.20

Sunday/Holiday	\$38.20
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Four 10-hour days allowed? - No

Make Up Day Allowed? - No

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Wayne

Classification Name	Category	Last Updated
Pipe and Manhole Rehab - 2	Pipe and Manhole Rehab	05/10/2024

Classification Description: Tap cutter/CCTV Tech/Grout Equipment Operator: unit driver and operator of CCTV; grouting equipment and tap cutting equipment

Wage Rates	Straight Time	Time and a Half	Double Time
Total Hourly Wage	\$32.70	\$44.95	\$57.19

Overtime Provisions

Over 8-hour day/40-hour week

9th hour	\$44.95
10th hour	\$44.95
Beyond 10 hours	\$44.95

Saturday

First 8 hours	\$44.95
9th hour	\$44.95
10th hour	\$44.95
Beyond 10 hours	\$44.95

Sunday/Holiday

\$44.95

Four 10-hour days allowed? - No

Make Up Day Allowed? - No

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Wayne

Classification Name	Category	Last Updated
Pipe and Manhole Rehab - 3	Pipe and Manhole Rehab	05/10/2024

Classification Description: CCTV Technician/Combo Unit Operator: unit driver and operator of cctv unit or combo unit in connection with normal cleaning and televising work

Wage Rates	Straight Time	Time and a Half	Double Time
Total Hourly Wage	\$31.45	\$43.07	\$54.69

Overtime Provisions

Over 8-hour day/40-hour week

9th hour	\$43.07
10th hour	\$43.07
Beyond 10 hours	\$43.07

Saturday

First 8 hours	\$43.07
9th hour	\$43.07
10th hour	\$43.07
Beyond 10 hours	\$43.07

Sunday/Holiday

\$43.07

Four 10-hour days allowed? - No

Make Up Day Allowed? - No

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Wayne

Classification Name	Category	Last Updated
Pipe and Manhole Rehab - 4	Pipe and Manhole Rehab	05/10/2024

Classification Description: Boiler Operator: unit driver and operator of steam/water heater units and all ancillary equipment associated

Wage Rates	Straight Time	Time and a Half	Double Time
Total Hourly Wage	\$33.20	\$45.70	\$58.19

Overtime Provisions

Over 8-hour day/40-hour week

9th hour	\$45.70
10th hour	\$45.70
Beyond 10 hours	\$45.70

Saturday

First 8 hours	\$45.70
9th hour	\$45.70
10th hour	\$45.70
Beyond 10 hours	\$45.70

Sunday/Holiday	\$45.70
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Four 10-hour days allowed? - No

Make Up Day Allowed? - No

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Wayne

Classification Name	Category	Last Updated
Pipe and Manhole Rehab - 5	Pipe and Manhole Rehab	05/10/2024

Classification Description: Combo Unit driver & Jetter-Vac Operator

Wage Rates	Straight Time	Time and a Half	Double Time
Total Hourly Wage	\$33.20	\$45.70	\$58.19

Overtime Provisions

Over 8-hour day/40-hour week

9th hour	\$45.70
10th hour	\$45.70
Beyond 10 hours	\$45.70

Saturday

First 8 hours	\$45.70
9th hour	\$45.70
10th hour	\$45.70
Beyond 10 hours	\$45.70

Sunday/Holiday	\$45.70
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Four 10-hour days allowed? - No

Make Up Day Allowed? - No

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Wayne

Classification Name	Category	Last Updated
Pipe and Manhole Rehab - 6	Pipe and Manhole Rehab	05/10/2024

Classification Description: Pipe Bursting & Slip-lining Equipment Operator

Wage Rates	Straight Time	Time and a Half	Double Time
Total Hourly Wage	\$34.20	\$47.20	\$60.19

Overtime Provisions

Over 8-hour day/40-hour week

9th hour	\$47.20
10th hour	\$47.20
Beyond 10 hours	\$47.20

Saturday

First 8 hours	\$47.20
9th hour	\$47.20
10th hour	\$47.20
Beyond 10 hours	\$47.20

Sunday/Holiday	\$47.20
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Four 10-hour days allowed? - No

Make Up Day Allowed? - No

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Wayne

Classification Name	Category	Last Updated
Pipefitter	Pipefitter	05/10/2024

Classification Description: Pipefitter, Steamfitter, HVAC-R mechanic

Wage Rates	Straight Time	Time and a Half	Double Time
Total Hourly Wage	\$77.06	\$100.47	\$118.67
Apprentice: 10th period	\$42.91	\$57.34	\$70.42
Apprentice: 1st & 2nd periods	\$34.00	\$43.98	\$52.60
Apprentice: 3rd period	\$35.25	\$45.85	\$55.10
Apprentice: 4th period	\$36.25	\$47.35	\$57.10
Apprentice: 5th period	\$36.98	\$48.44	\$58.56
Apprentice: 6th period	\$38.23	\$50.32	\$61.06
Apprentice: 7th period	\$39.48	\$52.20	\$63.56
Apprentice: 8th period	\$40.48	\$53.70	\$65.56
Apprentice: 9th period	\$41.48	\$55.20	\$67.56

Overtime Provisions

Over 8-hour day/40-hour week

9th hour	\$95.27
10th hour	\$95.27
Beyond 10 hours	\$113.47

Saturday

First 8 hours	\$95.27
9th hour	\$95.27
10th hour	\$113.47
Beyond 10 hours	\$113.47

Sunday/Holiday

	\$113.47
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Four 10-hour days allowed? - Yes

Make Up Day Allowed? - No

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Wayne

Classification Name	Category	Last Updated
Plumber	Plumber	05/10/2024

Classification Description: Plumber

Wage Rates	Straight Time	Time and a Half	Double Time
Total Hourly Wage	\$79.32	\$97.22	\$115.11
Apprentice: 1st Year	\$29.48	\$38.33	\$47.18
Apprentice: 2nd Year	\$33.10	\$42.83	\$52.55
Apprentice: 3rd Year	\$34.75	\$45.23	\$55.70

Overtime Provisions

Over 8-hour day/40-hour week

9th hour	\$97.22
10th hour	\$97.22
Beyond 10 hours	\$115.11

Saturday

First 8 hours	\$97.22
9th hour	\$115.11
10th hour	\$115.11
Beyond 10 hours	\$115.11

Sunday/Holiday

\$115.11

Four 10-hour days allowed? - Yes

Make Up Day Allowed? - No

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Wayne

Classification Name	Category	Last Updated
Roofer - WOM	Roofer	05/10/2024

Classification Description: Commercial Roofer

Wage Rates	Straight Time	Time and a Half	Double Time
Total Hourly Wage	\$62.82	\$79.68	\$96.53
Apprentice: Apprentice 1	\$48.74	\$58.55	\$68.37
Apprentice: Apprentice 2	\$49.25	\$59.32	\$69.39
Apprentice: Apprentice 3	\$50.76	\$61.59	\$72.41
Apprentice: Apprentice 4	\$52.26	\$63.83	\$75.41
Apprentice: Apprentice 5	\$53.77	\$66.10	\$78.43
Apprentice: Apprentice 6	\$55.18	\$68.21	\$81.25
Apprentice: Apprentice 7	\$56.79	\$70.63	\$84.47
Apprentice: Apprentice 8	\$58.27	\$72.85	\$87.43
Apprentice: new apprentice	\$48.68	\$58.47	\$68.25

Overtime Provisions

Over 8-hour day/40-hour week	
9th hour	\$79.68
10th hour	\$79.68
Beyond 10 hours	\$79.68
Saturday	
First 8 hours	\$79.68
9th hour	\$79.68
10th hour	\$79.68
Beyond 10 hours	\$79.68
Sunday/Holiday	
	\$96.53

Four 10-hour days allowed? - No

Make Up Day Allowed? - No

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Wayne

Classification Name	Category	Last Updated
Sewer Relining Operator - Class I	Sewer Relining	05/10/2024

Classification Description: Class I-Operator of audio visual CCTV system including remote in-ground cutter and other equipment used in conjunction with CCTV system.

Wage Rates	Straight Time	Time and a Half	Double Time
Total Hourly Wage	\$52.84	\$69.23	\$85.62
Apprentice: 0-6 months	\$41.58	\$54.66	\$67.74
Apprentice: 6-12 months	\$45.31	\$60.26	\$75.20

Overtime Provisions	
Over 8-hour day/40-hour week	
9th hour	\$69.23
10th hour	\$69.23
Beyond 10 hours	\$69.23
Saturday	
First 8 hours	\$69.23
9th hour	\$69.23
10th hour	\$69.23
Beyond 10 hours	\$69.23
Sunday/Holiday	\$85.62

Four 10-hour days allowed? - No

Make Up Day Allowed? - No

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Wayne

Classification Name	Category	Last Updated
Sewer Relining Operator - Class II	Sewer Relining	05/10/2024

Classification Description: Class II-Operator of hot water heaters and circulation system; water jetters; and vacuum and mechanical debris removal systems and those assisting.

Wage Rates	Straight Time	Time and a Half	Double Time
Total Hourly Wage	\$50.80	\$68.49	\$86.18

Overtime Provisions

Over 8-hour day/40-hour week

9th hour	\$66.30
10th hour	\$66.30
Beyond 10 hours	\$66.30

Saturday

First 8 hours	\$66.30
9th hour	\$66.30
10th hour	\$66.30
Beyond 10 hours	\$66.30

Sunday/Holiday	\$81.79
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Four 10-hour days allowed? - No

Make Up Day Allowed? - No

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Wayne

Classification Name	Category	Last Updated
Sheet Metal Worker	Sheet Metal Worker	05/10/2024

Classification Description: Journeyman -

A 4 10 schedule may be worked, 4 consecutive days Monday thru Friday.

Wage Rates	Straight Time	Time and a Half	Double Time
Total Hourly Wage	\$74.96	\$95.01	\$115.06
Apprentice: 1st & 2nd Periods	\$48.51	\$59.65	\$70.77
Apprentice: 3rd & 4th Periods	\$50.74	\$62.99	\$75.23
Apprentice: 5th & 6th Periods	\$52.96	\$66.32	\$79.67
Apprentice: 7th & 8th Periods	\$55.19	\$69.67	\$84.13

Overtime Provisions

Over 8-hour day/40-hour week

9th hour	\$95.01
10th hour	\$95.01
Beyond 10 hours	\$115.06

Saturday

First 8 hours	\$95.01
9th hour	\$115.06
10th hour	\$115.06
Beyond 10 hours	\$115.06

Sunday/Holiday	\$115.06
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Four 10-hour days allowed? - Yes

Make Up Day Allowed? - No

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Wayne

Classification Name	Category	Last Updated
Sprinkler Fitter Journeyman	Sprinkler Fitter	05/10/2024

Classification Description: Sprinkler Fitter Journeyman -
 4 ten hour days allowed Monday-Friday
 Double time pay due after 12 hours worked M-F

Wage Rates	Straight Time	Time and a Half	Double Time
Total Hourly Wage	\$78.57	\$102.66	\$126.74
Apprentice: 10th Period	\$69.91	\$87.12	\$104.33
Apprentice: 1st Period	\$31.91	\$40.00	\$48.09
Apprentice: 2nd Period	\$51.25	\$60.36	\$69.47
Apprentice: 3rd Period	\$53.58	\$63.71	\$73.83
Apprentice: 4th Period	\$55.91	\$67.04	\$78.17
Apprentice: 5th Period	\$58.25	\$70.40	\$82.55
Apprentice: 6th Period	\$60.58	\$73.73	\$86.89
Apprentice: 7th Period	\$62.91	\$77.08	\$91.24
Apprentice: 8th Period	\$65.25	\$80.44	\$95.62
Apprentice: 9th Period	\$67.58	\$83.78	\$99.98

Overtime Provisions

Over 8-hour day/40-hour week	
9th hour	\$102.66
10th hour	\$102.66
Beyond 10 hours	\$126.74
Saturday	
First 8 hours	\$102.66
9th hour	\$126.74
10th hour	\$126.74
Beyond 10 hours	\$126.74
Sunday/Holiday	
	\$126.74

Four 10-hour days allowed? - No

Make Up Day Allowed? - No

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Wayne

Classification Name	Category	Last Updated
Tile, Marble & Terrazzo Finisher-BAC2-Metro Detroit	Tile, Marble and Terrazzo	11/14/2024

Classification Description: Work: Assisting mechanics (e.g., tile, marble, terrazzo workers) with tasks necessary for completing installations.

Materials: Supporting materials used for tile, marble, or terrazzo work, such as cement and adhesives.

Wage Rates	Straight Time	Time and a Half	Double Time
Total Hourly Wage	\$54.19	\$68.23	\$82.26
Apprentice: TMT Finisher Apprentice Level 4	\$40.89	\$52.12	\$63.35
Apprentice: TMT Finisher Apprentice 1st Level	\$36.68	\$45.81	\$54.93
Apprentice: TMT Finisher Apprentice 2nd Level	\$38.08	\$47.91	\$57.73
Apprentice: TMT Finisher Apprentice 3rd Level	\$39.48	\$50.01	\$60.53
Apprentice: TMT Finisher Apprentice Level 5	\$42.29	\$54.22	\$66.15
Apprentice: TMT Finisher Apprentice Level 6	\$43.69	\$56.32	\$68.95
Apprentice: TMT Setter Apprentice 7thLevel	\$35.64	\$48.98	\$62.31

Overtime Provisions

Over 8-hour day/40-hour week	
9th hour	\$68.22
10th hour	\$68.22
Beyond 10 hours	\$68.22
Saturday	
First 8 hours	\$68.22
9th hour	\$68.22
10th hour	\$68.22
Beyond 10 hours	\$68.22
Sunday/Holiday	
	\$82.26

Four 10-hour days allowed? - Yes

Make Up Day Allowed? - No

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Wayne

Classification Name	Category	Last Updated
Tile, Marble & Terrazzo Mechanic - BAC 2 - Metro Detroit	Tile, Marble and Terrazzo	11/14/2024

Classification Description: Work: Installing and finishing mosaic and terrazzo materials, including precision tasks like grinding and polishing. Adding aggregate to the top of the finished base and troweled or rolled into the finish.
 Materials: Marble, mosaic, Venetian enamel, terrazzo, granules of marble, granite, bluestone, enamel, mother of pearl, quartz, ceramic-colored quartz, rubber, neoprene, vinyl, magnesium chloride, and resinous or chemical substances.

Wage Rates	Straight Time	Time and a Half	Double Time	Overtime Provisions
Total Hourly Wage	\$60.99	\$87.01	\$113.01	Over 8-hour day/40-hour week
Apprentice: TMT Setter Apprentice 1st Level	\$41.07	\$51.50	\$61.93	9th hour \$60.99
Apprentice: TMT Setter Apprentice 2nd Level	\$42.81	\$54.11	\$65.41	10th hour \$60.99
Apprentice: TMT Setter Apprentice 3rd Level	\$44.55	\$56.72	\$68.89	Beyond 10 hours \$60.99
Apprentice: TMT Setter Apprentice 4th Level	\$46.29	\$59.33	\$72.37	Saturday
Apprentice: TMT Setter Apprentice 5th Level	\$48.03	\$61.94	\$75.85	First 8 hours \$60.99
Apprentice: TMT Setter Apprentice 6th Level	\$49.76	\$64.55	\$79.33	9th hour \$60.99
Apprentice: TMT Setter Apprentice 7th Level	\$51.50	\$67.15	\$82.79	10th hour \$60.99
Apprentice: TMT Setter Apprentice 8th Level	\$53.24	\$69.76	\$86.27	Beyond 10 hours \$60.99
				Sunday/Holiday \$95.76

Four 10-hour days allowed? - Yes

Make Up Day Allowed? - No

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Wayne

Classification Name	Category	Last Updated
Tower Technician	Tower Technician	05/13/2024

Classification Description:

Wage Rates	Straight Time	Time and a Half	Double Time
Total Hourly Wage	\$67.89	\$98.24	\$128.58

Overtime Provisions

Over 8-hour day/40-hour week	
9th hour	\$98.24
10th hour	\$98.24
Beyond 10 hours	\$98.24
Saturday	
First 8 hours	\$98.24
9th hour	\$98.24
10th hour	\$98.24
Beyond 10 hours	\$98.24
Sunday/Holiday	
	\$128.58

Four 10-hour days allowed? - Yes

Make Up Day Allowed? - Yes

ONLY due to inclement weather or customer requirements may Friday be used as a make up day if the normal scheduled work week was interrupted and time lost of five (5) hours or more was incurred by workmen covered under the terms of the 6-17-C/6-876-T agreement.

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Wayne

Classification Name	Category	Last Updated
Truck Driver - RB1	Truck Driver	05/10/2024

Classification Description: on all trucks of 8 cubic yard capacity or less (except dump trucks of 8 cubic yard capacity or over, tandem axle trucks, transit mix and semis, euclid type equipment, double bottoms and low boys)

Wage Rates	Straight Time	Time and a Half	Double Time
Total Hourly Wage	\$53.95	\$70.30	\$86.64

Overtime Provisions

Over 8-hour day/40-hour week

9th hour	\$69.32
10th hour	\$69.32
Beyond 10 hours	\$69.32

Saturday

First 8 hours	\$69.32
9th hour	\$69.32
10th hour	\$69.32
Beyond 10 hours	\$69.32

Sunday/Holiday	\$84.69
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Four 10-hour days allowed? - Yes

Make Up Day Allowed? - No

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Wayne

Classification Name	Category	Last Updated
Truck Driver - RB1A	Truck Driver	05/10/2024

Classification Description: of all trucks of 8 cubic yard capacity or over semi, tractor trailer

Wage Rates	Straight Time	Time and a Half	Double Time
Total Hourly Wage	\$54.10	\$70.52	\$86.94

Overtime Provisions

Over 8-hour day/40-hour week

9th hour	\$69.55
10th hour	\$69.55
Beyond 10 hours	\$69.55

Saturday

First 8 hours	\$69.55
9th hour	\$69.55
10th hour	\$69.55
Beyond 10 hours	\$69.55

Sunday/Holiday	\$84.99
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Four 10-hour days allowed? - Yes

Make Up Day Allowed? - No

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Wayne

Classification Name	Category	Last Updated
Truck Driver - RB1B	Truck Driver	05/10/2024

Classification Description: on euclid type equipment, Pole drier, lowboy, doubles, fuel, bus, water

Wage Rates	Straight Time	Time and a Half	Double Time
Total Hourly Wage	\$54.20	\$69.70	\$85.19

Overtime Provisions

Over 8-hour day/40-hour week

9th hour	\$69.70
10th hour	\$69.70
Beyond 10 hours	\$69.70

Saturday

First 8 hours	\$69.70
9th hour	\$69.70
10th hour	\$69.70
Beyond 10 hours	\$69.70

Sunday/Holiday	\$85.19
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Four 10-hour days allowed? - Yes

Make Up Day Allowed? - Yes

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Wayne

Classification Name	Category	Last Updated
Truck Driver - RB2	Truck Driver	05/10/2024

Classification Description: of all trucks of 8 cubic yd capacity or over

Wage Rates	Straight Time	Time and a Half	Double Time
Total Hourly Wage	\$44.10	\$48.81	\$49.80

Overtime Provisions

Over 8-hour day/40-hour week

9th hour	\$56.55
10th hour	\$56.55
Beyond 10 hours	\$56.55

Saturday

First 8 hours	\$56.55
9th hour	\$56.55
10th hour	\$56.55
Beyond 10 hours	\$56.55

Sunday/Holiday

\$56.55

Four 10-hour days allowed? - Yes

Make Up Day Allowed? - No

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Wayne

Classification Name	Category	Last Updated
Truck Driver - RB2A	Truck Driver	05/10/2024

Classification Description: of all trucks of 8 cubic yard capacity or less (except dump trucks of 8 cubic yard capacity or over, tandem axle trucks, transit mix and semis, euclid type equipment, double bottoms and low boys)

Wage Rates	Straight Time	Time and a Half	Double Time
Total Hourly Wage	\$44.00	\$48.66	\$49.60

Overtime Provisions

Over 8-hour day/40-hour week

9th hour	\$56.40
10th hour	\$56.40
Beyond 10 hours	\$56.40

Saturday

First 8 hours	\$56.40
9th hour	\$56.40
10th hour	\$56.40
Beyond 10 hours	\$56.40

Sunday/Holiday

\$56.40

Four 10-hour days allowed? - Yes

Make Up Day Allowed? - No

Prevailing Wage Rates for State Funded Projects

Official Rate Schedule

Wayne

Classification Name	Category	Last Updated
Truck Driver - RB2B	Truck Driver	05/10/2024

Classification Description: on euclid type equipment

Wage Rates	Straight Time	Time and a Half	Double Time
Total Hourly Wage	\$44.25	\$49.04	\$0.00

Overtime Provisions

Over 8-hour day/40-hour week

9th hour	\$56.78
10th hour	\$56.78
Beyond 10 hours	\$56.78

Saturday

First 8 hours	\$56.78
9th hour	\$56.78
10th hour	\$56.78
Beyond 10 hours	\$56.78

Sunday/Holiday	\$56.78
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Four 10-hour days allowed? - Yes

Make Up Day Allowed? - No