CONSTRUCTION REQUEST FOR PROPOSAL

IFB # AAHC-25-4

GREEN BAXTER COURT
METER CONSOLIDATION

ANN ARBOR HOUSING COMMISSION

Issue Date: Friday, September 12, 2025
Due Date: Wednesday, October 29, 2025, by 2:00 p.m. (EST)

Issued By:

Ann Arbor Housing Commission
2000 S. Industrial Hwy
Ann Arbor, MI 48104
August 29, 2025

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SECTION I - GENERAL INFORMATION

A. OBJECTIVE

This IFB is being issued by the Ann Arbor Housing Commission (AAHC), a Michigan Public Body Corporate, with funding from the U.S. EPA's Environmental Justice Government to Government grant, entitled *A Model Regional Resilience Network and Resilience Infrastructure,* awarded to the City of Ann Arbor in Spring 2024. This IFB is issued by the Ann Arbor Housing Commission, and a contract will ultimately be signed with a wholly-owned subsidiary organization of the AAHC, called the Ann Arbor Housing Development Corporation (AAHDC). The purpose of this Invitation for Bid (IFB) is to select a firm to consolidate the electric metering to the building that contains the addresses 1737-1747 (odd only) Green Rd., Ann Arbor, MI 48105, for the purpose of the installation of a Photo Voltaic System.

B. QUESTIONS AND CLARIFICATIONS / DESIGNATED CONTACTS

All questions regarding this Invitation for Bid (IFB) shall be submitted via e-mail. Questions will be accepted and answered in accordance with the terms and conditions of this IFB.

All questions shall be submitted on or before October 21, 2025, at 2:00 p.m. (EST), and should be addressed as follows:

Scope of Work/Proposal Content questions shall be e-mailed to **Tom Pierce, Construction Project Manager, tpierce@a2gov.org**

Should any prospective bidder be in doubt as to the true meaning of any portion of this IFB, or should the prospective bidder find any ambiguity, inconsistency, or omission therein, the prospective bidder shall make a written request for an official interpretation or correction by the due date for questions above.

All interpretations, corrections, or additions to this IFB will be made only as an official addendum that will be posted to a2gov.org and it shall be the prospective bidder's responsibility to ensure they have received all addenda before submitting a proposal. Any addendum issued by the AAHC shall become part of the IFB and must be incorporated in the proposal where applicable.

C. PRE-PROPOSAL MEETING

A mandatory pre-proposal conference for this project will be held **at Green Baxter Court (meeting will begin at the Community Center, 1747 Green, Ann Arbor, MI 48105).** During the meeting prospective bidders will have the opportunity to walk the property and ask questions**.** Administrative and technical questions regarding this project will be answered at this time. The pre- proposal meeting is for information

only. Any answers furnished will not be official until verified in writing by the Ann Arbor Housing Commission. Answers that change or substantially clarify the proposal will be affirmed in an addendum.

Where: **Green Baxter Court**
Date: Wednesday, October 1, 2025
Time: 10:00 a.m.
Address: 1747 Green Rd.
Ann Arbor, MI 48105

D. PROPOSAL FORMAT

To be considered, each firm must submit a response to this IFB using the format provided in Section III. No other distribution of proposals is to be made by the prospective bidder. An official authorized to bind the bidder to its provisions must sign the proposal. Each proposal must remain valid for at least one hundred and twenty (120) days from the due date of this IFB.

Proposals should be prepared simply and economically providing a straightforward, concise description of the bidder's ability to meet the requirements of the IFB. Mistakes may be crossed out and corrected and must be initialed in ink by the person signing the proposal.

E. SELECTION CRITERIA

The contract will be awarded to the lowest responsive bidder. The AAHC reserves the right to contact the bidder to ask questions to clarify information in the bid.

F. SEALED PROPOSAL SUBMISSION

All proposals are due and must be delivered via email to Tom Pierce, Construction Project Manager, tpierce@a2gov.org on or before, October 29, 2025, at 2:00 p.m. (EST). Proposals submitted late or via facsimile will not be considered or accepted.

Each respondent must submit:

- **One (1) digital copy of the proposal as one file in PDF format**

Proposals submitted should be clearly marked: **"IFB No. AAHC 25-4 – Green Baxter Meter Consolidation"** and list the bidder's name and address.

All proposals received on or before the due date will be recorded on the due date. No

immediate decisions will be rendered.

Bidders are responsible for submission of their proposal. Additional time will not be granted to a single prospective bidder. However, additional time may be granted to all prospective bidders at the discretion of the Ann Arbor Housing Commission.

Each person signing the proposal certifies that they are a person in the bidder's firm/organization responsible for the decisions regarding the fees being offered in the Proposal and has not and will not participate in any action contrary to the terms of this provision.

G. DISCLOSURES

Under the Freedom of Information Act (Public Act 442), the AAHC is obligated to permit review of its files, if requested by others. All information in a proposal is subject to disclosure under this provision. This act also provides for a complete disclosure of contracts and attachments thereto.

H. TYPE OF CONTRACT

A sample of the Contract is included as Attachment B. Those who wish to submit a proposal to the Ann Arbor Housing Commission should review this sample agreement carefully. The Ann Arbor Housing Commission will not entertain changes to its Contract.

The Ann Arbor Housing Commission reserves the right to award the total proposal, to reject any or all proposals in whole or in part, and to waive any informality or technical defects if, in the Ann Arbor Housing Commission's sole judgment, the best interests of the Ann Arbor Housing Commission will be so served.

This IFB and the selected bidder's response thereto, shall constitute the basis of the scope of services in the contract by reference.

I. COST LIABILITY

The AAHC assumes no responsibility or liability for costs incurred by the bidder prior to the execution of an Agreement. The liability of the AAHC is limited to the terms and conditions outlined in the Agreement. By submitting a proposal, bidder agrees to bear all costs incurred or related to the preparation, submission, and selection process for the proposal.

J. DEBARMENT

Submission of a proposal in response to this IFB is certification that the Respondent is not currently debarred, suspended, proposed for debarment, and declared ineligible or voluntarily excluded from participation in this transaction by any State or Federal

departments or agency. Submission is also agreement that the AAHC will be notified of any changes in this status.

N. PROPOSAL PROTEST

All proposal protests must be in writing and filed with the AAHC Executive Director within five (5) business days of the award action (Jennifer Hall, jhall@a2gov.org). The bidder must clearly state the reasons for the protest.

Any inquiries or requests regarding this procurement should be only submitted in writing to the Designated Contacts provided herein. Attempts by the bidder to initiate contact with anyone other than the Designated Contact provided herein that the bidder believes can influence the procurement decision, e.g., Elected Officials, City Administrator, Selection Committee Members, Appointed Committee Members, etc., may lead to immediate elimination from further consideration.

O. SCHEDULE

The following is the schedule for this IFB process (subject to change).

Activity/Event	**Anticipated Date**
Pre-Proposal Meeting	October 1, 2025, at 10:00 AM (EST)
Written Question Deadline	October 21, 2025, at 2:00 PM (EST)
Addenda Published (if needed)	October 24, 2025
Proposal Due Date	October 29, 2025, at 2:00 PM (EST)
Selection	Week of November 3, 2025
Expected AAHC Authorizations	Week of November 17, 2025

The above schedule is for information purposes only and is subject to change at the AAHC's discretion.

P. IRS FORM W-9

The selected bidder will be required to provide the Ann Arbor Housing Commission with an IRS form W-9.

Q. RESERVATION OF RIGHTS

1. The Ann Arbor Housing Commission reserves the right in its sole and absolute discretion to accept or reject any or all proposals, or alternative proposals, in whole or in part, with or without cause.
2. The Ann Arbor Housing Commission reserves the right to waive, or not waive, informalities or irregularities in terms or conditions of any proposal if determined

by the Ann Arbor Housing Commission to be in its best interest.

3. The Ann Arbor Housing Commission reserves the right to request additional information from any or all bidders.
4. The Ann Arbor Housing Commission reserves the right to reject any proposal that it determines to be unresponsive and deficient in any of the information requested within the IFB.
5. The Ann Arbor Housing Commission reserves the right to determine whether the scope of the project will be entirely as described in the IFB, a portion of the scope, or a revised scope be implemented.
6. The Ann Arbor Housing Commission reserves the right to select one or more contractors or service providers to perform services.
7. The Ann Arbor Housing Commission reserves the right to retain all proposals submitted and to use any ideas in a proposal regardless of whether that proposal is selected. Submission of a proposal indicates acceptance by the firm of the conditions contained in this IFB, unless clearly and specifically noted in the proposal submitted.
8. The Ann Arbor Housing Commission reserves the right to disqualify proposals that fail to respond to any requirements outlined in the IFB, or failure to enclose copies of the required documents outlined within the IFB.

R. ENVIRONMENTAL COMMITMENT

The Ann Arbor Housing Commission recognizes its responsibility to minimize negative impacts on human health and the environment while supporting a vibrant community and economy. The Ann Arbor Housing Commission further recognizes that the products and services the Ann Arbor Housing Commission buys have inherent environmental and economic impacts and that the Ann Arbor Housing Commission should make procurement decisions that embody, promote, and encourage the City of Ann Arbor's commitment to the environment.

The Ann Arbor Housing Commission encourages potential vendors to bring forward emerging and progressive products and services that are best suited to the City of Ann Arbor's environmental principles.

S. MAJOR SUBCONTRACTORS

The Bidder shall identify each major subcontractor it expects to engage for this Contract if the work to be subcontracted is 15% or more of the bid sum or over $50,000, whichever is less. The Bidder shall not change or replace a major subcontractor without approval by the Ann Arbor Housing Commission.

SECTION II - SCOPE OF WORK

Project design specifications and drawings are attached as Exhibit A.

A. SCOPE OF WORK

The project involves the consolidation of the electrical meters on the Community Center Building at Green Baxter Court, hereafter known as "the Building".

1. Convert the Building from multi-metering to single-metering for solar conversion.

2. Scope of work is shown on the drawings by IMEG dated 4/18/2025 (Attachment K).

3. Install new Unistrut rack to mount new equipment. Unistrut rack will be installed adjacent to the Building at the service location.

4. Provide and install new CT can, CT meter and NEMA 3R exterior panel to rack.

5. Provide and install required conduit sleeves from CT can to DTE transformer. Wire from transformer to CT meter provided and installed by DTE.

6. Provide and install NEMA 3R wireway to splice building tenant feeder cables.

7. Provide and install conduits with wire from the new panel to the house panel.

8. Coordinate all work with DTE.

B. POST AWARD NEXT STEPS WITH SELECTED BIDDER

1. Visit the project site in December 2025 with AAHC staff and agree on a preliminary scope of construction.

2. Review any drawings, specifications, reports, etc. provided by AAHC staff on the proposed project.

3. Develop and agree on a final scope of construction together with the AAHC and the AAHC's engineer.

4. Apply for and obtain all necessary permits.

5. Perform all work necessary.

6. Ann Arbor Housing Commission staff will review all work prior to final approval of invoices. Contractor to address all identified deficiencies in the work.

7. Ann Arbor Housing Commission will not release any retainage held until the work is completed, inspections are completed, and permits are closed.

C. REQUIREMENTS

1. Ability to work effectively with the AAHC's staff with respect to any of the construction services required by the Ann Arbor Housing Commission.

2. Ability to work effectively with other City of Ann Arbor units and regulatory agencies.

3. The ability to function in a support role to the Ann Arbor Housing Commission.

4. Compliance with the Davis Bacon Act is necessary. All labor is required to be paid prevailing wage.

5. Performance Bond is required.

D. STANDARD SPECIFICATIONS

As of the date of this IFB, all work performed under this Contract shall be performed in accordance with all applicable codes. These are subject to change and the codes enforced at the time of construction by the City of Ann Arbor will govern.

SECTION III - MINIMUM INFORMATION REQUIRED

PROPOSAL FORMAT

The following describes the elements that should be included in each of the proposal sections that will be used for evaluation of the proposals.

Bidders should organize Proposals into the following Sections:

A. Bid Form (Attachment D)
B. Legal Status of Bidder (Attachment C)
C. Other Attachments (Any Additional Documents if Applicable)

A. Bid Form (Attachment C)

The proposal price shall include materials and equipment selected from the designated items and manufacturers listed in the bidding documents. This is done to establish uniformity in bidding and to establish standards of quality for the items named.

If the bidder wishes to quote alternate items for consideration by the Ann Arbor Affordable Housing Corporation, it may do so under this Section. A complete description of the item and the proposed price differential must be provided. Unless approved at the time of the award, substitutions where items are specifically named will be considered only as a negotiated change in the Contract Sum.

Consideration of any proposed alternative items or time may be negotiated at the discretion of the Ann Arbor Affordable Housing Corporation.

B. Attachments

Legal Status of Bidder and any additional attachments should be completed and included as attachments to the proposal submission.

ADDENDA

If it becomes necessary to revise any part of the IFB, notice of the addendum will be posted to the Ann Arbor Housing Commission's website for all parties to download.

Each bidder should acknowledge in its proposal all addenda it has received. The failure of a bidder to receive or acknowledge receipt of any addenda shall not relieve the bidder of the responsibility for complying with the terms thereof. The Ann Arbor Housing Commission will not be bound by oral responses to inquiries or written responses other than official written addenda.

PROPOSAL EVALUATION

1. The Ann Arbor Housing Commission reserves the right to reject any proposal that it determines to be unresponsive and deficient in any of the information requested for evaluation.

2. The responsible bidder whose bid, conforming with all the material terms and conditions of the IFB, and has the lowest price, will be considered the successful offeror. Should there be a tie in price, each responsive bidder shall be given one week in which to resubmit their best and final offer as a sealed bid. Should a tie occur again, the process will repeat.

3. The Ann Arbor Housing Commission will not award any contract until the prospective contractor has been determined to be responsible. This determination shall be based on the following criteria:
    - Having adequate financial resources to fulfil the contract, or the ability to obtain them.
    - Being able to comply with the proposed performance schedule considering the bidder's current commitments.
    - Having a satisfactory performance record.
    - Having a satisfactory record of integrity and business ethics.
    - Having the necessary organization, experience, accounting and operational controls, and technical skills, or the ability to obtain them.
    - Having the necessary production, construction, and technical equipment and facilities, or the ability to obtain them.
    - Being otherwise qualified and eligible to receive an award under applicable laws and regulations, including not being suspended, debarred or under a HUD-imposed Limited Denial of Participation.

4. If a bidder has not executed and satisfactorily completed a contract with the Ann Arbor Housing Commission or any of its affiliates in the last 5 years, then the Responsible Bidder Questionnaire, Attachment L, must be completed and submitted with the bidder's proposal. If deemed necessary, the committee will schedule an interview with the successful offeror for the purpose of determining if the successful offeror is responsible as described in paragraph 3 of this section.

5. The interview should include project team members expected to work on the project, but no more than six members total. The interview may consist of a presentation of up to thirty minutes (or the length provided by the committee) by the bidder, including the person who will be the project manager on this contract, followed by questions and answers. The committee may record the oral interviews.

6. If a prospective contractor is found to be non-responsible, a written determination of non-responsibility shall be prepared and included in the official contract file, and the

prospective contractor shall be advised of the reasons for the determination.

7. Upon being determined responsible and upon the approval of the AAHC Board, the successful offeror will be awarded a fixed-rate lump sum contract. The successful bidder will be required to provide all insurance listed in the contract as well as a Performance Bond.

SECTION IV - ATTACHMENTS

Attachment A – Technical Specifications

Attachment B – Sample Standard Contract

Attachment C – Legal Status of Bidder

Attachment D – Bid Form

Attachment E – City of Ann Arbor Non-Discrimination Ordinance Poster

Attachment F – Non-Discrimination Ordinance Compliance Form

Attachment G – Living Wage Poster

Attachment H – Living Wage Declaration of Compliance Form

Attachment I – Vendor Conflict of Interest Disclosure Form

Attachment J − Responsible Bidder Questionnaire

Attachment K – IMEG Drawings

Attachment A

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DIVISION 26 - ELECTRICAL

SECTION 260500 - BASIC ELECTRICAL REQUIREMENTS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Requirements applicable to all Division 26 Sections. Also refer to Division 1 - General Requirements. This section is also applicable to Interior Communications Pathways Section 270528. This section is also applicable to Fire Alarm and Detection Systems Section 283100.

B. All materials and installation methods shall conform to the applicable standards, guidelines and codes referenced herein and within each specification section.

1.2 REFERENCES

A. NFPA 70 - National Electrical Code (NEC)

1.3 SCOPE OF WORK

A. This Specification and the associated drawings govern furnishing, installing, testing and placing into satisfactory operation the Electrical Systems.

B. The Contractor shall furnish and install all new materials as indicated on the drawings, and/or in these specifications, and all items required to make the portion of the Electrical Work a finished and working system.

C. All work will be awarded under a single General Contract. The division of work listed below is for the Contractor's convenience and lists normal breakdown of the work. D. Description of Systems shall be as follows:

1. Electrical power system to and including equipment, motors, devices, etc.
2. Electrical power service system from the Utility Company to and including service entrance equipment, distribution and metering.
3. Grounding system.
4. Lightning protection system.
5. Wiring of equipment furnished by others.
6. Removal work and/or relocation and reuse of existing systems and equipment.
7. Furnish and install firestopping systems for penetrations of fire-rated construction associated with this Contractor's work.

1.4 WORK SEQUENCE

A. All work that will produce excessive noise or interference with normal building operations, as determined by the Owner, shall be scheduled with the Owner. It may be necessary to schedule such work during unoccupied hours. The Owner reserves the right to determine when restricted construction hours are required.

B. Itemize all work and list associated hours and pay scale for each item.

1.5 COORDINATION DRAWINGS

A. Definitions:

1. Coordination Drawings: A compilation of the pertinent layout and system drawings that show the sizes and locations, including elevations, of system components and required access areas to ensure that no two objects will occupy the same space.

    a. Electrical trades shall include, but are not limited to, electrical equipment, conduit 1.5" and larger, conduit racks, cable trays, pull boxes, transformers, raceway, busway, lighting, ceiling-mounted devices, and any item that may impact coordination with other disciplines.
    b. Maintenance clearances and code-required dedicated space shall be included.
    c. The coordination drawings shall include all underground, underfloor, in-floor, in chase, and vertical trade items.

2. The contractors shall use the coordination process to identify the proper sequence of installation of all utilities above ceilings and in other congested areas, to ensure an orderly and coordinated end result, and to provide adequate access for service and maintenance. B. Participation:

1. The contractors and subcontractors responsible for work defined above shall participate in the coordination drawing process.
2. Electronic CAD drawings shall be submitted to the Coordinating Contractor for addition of work by other trades. IMEG will provide electronic file copies of ventilation drawings for contractor's use if the contractor signs and returns an "Electronic File Transfer" waiver provided by IMEG. IMEG will not consider blatant reproductions of original file copies an acceptable alternative for coordination drawings. C. Drawing Requirements:

    1. The file format and file naming convention shall be coordinated with and agreed to by all contractors participating in the coordination process and the Owner.

        a. Scale of drawings:

            1) General plans: 1/4 Inch = 1 '-0" (minimum).
            2) Mechanical, electrical, communication rooms, and including the surrounding areas within 10 feet: 1/2 Inch = 1'-0" (minimum).
            3) Shafts and risers: 1/2 Inch = 1'-0" (minimum).
            4) Sections of shafts and mechanical and electrical equipment rooms: 1/4 Inch = 1 '-0" (minimum).
            5) Sections of congested areas: 1/2 Inch = 1'-0" (minimum).

    2. The minimum quantity of drawings will be established at the first coordination meeting and sent to the Engineer for review. Additional drawings may be required if other areas of congestion are discovered during the coordination process.

D. General:

1. A plotted set of coordination drawings shall be available at the project site.
2. Coordination drawings are not shop drawings and shall not be submitted as such.
3. The contract drawings are schematic in nature and do not show every fitting and appurtenance for each utility. Each contractor is expected to have included in the bid sufficient fittings, material, and labor to allow for adjustments in routing of utilities made necessary by the coordination process and to provide a complete and functional system.
4. The contractors will not be allowed additional costs or time extensions due to participation in the coordination process.
5. The contractors will not be allowed additional costs or time extensions for additional fittings, reroutings or changes of duct size, that are essentially equivalent sizes to those shown on the drawings and determined necessary through the coordination process.
6. The Engineer reserves the right to determine space priority of equipment in the event of spatial conflicts or interference between equipment, piping, conduit, ducts, and equipment provided by the trades.
7. Changes to the contract documents that are necessary for systems installation and coordination shall be brought to the attention of the Engineer.
8. Access panels shall preferably occur only in gypsum board walls or plaster ceilings where indicated on the drawings.

    a. Potential layout changes shall be made to avoid additional access panels.
    b. Additional access panels shall not be allowed without written approval from the Architect/Engineer at the coordination drawing stage.
    c. Providing additional access panels shall be considered after other alternatives are reviewed and discarded by the Architect/Engineer and the Owner's Representative.
    d. When additional access panels are required, they shall be provided without additional cost to the Owner.

9. Complete the coordination drawing process and obtain sign-off of the drawings by all contractors prior to installing any of the components.
10. Conflicts that result after the coordination drawings are signed off shall be the responsibility of the contractor or subcontractor who did not properly identify their work requirements, or installed their work without proper coordination.
11. Updated coordination drawings that reflect as-built conditions may be used as record documents.

1.6 QUALITY ASSURANCE

A. Contractor's Responsibility Prior to Submitting Pricing/Bid Data:

1. The Contractor is responsible for constructing complete and operating systems. The Contractor acknowledges and understands that the Contract Documents are a twodimensional representation of a three-dimensional object, subject to human interpretation. This representation may include imperfect data, interpreted codes, utility guides, threedimensional conflicts, and required field coordination items. Such deficiencies can be corrected when identified prior to ordering material and starting installation. The Contractor agrees to carefully study and compare the individual Contract Documents and report at once in writing to the Engineer any deficiencies the Contractor may discover. The Contractor further agrees to require each subcontractor to likewise study the documents and report at once any deficiencies discovered.

2. The Contractor shall resolve all reported deficiencies with the Engineer prior to awarding any subcontracts, ordering material, or starting any work with the Contractor's own employees. Any work performed prior to receipt of instructions from the Architect/Engineer will be done at the Contractor's risk. B. Qualifications:

1. Only products of reputable manufacturers as determined by the Engineer are acceptable.
2. All Contractors and subcontractors shall employ only workmen who are skilled in their trades. At all times, the number of apprentices at the job site shall be less than or equal to the number of journeymen at the job site. C. Compliance with Codes, Laws, Ordinances:

    1. Conform to all requirements of the State of Michigan Codes, Laws, Ordinances and other regulations having jurisdiction.
    2. If there is a discrepancy between the codes and regulations and these specifications, the Engineer shall determine the method or equipment used.
    3. If the Contractor notes, at the time of bidding, that any parts of the drawings or specifications do not comply with the codes or regulations, Contractor shall inform the Engineer in writing, requesting a clarification. If there is insufficient time for this procedure, Contractor shall submit with the proposal a separate price to make the system comply with the codes and regulations.
    4. All changes to the system made after the letting of the contract to comply with codes or the requirements of the Inspector, shall be made by the Contractor without cost to the Owner.
    5. If there is a discrepancy between manufacturer's recommendations and these specifications, the manufacturer's recommendations shall govern.
    6. If there are no local codes having jurisdiction, the current issue of the National Electrical Code shall be followed.

D. Permits, Fees, Taxes, Inspections:

    1. Procure all applicable permits and licenses.
    2. Abide by all laws, regulations, ordinances, and other rules of the State or Political Subdivision where the work is done, or as required by any duly constituted public authority.
    3. Pay all charges for permits or licenses.
    4. Pay all fees and taxes imposed by State, Municipal, and other regulatory bodies.
    5. Pay all charges arising out of required inspections by an authorized body.
    6. Pay all charges arising out of required contract document reviews associated with the project and as initiated by the Owner or authorized agency/consultant.
    7. Where applicable, all fixtures, equipment and materials shall be listed by Underwriter's Laboratories, Inc. or a nationally recognized testing organization.
    8. Pay all telephone company charges related to the service or change in service. E. Utility Company Requirements:

    1. Secure from the private or public utility company all applicable requirements.
    2. Comply with all utility company requirements.
    3. The Owner shall make application for and pay for new electrical service equipment and installation. The Contractor shall coordinate schedule and requirements with the Owner and Utility Company.
    4. The contractor is responsible for completing utility requested forms and sharing utility requested load data from the construction documents.

5. Furnish the meter socket metering. Verify approved manufacturers and equipment with the Utility Company.
6. The Owner shall apply and pay for any changes for removal of existing electrical service by the utility company. The Contractor shall verify approved manufacturers and equipment with the Utility Company.

F. Examination of Drawings:

1. The drawings for the electrical work are completely diagrammatic, intended to convey the scope of the work and to indicate the general arrangements and locations of equipment, outlets, etc., and the approximate sizes of equipment.
2. Contractor shall determine the exact locations of equipment and rough-ins, and the exact routing of raceways to best fit the layout of the job. Conduit entry points for electrical equipment including, but not limited to, panelboards, switchboards, switchgear and unit substations, shall be determined by the Contractor unless noted in the contract documents.
3. Scaling of the drawings will not be sufficient or accurate for determining these locations.
4. Where job conditions require reasonable changes in arrangements and locations, such changes shall be made by the Contractor at no additional cost to the Owner.
5. Because of the scale of the drawings, certain basic items, such as junction boxes, pull boxes, conduit fittings, etc., may not be shown, but where required by other sections of the specifications or required for proper installation of the work, such items shall be furnished and installed.
6. If an item is either shown on the drawings or called for in the specifications, it shall be included in this contract.
7. The Contractor shall determine quantities and quality of material and equipment required from the documents. Where discrepancies arise between drawings, schedules and/or specifications, the greater and better-quality number shall govern.
8. Where used in electrical documents the word "furnish" shall mean supply for use, the word "install" shall mean connect up complete and ready for operation, and the word "provide" shall mean to supply for use and connect up complete and ready for operation.
9. Any item listed as furnished shall also be installed unless otherwise noted.
10. Any item listed as installed shall also be furnished unless otherwise noted.

G. Electronic Media/Files:

1. Construction drawings for this project have been prepared utilizing Revit.
2. Contractors and Subcontractors may request electronic media files of the contract drawings and/or copies of the specifications. Specifications will be provided in PDF format.
3. Upon request for electronic media, the Contractor shall complete and return a signed "Electronic File Transmittal" form provided by IMEG.
4. If the information requested includes floor plans prepared by others, the Contractor will be responsible for obtaining approval from the appropriate Design Professional for use of that part of the document.
5. The electronic contract documents can be used for preparation of shop drawings and asbuilt drawings only. The information may not be used in whole or in part for any other project.
6. The drawings prepared by IMEG for bidding purposes may not be used directly for ductwork layout drawings or coordination drawings.
7. The use of these CAD documents by the Contractor does not relieve them from their responsibility for coordination of work with other trades and verification of space available for the installation.
8. The information is provided to expedite the project and assist the Contractor with no guarantee by IMEG as to the accuracy or correctness of the information provided. IMEG accepts no responsibility or liability for the Contractor's use of these documents. H. Field Measurements:

1. Verify all pertinent dimensions at the job site before ordering any conduit, conductors, wireways, bus duct, fittings, etc.

1.7 WEB-BASED PROJECT SOFTWARE

A. The General Contractor shall provide a web-based project software site for the purpose of hosting and managing project communication and documentation until completion of the warranty phase.

B. The web-based project software shall include, at a minimum, the following features:
construction schedule, submittals, RFIs, ASIs, construction change directives, change orders, drawing management, specification management, payment applications, contract modifications, meeting minutes, construction progress photos.

C. Provide web-based project software user licenses for use by the Architect/Engineer. Access will be provided from the start of the project through the completion of the warranty phase.

D. At project completion, provide digital archive of entire project in format that is readable by common desktop software applications in format acceptable to Architect/Engineer. Provide data in locked format to prevent further changes.

1.8 SUBMITTALS

A. Submittals shall be required for the following items, and for additional items where required elsewhere in the specifications or on the drawings.

1. Submittals list:

Referenced Specification Section	Submittal Item	Coordination Drawing
26 05 13	Wire and Cable	
26 05 23	Manufactured Wiring Assemblies	
26 05 26	Grounding and Bonding	
26 05 33	Conduit and Boxes	+> 1.5"
26 05 35	Surface Raceways	
26 05 36	Cable Trays	Yes
26 05 53	Electrical Identification	
26 05 73	Power System Study	
26 09 13	Energy Metering and Management System	
26 24 16	Panelboards	Yes
26 25 00 and Layout Plan	Busway	Yes
26 25 05	Cable Bus	
26 26 00	Power Distribution Unit	
26 27 16	Cabinets and Enclosures	Yes
26 27 26	Wiring Devices	Ceiling mount

B. General Submittal Procedures: In addition to the provisions of Division 1, the following are required:

1. Transmittal: Each transmittal shall include the following:

    a. Date
    b. Project title and number
    c. Contractor's name and address
    d. Division of work (e.g., electrical, plumbing, heating, ventilating, etc.)
    e. Description of items submitted and relevant specification number
    f. Notations of deviations from the contract documents
    g. Other pertinent data

2. Submittal Cover Sheet: Each submittal shall include a cover sheet containing:

    a. Date
    b. Project title and number
    c. Engineer
    d. Contractor and subcontractors' names and addresses
    e. Supplier and manufacturer's names and addresses
    f. Division of work (e.g., electrical, plumbing, heating, ventilating, etc.)
    g. Description of item submitted (using project nomenclature) and relevant specification number
    h. Notations of deviations from the contract documents
    i. Other pertinent data
    j. Provide space for Contractor's review stamps

3. Composition:

    a. Submittals shall be submitted using specification sections and the project nomenclature for each item.
    b. Individual submittal packages shall be prepared for items in each specification section. All items within a single specification section shall be packaged together where possible. An individual submittal may contain items from multiple specifications sections if the items are intimately linked (e.g., pumps and motors).
    c. All sets shall contain an index of the items enclosed with a general topic description on the cover.

4. Content: Submittals shall include all fabrication, erection, layout, and setting drawings; manufacturers' standard drawings; schedules; descriptive literature, catalogs and brochures; performance and test data; wiring and control diagrams; dimensions; shipping and operating weights; shipping splits; service clearances; and all other drawings and descriptive data of materials of construction as may be required to show that the materials, equipment or systems and the location thereof conform to the requirements of the contract documents.
5. Contractor's Approval Stamp:

    a. The Contractor shall thoroughly review and approve all shop drawings before submitting them to the Architect/Engineer. The Contractor shall stamp, date and sign each submittal certifying it has been reviewed.
    b. Unstamped submittals will be rejected.
    c. The Contractor's review shall include, but not be limited to, verification of the following:

1) Only approved manufacturers are used.
2) Addenda items have been incorporated.
3) Catalog numbers and options match those specified.
4) Performance data matches that specified.
5) Electrical characteristics and loads match those specified.
6) Equipment connection locations, sizes, capacities, etc. have been coordinated with other affected trades.
7) Dimensions and service clearances are suitable for the intended location.
8) Equipment dimensions are coordinated with support steel, housekeeping pads, openings, etc.
9) Constructability issues are resolved (e.g., weights and dimensions are suitable for getting the item into the building and into place, sinks fit into countertops, etc.).

d. The Contractor shall review, stamp and approve all subcontractors' submittals as described above.
e. The Contractor's approval stamp is required on all submittals. Approval will indicate the Contractor's review of all material and a complete understanding of exactly what is to be furnished. Contractor shall clearly mark all deviations from the contract documents on all submittals. If deviations are not marked by the Contractor, then the item shall be required to meet all drawing and specification requirements.

6. Submittal Identification and Markings:

a. The Contractor shall clearly mark each item with the same nomenclature applied on the drawings or in the specifications.
b. The Contractor shall clearly indicate the size, finish, material, etc.
c. Where more than one model is shown on a manufacturer's sheet, the Contractor shall clearly indicate exactly which item and which data is intended.
d. All marks and identifications on the submittals shall be unambiguous.

7. Schedule submittals to expedite the project. Coordinate submission of related items.
8. Identify variations from the contract documents and product or system limitations that may be detrimental to the successful performance of the completed work.
9. Reproduction of contract documents alone is not acceptable for submittals.
10. Incomplete submittals will be rejected without review. Partial submittals will only be reviewed with prior approval from the Architect/Engineer.
11. Submittals not required by the contract documents may be returned without review.
12. The Architect/Engineer's responsibility shall be to review one set of shop drawing submittals for each product. If the first submittal is incomplete or does not comply with the drawings and/or specifications, the Contractor shall be responsible to bear the cost for the Architect/Engineer to recheck and handle the additional shop drawing submittals.
13. Submittals shall be reviewed and approved by the Architect/Engineer before releasing any equipment for manufacture or shipment.
14. Contractor's responsibility for errors, omissions or deviation from the contract documents in submittals is not relieved by the Architect/Engineer's approval.
15. Schedule shall allow for adequate time to perform orderly and proper review of submittals, including time for consultants and Owner if required, and resubmittals by Contractor if necessary, and to cause no delay in Work or in activities of Owner or other contractors.

a. Allow at least two weeks for Architect™™s/Engineer's review and processing of each submittal, excluding mailing.

16. Architect/Engineer reserves the right to withhold action on a submittal which, in the Architect/Engineer™™s opinion, requires coordination with other submittals until related submittals are received. The Architect/Engineer will notify the Contractor, in writing, when they exercise this right. C. Electronic Submittal Procedures:

1. Distribution: Email submittals as attachments to all parties designated by the Architect/Engineer, unless a web-based submittal program is used.
2. Transmittals: Each submittal shall include an individual electronic letter of transmittal.
3. Format: Electronic submittals shall be in PDF format only. Scanned copies, in PDF format, of paper originals are acceptable. Submittals that are not legible will be rejected. Do not set any permission restrictions on files; protected, locked, or secured documents will be rejected.
4. File Names: Electronic submittal file names shall include the relevant specification section number followed by a description of the item submitted, as follows. Where possible, include the transmittal as the first page of the PDF instead of using multiple electronic files.

    a. Submittal file name: 26 XX XX.description.YYYYMMDD
    b. Transmittal file name: 26 XX XX.description.YYYYMMDD

5. File Size: Files shall be transmitted via a pre-approved method. Larger files may require an alternative transfer method, which shall also be pre-approved.

1.9 CHANGE ORDERS

A. A detailed material and labor takeoff shall be prepared for each change order, along with labor rates and markup percentages. Change orders shall be broken down by sheet or associated individual line item indicated in the change associated narrative, whichever provides the most detailed breakdown. Change orders with inadequate breakdown will be rejected.

B. Itemized pricing with unit cost shall be provided from all distributors and associated subcontractors.

C. Change order work shall not proceed until authorized.

1.10 PRODUCT DELIVERY, STORAGE, HANDLING and MAINTENANCE

A. Exercise care in transporting and handling to avoid damage to materials. Store materials on the site to prevent damage.

B. Protect equipment, components, and openings with airtight covers and exercise care at every stage of storage, handling, and installation of equipment to prevent airborne dust and dirt from entering or fouling equipment to include, but not limited to:

1. Distribution equipment - branch panels, distribution panels, switchboards, motor control centers, etc.

C. Equipment and components that are visibly damaged or have been subject to environmental conditions prior to building turnover to Owner that could shorten the life of the component (for example, water damage,

humidity, dust and debris, excessive hot or cold storage location, etc.) shall be repaired or replaced with new equipment or components without additional cost to the building owner.

D. Keep all materials clean, dry and free from damaging environments.

E. Coordinate the installation of heavy and large equipment with the General Contractor and/or Owner. If the Electrical Contractor does not have prior documented experience in rigging and lifting similar equipment, they shall contract with a qualified lifting and rigging service that has similar documented experience. Follow all equipment lifting and support guidelines for handling and moving.

F. Contractor is responsible for moving equipment into the building and/or site. Contractor shall review site prior to bid for path locations and any required building modifications to allow movement of equipment. Contractor shall coordinate the work with other trades.

1.11 WARRANTY

A. Provide one-year warranty for all fixtures, equipment, materials, and workmanship.

B. The warranty period for all work in this specification Division shall commence on the date of Substantial Completion or successful system performance whichever occurs later. The warranty may also commence if a whole or partial system or any separate piece of equipment or component is put into use for the benefit of any party other than the installing contractor with prior written authorization of the Owner. In this instance, the warranty period shall commence on the date when such whole system, partial system or separate piece of equipment or component is placed in operation and accepted in writing by the Owner.

C. Warranty requirements extend to correction, without cost to the Owner, of all work found to be defective or nonconforming to the contract documents. The Contractor shall bear the cost of correcting all damage due to defects or nonconformance with contract documents excluding repairs required as a result of improper maintenance or operation, or of normal wear as determined by the Architect/Engineer.

1.12 INSURANCE

A. This Contractor shall maintain insurance coverage as set forth in Division 1 of these specifications.

1.13 MATERIAL SUBSTITUTION

A. Where several manufacturers' names are given, the manufacturer for which a catalog number is given is the basis for job design and establishes the quality.

B. Equivalent equipment manufactured by the other listed manufacturers may be used. Contractor shall ensure that all items submitted by these other manufacturers meet all requirements of the drawings and specifications and fits in the allocated space. When using other listed manufacturers, the Contractor shall assume responsibility for any and all modifications necessary (including, but not limited to structural supports, electrical connections and rough-in, and regulatory agency approval, etc.) and coordinate such with other contractors. The Architect/Engineer shall make the final determination of whether a product is equivalent.

C. Any material, article or equipment of other unnamed manufacturers which will adequately perform the services and duties imposed by the design and is of a quality equal to or better than the material, article or equipment identified by the drawings and specifications may be used if approval is secured in writing from the

Architect/Engineer via addendum. The Contractor assumes all costs incurred as a result of using the offered material, article or equipment, on the Contractors part or on the part of other Contractors whose work is affected.

D. Voluntary add or deduct prices for alternate materials may be listed on the bid form. These items will not be used in determining the low bidder. This Contractor assumes all costs incurred as a result of using the offered material or equipment on the Contractors part or on the part of other Contractors whose work is affected.

E. All material substitutions requested after the final addendum must be listed as voluntary changes on the bid form.

PART 2 - PRODUCTS

2.1 GENERAL

A. All items of material having a similar function (e.g., panelboards) shall be of the same manufacturer unless specifically stated otherwise on drawings or elsewhere in specifications.

PART 3 - EXECUTION

3.1 JOBSITE SAFETY

A. Neither the professional activities of the Architect/Engineer, nor the presence of the Architect/Engineer or the employees and subconsultants at a construction site, shall relieve the Contractor and any other entity of their obligations, duties and responsibilities including, but not limited to, construction means, methods, sequence, techniques or procedures necessary for performing, superintending or coordinating all portions of the work of construction in accordance with the contract documents and any health or safety precautions required by any regulatory agencies. The Architect/Engineer and personnel have no authority to exercise any control over any construction contractor or other entity or their employees in connection with their work or any health or safety precautions. The Contractor is solely responsible for jobsite safety. The Architect/Engineer and the Architect/Engineer's consultants shall be indemnified and shall be made additional insureds under the Contractor's general liability insurance policy.

3.2 EXCAVATION, FILL, BACKFILL, COMPACTION A. General:

1. Prior to the commencement of any excavation or digging, the Contractor shall verify all underground utilities with the regional utility locator. Provide prior notice to the locator before excavations. Contact information for most regional utility locaters can be found by calling 811.
2. The Contractor shall do all excavating, filling, backfilling, compacting, and restoration in connection with the work. B. Excavation:

1. Make all excavations to accurate, solid, undisturbed earth, and to proper dimensions.
2. If excavations are carried in error below indicated levels, concrete of same strength as specified for the foundations or thoroughly compacted sand-gravel fill, as determined by the Architect/Engineer shall be placed in such excess excavations under the foundation. Place thoroughly compacted, clean, stable fill in excess excavations under slabs on grade, at the Contractor's expense.
3. Trim bottom and sides of excavations to grades required for foundations.
4. Protect excavations against frost and freezing.

5. Take care in excavating not to damage surrounding structures, equipment or buried pipe. Do not undermine footing or foundation.
6. Perform all trenching in a manner to prevent cave-ins and risk to workmen.
7. Where original surface is pavement or concrete, the surface shall be saw cut to provide clean edges and assist in the surface restoration.

8. If satisfactory bearing soil is not found at the indicated levels, immediately notify the Architect/Engineer or their representative, and do no further work until the Architect/Engineer or their representative gives further instructions.
9. Excavation shall be performed in all ground conditions, including rock, if encountered. Bidders shall visit the premises and determine the soil conditions by actual observations, borings, or other means. The cost of all such inspections, borings, etc., shall be borne by the bidder.
10. If a trench is excavated in rock, a compacted bed with a depth of 3" (minimum) of sand and gravel shall be used to support the conduit unless masonry cradles or encasements are used.
11. Mechanical excavation of the trench to line and grade of the conduit or to the bottom level of masonry cradles or encasements is permitted, unless otherwise indicated on the electrical drawings.
12. Mechanical excavation of the trench to line and grade where direct burial cables are to be installed is permitted provided the excavation is made to a depth to permit installation of the cable on a fine sand bed at least 3 inches deep.

C. Dewatering:

1. Furnish, install, operate and remove all dewatering pumps and pipes needed to keep trenches and pits free of water. D. Underground Obstructions:

1. Known underground piping, conduit, feeders, foundations, and other obstructions in the vicinity of construction are shown on the drawings. Review all Bid Documents for all trades on the project to determine obstructions indicated. Take great care in making installations near underground obstructions.
2. If objects not shown on the drawings are encountered, remove, relocate, or perform extra work as directed by the Architect/Engineer. E. Fill and Backfilling:

1. No rubbish or waste material is permitted for fill or backfill.
2. Provide all necessary sand and/or CA6 for backfilling.
3. Native soil materials may be used as backfill if approved by the Geotechnical Engineer.
4. Dispose of the excess excavated earth as directed.
5. Backfill materials (native soil material, sand, and/or CA6) shall be suitable for required compaction, clean and free of perishable materials, frozen earth, debris, earth with a high void content, and stones greater than 4 inches in diameter. Water is not permitted to rise in unbackfilled trenches.
6. Backfill all trenches and excavations immediately after installing of conduit, or removing forms, unless other protection is directed.
7. Around piers and isolated foundations and structures, backfill and fill shall be placed and consolidated simultaneously on all sides to prevent wedge action and displacement. Spread fill and backfill materials in 6" uniform horizontal layers with each layer compacted separately to required density.
8. For conduits that are not concrete encased, lay all conduits on a compacted bed of sand at least 3" deep. Backfill around conduits with sand, in 6" layers and compact each layer.

9. Backfill with native soil material (if approved) or sand up to grade for all conduits under slabs or paved areas. All other conduits shall have sand backfill to 6" above the top of the conduit.

10. Place all backfill above the sand in uniform layers not exceeding 6" deep. Place then carefully and uniformly tamp each layer to eliminate lateral or vertical displacement.
11. Where the fill and backfill will ultimately be under a building, floor or paving, each layer of fill shall be compacted to 95% of the maximum density as determined by AASHTO Designation T-99 or ASTM Designation D-698. Moisture content of soil at time of compaction shall not exceed plus or minus 2% of optimum moisture content as determined by AASHTO T-99 or ASTM D-698 test.
12. After backfilling of trenches, no superficial loads shall be placed on the exposed surface of the backfill until a period of 48 hours has elapsed. F. Surface Restoration:

1. Where trenches are cut through graded, planted or landscaped areas, the areas shall be restored to the original condition. Replace all planting and landscaping features removed or damaged to its original condition. At least 6" of topsoil shall be applied where disturbed areas are to be seeded or sodded. All lawn areas shall be sodded unless seeding is called out in the drawings or specifications.
2. Concrete or asphalt type pavement, seal coat, rock, gravel or earth surfaces removed or damaged shall be replaced with comparable materials and restored to original condition. Broken edges shall be saw cut and repaired as directed by Architect/Engineer.

3.3 ENGINEER OBSERVATION OF WORK

A. The contractor shall provide seven (7) calendar days' notice to the Engineer prior to:

1. Placing fill over underground and underslab utilities.
2. Covering exterior walls, interior partitions and chases.

B. The Engineer will review the installation and provide a written report noting deficiencies requiring correction. The contractor's schedule shall account for these reviews and show them as line items in the approved schedule.

3.4 PROJECT CLOSEOUT

A. The following paragraphs supplement the requirements of Division 1.

B. IDPH Pre-Occupancy Requirements:

1. Each Contractor must submit all forms and certifications required by IDPH relating to their work at 85% completion of the project or when directed by the Owner/Engineer. C. Final Jobsite Observation:

1. To prevent the Final Jobsite Observation from occurring too early, the Contractor shall review the completion status of the project and certify that the job is ready for the final jobsite observation.

2. Attached to the end of this section is a typical list of items that represent the degree of job completeness expected prior to requesting a review. The Contractor shall sign the attached certification and return it to the Architect/Engineer so that the final observation can be scheduled.
3. It is understood that if the Architect/Engineer finds the job not ready for the final observation and additional trips and observations are required to bring the project to completion, the cost of the additional time and expenses incurred by the Architect/Engineer will be deducted from the Contractor's final payment. D. The

following must be submitted before Engineer recommends final payment:

1. Operation and maintenance manuals with copies of approved shop drawings.
2. Record documents including marked-up drawings and specifications.
3. A report documenting the instructions given to the Owner's representatives complete with the number of hours spent in the instruction. The report shall bear the signature of an authorized agent of this Contractor and shall be signed by the Owner's representatives. E. Circuit Directories:

1. Provide custom typed circuit directory for each branch circuit panelboard. Provide updated custom typed circuit directory for each existing branch circuit panelboard with new or revised circuits per the scope of work. Label shall include equipment name or final approved room name, room number, and load type for each circuit (examples: SUMP SP-1 or ROOM 101 RECEPT). Revise directory to reflect circuit changes required to balance phase loads. Printed copies of the bid document panel schedules are not acceptable as circuit directories.

3.5 RECORD DOCUMENTS

A. The following paragraphs supplement Division 1 requirements.

B. Maintain at the job site a separate and complete set of electrical drawings and specifications with all changes made to the systems clearly and permanently marked in complete detail.

C. Mark drawings and specifications to indicate approved substitutions; Change Orders, and actual equipment and materials used. All Change Orders, RFI responses, Clarifications and other supplemental instructions shall be marked on the documents. Record documents that merely reference the existence of the above items are not acceptable. Should this Contractor fail to complete Record Documents as required by this contract, this Contractor shall reimburse Architect/Engineer for all costs to develop record documents that comply with this requirement. Reimbursement shall be made at the Architect/Engineer's hourly rates in effect at the time of work.

D. Record changes daily and keep the marked drawings available for the Architect/Engineer's examination at any normal work time.

E. Upon completing the job, and before final payment is made, give the marked-up drawings to the Architect/Engineer.

F. Record actual routing of conduits exceeding 2 inches.

3.6 ADJUST AND CLEAN

A. Thoroughly clean all equipment and systems prior to the Owner's final acceptance of the project.

B. Clean all foreign paint, grease, oil, dirt, labels, stickers, etc. from all equipment.

C. Remove all rubbish, debris, etc., accumulated during construction from the premises.

3.7 SPECIAL REQUIREMENTS

A. Coordinate the installation of all equipment, controls, devices, etc., with other trades to maintain clear access area for servicing.

B. Install all equipment to maximize access to parts needing service or maintenance. Review the final location, placement, and orientation of equipment with the Owner's representative prior to setting equipment.

C. Installation of equipment or devices without regard to coordination of access requirements and confirmation with the Owner's representative will result in removal and reinstallation of the equipment at the Contractor's expense.

D. Raceway and Cable Routing Restrictions: Raceways and cable are restricted from being routed in the following locations, unless serving the space or permitted by the authority having jurisdiction.

1. Elevator machine rooms and hoistways.
2. Exit enclosures.
3. Other areas restricted by code.
4. Technology, data, server rooms.
5. Fire pump and sprinkler rooms.
6. Normal power in emergency power equipment rooms: Limited to feeders and branch circuits serving the emergency power equipment located in the room.
7. Emergency power in normal power equipment rooms: Limited to feeders and branch circuits serving the normal power equipment located in the room.

3.8 SYSTEM STARTING AND ADJUSTING

A. The electrical systems shall be complete and operating. System startup, testing, adjusting, and balancing to obtain satisfactory system performance is the responsibility of the Contractor. This includes all calibration and adjustment of electrical controls, balancing of loads, troubleshooting and verification of software, and final adjustments that may be needed.

B. Complete all manufacturer-recommended startup procedures and checklists to verify proper equipment operation and does not pose a danger to personnel or property.

C. All operating conditions and control sequences shall be tested during the start-up period. Testing all interlocks, safety shut-downs, controls, and alarms.

D. The Contractor, subcontractors, and equipment suppliers shall have skilled technicians to ensure that all systems perform properly. If the Architect/Engineer is requested to visit the job site for trouble shooting, assisting in start-up, obtaining satisfactory equipment operation, resolving installation and/or workmanship problems, equipment substitution issues or unsatisfactory system performance, including call backs during the warranty period, through no fault of the design; the Contractor shall reimburse the Owner on a time and materials basis for services rendered at the Architect/Engineer's standard hourly rates in effect when the services are requested. The Contractor shall pay the Owner for services required that are product, installation or workmanship related. Payment is due within 30 days after services are rendered.

3.9 FIELD QUALITY CONTROL A. General:

1. Conduct all tests required during and after construction. Submit test results in NETA format, or equivalent form, that shows the test equipment used, calibration date, tester's name, ambient test conditions, humidity, conductor length, and results corrected to 40°C.
2. Supply necessary instruments, meters, etc., for the tests. Supply competent technicians with training in the proper testing techniques.
3. All cables and wires shall be tested for shorts and grounds following installation and connection to devices. Replace shorted or grounded wires and cables.
4. Any wiring device, electrical apparatus or luminaire, if grounded or shorted on any integral "live" part, shall have all defective parts or materials replaced.
5. Test cable insulation of service and panel feeder conductors for proper insulation values. Tests shall include the cable, all splices, and all terminations. Each conductor shall be tested and shall test free of short circuits and grounds and have an insulation value not less than Electrical Code Standards. Take readings between conductors, and between conductors and ground.
6. If the results obtained in the tests are not satisfactory, make adjustments, replacements, and changes as needed. Then repeat the tests, and make additional tests, as the Architect/Engineer or authority having jurisdiction deems necessary. B. Ground Resistance:

1. Conduct service ground resistance tests using an approved manufactured ground resistance meter. Submit to the Architect/Engineer a proposed test procedure including type of equipment to be used. (The conventional ohmmeter is not an acceptable device.)
2. Make ground resistance measurements during normal dry weather and not less than 48 hours after a rain.
3. If the ground resistance value obtained is more than the value set forth in Section 260526, the following shall be done to obtain the value given:

    a. Verify that all connections in the service ground system are secure.
    b. Increase the depth to which ground rods are driven by adding section lengths to the rods and retest. If the resistance is still excessive increase the depth by adding an additional rod section and retest.
    c. If the resistance is still excessive, furnish and install additional ground rods, spaced not less than 20 feet from other ground rods unless otherwise noted on plans, and connect into the ground electrode system. Retest.
    d. Review results with the Architect/Engineer.

4. Before final payment is made to the Contractor submit a written report to the Architect/Engineer including the following:

    a. Date of test.
    b. Number of hours since the last rain.
    c. Soil condition at the time of the test in the ground electrode location. That is: dry, wet, moist, sand, clay, etc.
    d. Diagram of the test set-up showing distances between test equipment, ground electrode, auxiliary electrodes, etc.
    e. Make, model, and calibration date of test equipment.
    f. Tabulation of measurements taken and calculations made. C. Ground-Fault Equipment

    Performance Testing:

1. Test: Perform ground-fault performance testing when system is installed. The test process shall use

primary current injection per manufacturer instruction and procedures. Perform test for the following:

a. Service disconnects
b. Solid state molded case circuit breakers and solid-state insulated case circuit breakers equipped with ground fault protection.
c. Fusible switches with ground fault relay protection.
d. Outside branch circuits and feeders.
e. Code required.

2. Report: Provide copy of test result report with Operation and Maintenance manuals. Provide report to Authority Having Jurisdiction when requested. D. Other

Equipment:

1. Give other equipment furnished and installed by the Contractor all standard tests normally made to assure that the equipment is electrically sound, all connections properly made, phase rotation correct, fuses and thermal elements suitable for protection against overloads, voltage complies with equipment nameplate rating, and full load amperes are within equipment rating.

E. If any test results are not satisfactory, make adjustments, replacements and changes as needed and repeat the tests and make additional tests as the Architect/Engineer or authority having jurisdiction deem necessary.

READINESS CERTIFICATION PRIOR TO FINAL JOBSITE OBSERVATION

To prevent the final job observation from occurring too early, we require that the Contractor review the completion status of the project and, by copy of this document, certify that the job is indeed ready for the final job observation. The following is a typical list of items that represent the degree of job completeness expected prior to requesting a final job observation.

1. Penetrations of fire-rated construction fire sealed in accordance with specifications.
2. Electrical panels have typed circuit identification.
3. Smoke and fire/smoke dampers are wired and have been tested.
4. Per Section 260500, cable insulation test results have been submitted.
5. Per Section 260500, medium voltage testing report has been submitted.
6. Per Section 260500, ground resistance test results have been submitted.
7. Operation and Maintenance manuals have been submitted as per Section 260500.
8. Bound copies of approved shop drawings have been submitted as per Section 260500.
9. Report of instruction of Owner's representative has been submitted as per Section 260500.
10. Fire alarm inspection and testing report has been submitted as per Sections 26 05 00 and 28 31 00.
11. Start-up reports from factory representative have been submitted as per Section 260500.

Accepted by:

Prime Contractor _____

By _____ Date _____

Upon Contractor certification that the project is complete and ready for a final job observation, we require the Contractor to sign this agreement and return it to the Architect/Engineer so that the final observation can be scheduled.

It is understood that if the Architect/Engineer finds the job not ready for the final observation and that additional trips and observations are required to bring the project to completion, the costs incurred by the Architect/Engineers for additional time and expenses will be deducted from the Contractor's contract retainage prior to final payment at the completion of the job.

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SECTION 260505 - ELECTRICAL DEMOLITION FOR REMODELING

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Electrical demolition

PART 2 - PRODUCTS

2.1 MATERIALS AND EQUIPMENT

A. Materials and equipment for patching and extending work shall be as specified in individual Sections.

PART 3 - EXECUTION

3.1 EXAMINATION

A. THE DRAWINGS ARE INTENDED TO INDICATE THE SCOPE OF WORK REQUIRED AND DO NOT INDICATE EVERY BOX, CONDUIT, OR WIRE THAT MUST BE REMOVED. THE CONTRACTOR SHALL VISIT THE SITE PRIOR TO SUBMITTING A BID AND VERIFY EXISTING CONDITIONS.

B. Where walls, ceilings, structures, etc., are indicated as being removed on general or electrical drawings, the Contractor shall be responsible for the removal of all electrical equipment, devices, fixtures, raceways, wiring, systems, etc., from the removed area.

C. Where ceilings, walls, structures, etc., are temporarily removed and replaced by others, this Contractor shall be responsible for the removal, storage, and replacement of equipment, devices, fixtures, raceways, wiring, systems, etc.

D. Where mechanical or technology equipment is indicated as being removed on electrical, mechanical, or technology drawings, the Contractor shall be responsible for disconnecting the equipment and removing all starters, VFD, controllers, electrical equipment, raceways, wiring, etc. associated with the device.

E. Verify that abandoned wiring and equipment serve only abandoned equipment or facilities. Extend conduit and wire to facilities and equipment that will remain in operation following demolition. Extension of conduit and wire to equipment shall be compatible with the surrounding area. Extended conduit and conductors to match existing size and material.

F. Coordinate scope of work with all other Contractors and the Owner at the project site. Schedule removal of equipment and electrical service to avoid conflicts.

G. Bid submittal shall mean the Contractor has visited the project site and has verified existing conditions and scope of work.

3.2 PREPARATION

A. The Contractor shall obtain approval from the Owner before turning off power to circuits, feeders, panels, etc. Coordinate all outages with Owner.

B. Coordinate utility service outages with Utility Company.

C. Provide temporary wiring and connections to maintain existing systems in service during construction. When work must be performed on energized equipment or circuits, use personnel experienced in such operations. Assume all equipment and systems must remain operational unless specifically noted otherwise on drawings.

D. Disconnect electrical systems in walls, floors, structures, and ceilings scheduled for removal.

E. Existing Electrical Service: Maintain existing system in service until new system is complete and ready for service. Disable system only to make switchovers and connections. Obtain permission from Owner at least 48 hours before partially or completely disabling system. Minimize outage duration. Make temporary connections to maintain service in areas adjacent to work area. Service changeover shall be completed on an overtime basis.

3.3 DEMOLITION AND EXTENSION OF EXISTING ELECTRICAL WORK

A. Demolish and extend existing electrical work under provisions of Division 1 of Specifications and this Section.

B. Remove, relocate, and extend existing installations to accommodate new construction.

C. Remove abandoned wiring and raceway to source of supply. Existing conduit in good condition may be reused in place by including an equipment ground conductor in reused conduit. Reused conduit and boxes shall have supports revised to meet current codes. Relocating conduit shall not be allowed.

D. Remove exposed abandoned raceway, including abandoned raceway above accessible ceiling finishes. Cut raceway flush with walls and floors, and patch surfaces. Remove all associated clamps, hangers, supports, etc. associated with raceway removal.

E. Disconnect and remove abandoned panelboards and distribution equipment.

F. Disconnect and remove electrical devices and equipment serving utilization equipment that has been removed.

G. Repair adjacent construction and finishes damaged during demolition and extension work. Patch openings to match existing surrounding finishes.

H. Maintain access to existing electrical installations that remain active. Modify installation or provide junction boxes and access panel as appropriate.

I. Extend existing installations using materials and methods compatible with existing electrical installations, or as specified. Extended conduit and conductors to match existing size and material.

J. Regulatory Requirements: Comply with governing EPA notification regulations before beginning demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.

K. Floor slab on grade is a structural slab. All penetrations shall be X-rayed prior to cutting and/or drilling to avoid rebar or utilities encased in floor construction. Provide rebar dowels to replace damaged rebar and pin existing slab with patched slab.

L. This Contractor is responsible for all costs incurred in repair, relocations, or replacement of any cables, conduits, or other services if damaged without proper investigation.

3.4 EXISTING ENCLOSURES - NEW EQUIPMENT

A. Existing enclosures may be reused to house new equipment including branch panels, industrial controls, and similar systems pending documented verification of the following provided with the applicable new equipment submittals.

1. New equipment or panelboard is listed for the existing enclosure or application.
2. Existing enclosure and new equipment is field evaluated by the manufacturer or nationally recognized testing laboratory for the available fault current, condition, and application.
3. Authority Having Jurisdiction (AHJ) approval.

3.5 CLEANING AND REPAIR

A. Clean and repair existing materials and equipment that remain or are to be reused.

B. Panelboards: Clean exposed surfaces and check tightness of electrical connections. Replace damaged circuit breakers and provide closure plates for vacant positions. Provide typed circuit directory showing revised circuiting arrangement.

C. ELECTRICAL ITEMS (E.G., LIGHTING FIXTURES, RECEPTACLES, SWITCHES, CONDUIT, WIRE, ETC.) REMOVED AND NOT RELOCATED REMAIN THE PROPERTY OF THE OWNER. CONTRACTOR SHALL PLACE ITEMS RETAINED BY THE OWNER IN A LOCATION COORDINATED WITH THE OWNER. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE DISPOSAL OF MATERIAL THE OWNER DOES NOT WANT.

3.6 INSTALLATION

A. Install relocated materials and equipment under the provisions of Division 1 of Specifications.

END OF SECTION 260505

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SECTION 260513 - WIRE AND CABLE

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Building Wire - Copper

1.2 RELATED WORK

A. Section 260553 - Electrical Identification: Refer to electrical identification for color and identification labeling requirements.

1.3 REFERENCES

A. NFPA 70 - National Electrical Code (NEC)

B. UL 44 - Thermoset-Insulated Wires and Cables

C. UL 83 - Thermoplastic-Insulated Wires and Cables

D. UL 854 - Service-Entrance Cables

E. UL 1581 - Standard for Electrical Wires, Cables, and Flexible Cords

F. UL 2196 - Fire Resistive, Fire Resistant and Circuit Integrity Cables

1.4 SUBMITTALS

A. Submit shop drawings and product data under the provisions of Section 260500.

B. Submit manufacturer's installation instructions.

PART 2 - PRODUCTS

2.1 BUILDING WIRE - COPPER

A. The basis of design is copper conductor.

B. Feeders and Branch Circuits 8 AWG and larger: Copper, stranded conductor, 600-volt insulation, THHN/THWN or XHHW-2.

C. Feeders and Branch Circuits 8 AWG and larger in Underground Conduit: Copper, stranded conductor, 600-volt insulation, THWN or XHHW-2.

D. Feeders and Branch Circuits 10 AWG and Smaller: Copper, solid or stranded conductor, 600volt insulation, THHN/THWN, unless otherwise noted on the drawings.

E. Motor Feeder from Variable Frequency Drives: Copper conductor, 600-volt XHHW-2 insulation, stranded conductor, unless otherwise noted on the drawings. Three conductor stranded copper, 600-volt XHHW-2 insulation, with copper ground and overall helical copper tape shield. Shield shall be terminated at both ends of cable with an approved termination. F. Control Circuits: Copper, stranded conductor 600-volt insulation, THHN/THWN.

G. Each 120 and 277-volt branch circuit shall have a dedicated neutral conductor. Neutral conductors shall be considered current-carrying conductors for wire derating.

PART 3 - EXECUTION

3.1 WIRE AND CABLE INSTALLATION SCHEDULE

A. Above Accessible Ceilings:

1. Building wire shall be installed in raceway.

B. All Other Locations: Building wire in raceway.

C. Above Grade: All conductors installed above grade shall be type "THHN".

D. Underground or In Slab: All conductors shall be type "THWN".

E. Low Voltage Cable (less than 100 volts): Low voltage cable shall be installed in raceway.

F. Fire-Rated 2-Hour Feeders and Circuit Requiring Continuous Operation (CI): Refer to Part 2 of this section for acceptable products and assemblies. Installation shall meet UL 2196.

3.2 CONTRACTOR CHANGES

A. The basis of design is copper conductors installed in raceway based on ambient temperature of 30°C, NEC Table 310.16 (2011 - 2017 edition 310.15(B)(16)). Service entrance conductors are based on copper conductor installed in underground electrical ducts,

B. The Contractor shall be responsible for derating and sizing conductors and conduits to equal or exceed the ampacity of the basis of design circuits, if other than the basis of design.

C. Underground electrical duct ampacity rating shall be in accordance with NEC Table 310.16 (2011 - 2017 edition 310.15(B)(16)) or calculated in accordance with Annex B Application Information for Ampacity Calculation. The calculations and a sketch of the proposed installation shall be submitted prior to any conduit being installed.

D. Conductor length(s) listed on plans and schedules. The drawings are diagrammatic with intent to convey the components of the electrical distribution system. Conductor length(s) when listed on plans and schedules are for engineering calculation purposes. Conductor length(s) shall NOT be used for bidding purposes.

E. Record drawing shall include the calculations and sketches.

3.3 GENERAL WIRING METHODS

A. Use no wire smaller than 12 AWG for power and lighting circuits, and no smaller than 14 AWG for control wiring.

B. Use no wire smaller than 18 AWG for low voltage control wiring below 100 volts.

C. Use 10 AWG conductor for 20 ampere, 120-volt branch circuit home runs longer than 75 feet, and for 20 ampere, 277-volt branch circuit home runs longer than 200 feet. D. Use no wire smaller than 8 AWG for outdoor lighting branch circuits.

E. The ampacity of multiple conductors in one conduit shall be derated per the Electrical Code. In no case shall more than 4 conductors be installed in one conduit to such loads as motors larger than 1/4 HP, panelboards, motor control centers, etc.

F. Where installing parallel feeders, place an equal number of conductors for each phase of a circuit in same raceway or cable.

G. Splice only in junction or outlet boxes.

H. Neatly train and lace wiring inside boxes, equipment, and panelboards.

I. Make conductor lengths for parallel circuits equal.

J. All conductors shall be continuous in conduit from last outlet to their termination.

K. Terminate all spare conductors on terminal blocks, and label the spare conductors.

L. Cables or wires shall not be laid out on the ground before pulling.

M. Cables or wires shall not be dragged over earth or paving.

N. Care shall be taken so as not to subject the cable or wire to high mechanical stresses that would cause damage to the wire and cable.

O. At least six (6)-inch loops or ends shall be left at each outlet for installation connection of luminaires or other devices.

P. All wires in outlet boxes not connected to fixtures or other devices shall be rolled up, spliced if continuity of circuit is required, and insulated.

3.4 WIRING INSTALLATION IN RACEWAYS

A. Pull all conductors into a raceway at the same time. Use UL listed wire pulling lubricant for pulling 4 AWG and larger wires.

B. Install wire in raceway after interior of building has been physically protected from the weather and all mechanical work likely to injure conductors has been completed.

C. Pulling shall be continuous without unnecessary stops and starts with wire or cable only partially through raceway.

D. Where reels of cable or wire are used, they shall be set up on jacks close to the point where the wire or cable enters the conduit or duct so that the cable or wire may be unreeled and run into the conduit or duct with a minimum of change in the direction of the bend.

E. Conductors shall not be pulled through conduits until plastering or masonry work is completed and conduits are free from moisture. Care shall be taken so that long pulls of wire or pulls around several bends are not made where the wire may be permanently stretched and the insulation damaged.

F. Only nylon rope shall be permitted to pull cables into conduit and ducts.

G. Completely and thoroughly swab raceway system before installing conductors.

3.5 WIRING CONNECTIONS AND TERMINATIONS

A. Splice and tap only in accessible junction boxes.

B. Use solderless, tin-plated copper, compression terminals (lugs) applied with circumferential crimp for conductor terminations, 8 AWG and larger.

C. Use solderless, tin-plated, compression terminals (lugs) applied with indenter crimp for copper conductor terminations, 10 AWG and smaller.

D. Use solderless pressure connectors with insulating covers for copper wire splices and taps, 8 AWG and smaller. For 10 AWG and smaller, use insulated spring wire connectors with plastic caps.

E. Use compression connectors applied with circumferential crimp for conductor splices and taps, 6 AWG and larger. Tape uninsulated conductors and connectors with electrical tape to 150 percent of the insulation value of conductor. Cold shrink connector insulator with 1kV rating shall be used in damp and wet locations.

F. Thoroughly clean wires before installing lugs and connectors.

G. Make splices, taps and terminations to carry full ampacity of conductors without perceptible temperature rise.

H. Phase Sequence: All apparatus shall be connected to operate in the phase sequence A-B-C representing the time sequence in which the phase conductors so identified reach positive maximum voltage.

I. As a general rule, applicable to switches, circuit breakers, starters, panelboards, switchgear and the like, the connections to phase conductors are intended thus:

1. Facing the front and operating side of the equipment, the phase identification shall be:

a. Left to Right - A-B-C

b. Top to Bottom - A-B-C

J. Connection revisions as required to achieve correct rotation of motors shall be made at the load terminals of the starters or disconnect switches.

END OF SECTION

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SECTION 260526 - GROUNDING AND BONDING

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Equipment grounding system

B. Bonding system

1.2 QUALITY ASSURANCE

A. Testing Agency Qualifications: Testing agency as defined by OSHA in 29 CFR 1910.7 or a member company of the International Electrical Testing Association and that is acceptable to authorities having jurisdiction.

B. Testing Agency's Field Supervisor: Person currently certified by the International Electrical Testing Association to supervise on-site testing specified in Part 3.

C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in Electrical Code, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

D. Comply with UL 467 Grounding and Bonding Equipment.

E. Comply with NFPA 780 and UL 96 when interconnecting with lightning protection system.

F. Comply with Electrical Code; for overhead-line construction and medium-voltage underground construction, comply with IEEE/ANSI C2 National Electrical Safety Code (NESC).

1.3 REFERENCES

A. NFPA 70 - National Electrical Code (NEC)

1.4 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.

PART 2 - PRODUCTS

2.1 GROUNDING CONDUCTORS

A. For insulated conductors, comply with Division 26 Section 260513 "Wire and Cable".

B. Material: Copper.

C. Equipment Grounding Conductors: Insulated. Refer to Section 260553 for insulation color.

D. Isolated Ground Conductors: Insulated. Refer to Section 260553 for insulation color.

E. Grounding Electrode Conductors: Stranded cable.

F. Underground Conductors: Bare, tinned, stranded, unless otherwise indicated.

G. Copper Bonding Conductors: As follows:

1. Bonding Cable: 28 kcmil, 14 strands of No. 17 AWG copper conductor, 1/4 inch in diameter.
2. Bonding Conductor: No. 4 or No. 6 AWG, stranded copper conductor.
3. Bonding Jumper: Bare copper tape, braided bare copper conductors, terminated with copper ferrules; 1-5/8 inches wide and 1/16 inch thick.
4. Tinned Bonding Jumper: Tinned-copper tape, braided copper conductors, terminated with copper ferrules; 1-5/8 inches wide and 1/16 inch thick.

2.2 CONNECTOR PRODUCTS

A. Comply with UL 467; listed for use for specific types, sizes, and combinations of conductors and connected items.

B. Connectors: Hydraulic compression type, in kit form, and selected per manufacturer's written instructions.

C. Bolted Connectors: Bolted-pressure-type connectors.

PART 3 - EXECUTION

3.1 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. 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 non-continuous conduits at entrances and exits with grounding bushings and bare grounding conductors, unless otherwise indicated.

C. Underground Connections: Hydraulic compression connection. Use for underground connections, except those at test wells.

D. Connections at back boxes, junction boxes, pull boxes, and equipment terminations: The equipment grounding conductor(s) associated with all circuits in the box shall be connected together and to the box using a suitable grounding screw. The removal of the respective receptacle, luminaire, or other device served by the box shall not interrupt the grounding continuity.

E. 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.

F. 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.

3.2 INSTALLATION

A. Use only copper conductors for both insulated and bare grounding conductors in direct contact with earth, concrete, masonry, crushed stone, and similar materials.

B. 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. Each grounding conductor that passes through a below grade wall must be provided with a waterstop.

C. Grounding electrode conductor (GEC) shall be protected from physical damage by rigid polyvinyl chloride conduit (PVC) in exposed locations.

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 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. In raceways, use insulated equipment grounding conductors.

F. Underground Grounding Conductors: Use copper conductor, 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.

3.3 EQUIPMENT GROUNDING SYSTEM

A. Comply with Electrical Code, for types, sizes, and quantities of equipment grounding conductors, unless specific types, larger sizes, or more conductors than required by Electrical Code are indicated.

B. Install equipment grounding conductors in all feeders and circuits. Terminate each end on a grounding lug or bus.

3.4 BONDING SYSTEM

A. At building expansion joints, provide flexible bonding jumpers to connect to columns or beams on each side of the expansion joint.

B. Isolated Equipment Enclosure: For designated equipment supplied by a branch circuit or feeder, isolate equipment enclosure from supply raceway with a nonmetallic raceway fitting listed for the purpose. Install fitting where raceway enters enclosure, and install a separate equipment bonding conductor.

C. Exterior Metallic Pull and Junction Box Covers, Metallic Hand Rails: Bond to grounding system using flexible grounding conductors.

D. Connect bonding conductors to metal water pipe using a suitable ground clamp. Make connections to flanged piping at street side of flange. Provide bonding jumper around water meter.

E. Equipment Ground Conductor Continuity: All spliced equipment grounding conductors in junction boxes, cabinets, and distribution equipment shall be connected together and bonded to the metal enclosure.

3.5 FIELD QUALITY CONTROL

A. Inspect grounding and bonding system conductors and connections for tightness and proper installation.

1. Measure ground resistance from system neutral connection at service entrance to convenient ground reference points using suitable ground testing equipment. Resistance shall not exceed 5 ohms.
2. Testing: Owner will engage a qualified testing agency to perform the following field quality-control testing:
3. Testing: Engage a qualified testing agency to perform the following field quality-control testing:
4. Testing: Perform the following field quality-control testing:

    a. After installing grounding system but before permanent electrical circuitry has been energized, test for compliance with requirements.

    b. Test completed grounding system at each location where a maximum groundresistance level is specified, at service disconnect enclosure grounding terminal, and at ground test wells. 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. Perform tests, by the fall-ofpotential method according to IEEE 81.

c. Excessive Ground Resistance: If resistance to ground exceeds specified values, notify Architect/Engineer promptly and include recommendations to reduce ground resistance.

3.6 GRADING AND PLANTING

A. Restore surface features, including vegetation, at areas disturbed by Work of this Section. Reestablish original grades, unless otherwise indicated. If sod has been removed, replace it as soon as possible after backfilling is completed. Restore areas disturbed by trenching, storing of dirt, cable laying, and other activities to their original condition. Include application of topsoil, fertilizer, lime, seed, sod, sprig, and mulch. Comply with Division 2. Maintain restored surfaces. Restore disturbed paving.

END OF SECTION

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SECTION 260527 - SUPPORTING DEVICES

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Conduit and Equipment Supports

B. Fastening Hardware

C. Concrete Housekeeping Pads

1.2 QUALITY ASSURANCE

A. Support systems shall be adequate for weight of equipment and conduit, including wiring, which they carry.

1.3 REFERENCES

A. UL 62275 - Cable Management Systems - Cables Ties for Electrical Installations

1.4 COORDINATION

A. Coordinate size, shape and location of concrete pads with section on Cast-in-Place Concrete or Concrete Topping.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Allied Support Systems

B. Cooper B-Line

C. Erico, Inc.

D. Hilti

E. Power Fasteners

F. Orbit Industries

2.2 MATERIAL

A. Support Channel: stainless steel for wet/damp locations; painted steel for interior/dry locations. All field cut ends shall be touched up with matching finish to inhibit rusting.

B. Hardware: Corrosion resistant.

C. Anchorage and Structural Attachment Components:

1. Strength: Defined in reports by ICBO Evaluation Service or another agency acceptable to Authorities Having Jurisdiction.

    a. Structural Safety Factor: Strength in tension and shear of components used shall be at least two times the maximum seismic forces to which they will be subjected.

2. Through Bolts: Structural type, hex head, high strength. Comply with ASTM F3125/F3125M Standard Specification for High Strength Structural Bolts and Assemblies.
3. Welding Lugs: Comply with MSS-SP-69, Type 57.
4. Beam clamps for Steel Beams and Joists: Double sided or concentric open web joist hangars. Single-sided type is not acceptable.
5. Bushings for Floor-Mounted Equipment Anchors: Neoprene units designed for seismically rated rigid equipment mountings, and matched to the type and size of anchor bolts and studs used.
6. Bushing Assemblies for Wall-Mounted Equipment Anchorage: Assemblies of neoprene elements and steel sleeves designed for seismically rated rigid equipment mountings, and matched to the type and size of attachment devices used.
7. Concrete Anchors: Fasten to concrete using cast-in or post-installed anchors designed per the requirements of Appendix D of ACI 318-05. Post-installed anchors shall be qualified for use in cracked concrete by ACI-355.2.
8. Masonry Anchors: Fasten to concrete masonry units with expansion anchors or selftapping masonry screws. For expansion anchors into hollow concrete block, use sleevetype anchors designed for the specific application. Do not fasten in masonry joints. Do not use powder actuated fasteners, wooden plugs, or plastic inserts. D. Conduit Sleeves and Lintels:

1. Each Contractor shall provide, to the General Contractor for installation, lintels for all openings required for the Contractor's work in masonry walls and conduit sleeves for floors, unless specifically shown as being by others.
2. Lintels:

    a. Lintels in non-bearing masonry wall openings can be sized in accordance with the note below. Lintels that occur in existing bearing walls are to be sized according to similar conditions and spans in the new construction and lintel schedule. Bottom plate size shall be a minimum of 3/8" thick. The width of the plate shall be 3/4" less than the field verified wall thickness. The plate shall be the full length of the lintel member. Lintels are not required over openings that are 12" wide or less and at least 1 course below the top of the wall.
    b. All lintels shall have a minimum of 8" end bearing.
    c. All lintels in exterior wall construction shall be hot-dip galvanized.
    d. For all openings not otherwise detailed or scheduled, minimum lintels shall be for each 4 inch of masonry width:

        1) 0 to 2'-0" span: 5/16" plate (3/4" less than wall width)

2) 2'-0" to 4'-0" span: L 3 1/2 x 3 1/2 x 1/4
3) 4'-0" to 6'-0" span: L4 x 3 1/2 x 5/16 (llv)
4) 6'-0" to 8'-0" span: L5 x 3 1/2 x 5/16 (llv)

e. All angles that are back to back shall be welded top and bottom 3" at 12" minimum.

3. Fabricate all lintels from structural steel shapes or as indicated on the drawings. All lintels and grouped wall openings shall be approved by the Architect or Structural Engineer.
4. Fabricate all sleeves from standard weight black steel pipe. Provide continuous sleeve. Cut or split sleeves are not acceptable. Sleeves through concrete walls may be high density polyethylene pipe penetration sleeve with a water stop collar, suitable for use with Link-Seal mechanical seals. Century-Line Model CS.
5. Sleeves through the floors on exposed risers shall be flush with the ceiling, with planed squared ends extending 1" above the floor in unfinished areas, and flush with the floor in finished areas, to accept spring closing floor plates.
6. Sleeves shall not penetrate structural members without approval from the Structural Engineer.
7. Openings through unexcavated floors and/or foundation walls below the floor shall have a smooth finish with sufficient annular space around material passing through opening so slight settling will not place stress on the material or building structure.
8. Install all sleeves concentric with conduits. Secure sleeves in concrete to wood forms. This Contractor is responsible for sleeves dislodged or moved when pouring concrete.
9. Where conduits rise through concrete floors that are on earthen grade, provide 3/4" resilient expansion joint material (asphalt and cork) wrapped around the pipe, the full depth of concrete, at the point of penetration. Secure to prevent shifting during concrete placement and finishing.
10. Size sleeves large enough to allow expansion and contraction movement. E.

Concrete Housekeeping Pads:

1. Concrete bases for all floor mounted equipment and wall mounted equipment which is surface mounted and extends to within 6" of the finished floor, unless shown otherwise on the drawings, shall be 3-1/2" thick concrete.
2. Bases shall extend 3" on all sides of the equipment (6" larger than factory base).
3. Where the base is less than 12" from a wall, the base shall be carried to the wall to prevent a "dirt-trap".
4. Concrete materials and workmanship required for the Contractor's work shall be provided by the Contractor. Materials and workmanship shall conform to the applicable standards of the Portland Cement Association. Reinforce with 6" x 6", W1.4-W1.4 welded wire fabric. Concrete shall withstand 3,000 pounds compression per square inch at twentyeight days.

F. Truss and Joist Support System: Provided the installation complies with all loading requirements of truss and joist manufacturers, the following practices are acceptable:

1. Loads of 100 lbs. or less may be attached anywhere along the top or bottom chords of trusses or joists with a minimum 3' spacing between loads.

2. Loads greater than 100 lbs. must be hung concentrically and may be hung from top or bottom chord, provided one of the following conditions is met:

    a. The hanger is attached within 6" from a web/chord joint.
    b. Additional L2x2x1/4 web reinforcement is installed per manufacturer's requirements.

3. It is prohibited to cantilever a load using an angle or other structural component that is attached to a truss or joist in such a fashion that a torsional force is applied to that structural member.
4. If conditions cannot be met, coordinate installation with truss or joist manufacturer and contact Architect/Engineer.

G. Cable Ties for Cable Management Systems:

1. Cables ties, UL Listed, Type 21 or Type 21S, and test to UL Standard 62275 for Cable Management Systems.
2. Acceptable Applications: Low Voltage Wire and Cabling.

    a. Bundle wires and cables within cable trays, auxiliary gutters, and similar applications.
    b. Organize and support wiring and cables within equipment and distribution systems.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Fasten hanger rods, conduit clamps, and outlet and junction boxes to building structure using expansion anchors in concrete and beam clamps on structural steel.

B. Trapeze support installation: Cut hanger rods back at trapeze supports so they do not extend more than 3/4" below bottom face of lowest fastener and blunt any sharp edges.

C. Use toggle bolts or hollow wall fasteners in hollow masonry, plaster, or gypsum board partitions and walls; expansion anchors or preset inserts in solid masonry walls; self-drilling anchors or expansion anchor on concrete surfaces; sheet metal screws in sheet metal studs; and wood screws in wood construction.

D. Do not fasten supports to ceiling systems, piping, ductwork, mechanical equipment, or conduit, unless otherwise noted.

E. Do not use powder-actuated anchors without specific permission.

F. Do not drill structural steel members.

G. Fabricate supports from structural steel or steel channel, rigidly welded or bolted to present a neat appearance. Use hexagon head bolts with spring lock washers under all nuts.

H. In wet locations and on all building floors below exterior earth grade install free-standing electrical equipment on concrete pads.

I. Install cabinets and panelboards with minimum of four anchors. Provide horizontal backing/support framing in stud walls for rigid mounting.

J. Bridge studs top and bottom with channels to support flush-mounted cabinets and panelboards in stud walls.

K. Do not exceed 25 lbs. per hanger and a minimum spacing of 2'-0" on center when attaching to metal roof decking (excludes concrete on metal deck). This 25 lbs. load and 2'-0" spacing include adjacent electrical and mechanical items hanging from deck. If the hanger restrictions cannot be achieved, supplemental framing off steel framing will need to be added. L. Refer to Section 260533 for special conduit supporting requirements.

3.2 FINISH

A. Prime coat exposed steel hangers and supports. Hangers and supports in crawl spaces, pipe shafts, and above suspended ceiling spaces are not considered exposed.

B. Trim all ends of exposed field fabricated steel hangers, slotted channel and threaded rod to within 1" of support or fastener to eliminate potential injury to personnel unless shown otherwise on the drawings. Smooth ends and install elastomeric insulation with two coats of latex paint if exposed steel is within 6'-6" of finish floor and presents potential injury to personnel.

END OF SECTION

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SECTION 260533 - CONDUIT AND BOXES

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Rigid metallic conduit and fittings (RMC)

B. Rigid polyvinyl chloride conduit and fittings (PVC)

C. Electrical connection

D. Pull and junction boxes

E. Handholes

F. Foundation - Underground Sleeves and Seals

G. Raceway Seals and Sealant

H. Accessories

1.2 RELATED WORK

A. Section 260553 - Electrical Identification: Refer to electrical identification for color and identification labeling requirements.

1.3 REFERENCES

A. American National Standards Institute (ANSI):

1. ANSI C80.1 - Rigid Steel Conduit, Zinc-Coated
2. ANSI C80.3 - Electrical Metallic Tubing, Zinc-Coated and Fittings
3. ANSI C80.4 - Fittings for Rigid Metal Conduit and Electrical Metallic Tubing
4. ANSI C80.6 - Intermediate Metal Conduit, Zinc Coated
5. ANSI/NEMA OS 1 - Sheet-Steel Outlet Boxes, Device Boxes, Covers and Box Supports
6. ANSI/NEMA OS 2 - Nonmetallic Outlet Boxes, Device Boxes, Covers and Box

Supports B. Federal Specifications (FS):

1. A-A-50553A - Fittings for Conduit, Metal, Rigid, (Thick-Wall and Thin-Wall (EMT) Type
2. A-A-55810 - Specification for Flexible Metal Conduit

C. NECA "Standards of Installation"

D. National Electrical Manufacturers Association (NEMA):

1. ANSI/NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit, Electrical Metallic Tubing and Cable
2. RN 1 - Polyvinyl chloride (PVC) Externally Coated Galvanized Rigid Steel Conduit, Rigid Aluminum Conduit, and Intermediate Metal Conduit
3. TC 2 - Electrical Polyvinyl Chloride (PVC) Conduit
4. TC 9 - Fittings for PVC Plastic Utilities Duct for Underground Installation

E. NFPA 70 - National Electrical Code (NEC)

F. Underwriters Laboratories (UL): Applicable Listings

1. UL 1 - Flexible Metal Conduit
2. UL 6 - Rigid Metal Conduit
3. UL 360 - Liquid Tight Flexible Steel Conduit
4. UL514-B - Conduit Tubing and Cable Fittings
5. UL651-A - Type EB and a PVC Conduit and HDPE Conduit
6. UL651-B - Continuous Length HDPE Conduit
7. UL746A - Standard for Polymeric Materials - Short Term Property Evaluations
8. UL797 - Electrical Metal Tubing
9. UL1242 - Intermediate Metal Conduit

G. American Standard of Testing and Materials (ASTM):

1. ASTM D 570 - Standard Test Method for Water Absorption of Plastics
2. ASTM D 638 - Standard Test Method for Tensile Properties of Plastics
3. ASTM D 648 - Standard Test Method for Deflection Temperature of Plastics under Flexural Load in the Edge Wise Position
4. ASTM D 2412 - Standard Test Method for Determination of External Loading Characteristics of Plastic Pipe by Parallel-Plate Loading
5. ASTM D 2447 - Standard Specification for Polyethylene (PE) Plastic Pipe, Schedules 40 and 80, Based on Outside Diameter
6. ASTM D 3350 - Standard Specification for Polyethylene Plastic Pipe and Fittings

Material H. Definitions:

1. Fittings: Conduit connection or coupling.
2. Body: Enlarged fittings with opening allowing access to the conductors for pulling purposes only.
3. Mechanical Spaces: Enclosed areas, usually kept separated from the general public, where the primary use is to house service equipment and to route services. These spaces generally have exposed structures, bare concrete and non-architecturally emphasized finishes.
4. Finished Spaces: Enclosed areas where the primary use is to house personnel and the general public. These spaces generally have architecturally emphasized finishes, ceilings and/or floors.
5. Concealed: Not visible by the general public. Often indicates a location either above the ceiling, in the walls, in or beneath the floor slab, in column coverings, or in the ceiling construction.

6. Above Grade: Not directly in contact with the earth. For example, an interior wall located at an elevation below the finished grade shall be considered above grade but a wall retaining earth shall be considered below grade.
7. Slab: Horizontal pour of concrete used for a floor or sub-floor.

1.4 SUBMITTALS

A. Include fittings and conduits 1.5" and larger in coordination files. Include all in--floor and underfloor conduit in coordination files. Refer to Section 260500 for coordination drawing requirements.

PART 2 - PRODUCTS

2.1 RIGID METALLIC CONDUIT (RMC) AND FITTINGS A.

Manufacturers:

1. Atkore Allied Tube & Conduit
2. Nucor
3. Western Tube
4. or approved equal.

B. Manufacturers of RMC Conduit Fittings:

1. ABB/Thomas & Betts
2. Eaton/Crouse-Hinds
3. Electroline
4. Emerson Appleton & OZ Gedney
5. Hubbell Raco and Killark 6. or approved equal.

C. Minimum Size Galvanized Steel: 3/4 inch, unless otherwise noted.

D. Fittings and Conduit Bodies:

1. End Bell Fittings: Malleable iron, hot dip galvanized, threaded flare type with provisions for mounting to form.
2. Expansion Joints: Malleable iron and hot dip galvanized providing a minimum of 4 inches of movement. Fitting shall be watertight with an insulating bushing and a bonding jumper.
3. Expansion Joint for Concrete Encased Conduit: Neoprene sleeve with bronze end coupling, stainless steel bands and tinned copper braid bonding jumper. Fittings shall be watertight and concrete-tight.
4. Conduit End Bushings: Malleable iron type with molded-on high impact phenolic thermosetting insulation. Where required elsewhere in the contract documents, bushing shall be complete with ground conductor saddle and clamp. High impact phenolic threaded type bushings are not acceptable.

5. All other fittings and conduit bodies shall be of malleable iron construction and hot dip galvanized.

2.2 RIGID NON-METALLIC CONDUIT (PVC) AND FITTINGS

A. Minimum Size Rigid Smooth-Wall Nonmetallic Conduit: 3/4 inch, unless otherwise noted.

B. Acceptable Manufacturers:

1. ABB/Carlon
2. Chevron Phillips Chemical Company
3. Atkore Heritage Plastics
4. or approved equal.

C. Construction: Schedule 40 and Schedule 80 rigid polyvinyl chloride (PVC), UL labeled for 90C.

D. Fittings and Conduit Bodies: NEMA TC 3; sleeve type suitable for and manufactured especially for use with the conduit by the conduit manufacturer.

E. Plastic cement for joining conduit and fittings shall be provided as recommended by the manufacturer.

2.3 ECONN; ELECTRICAL CONNECTION

A. Electrical connection to equipment and motors, sized per Electrical Code. Coordinate requirements with contractor furnishing equipment or motor. Refer to specifications and general installation notes for terminations to motors.

2.4 JB; PULL AND JUNCTION BOXES

A. Sheet Metal Boxes: ANSI/NEMA OS 1; galvanized steel.

B. Sheet metal boxes larger than 12 inches in any dimension that contain terminations or components: Continuous hinged enclosure with 1/4 turn latch and white back panel for mounting terminal blocks and electrical components.

C. Cast Metal Boxes for Outdoor and Wet Location Installations: NEMA 250; Type 4 and Type 6, flat-flanged, surface-mounted junction box, UL listed as raintight. Galvanized cast iron box and cover with ground flange, neoprene gasket, and stainless steel cover screws.

D. Cast Metal Boxes for Underground Installations: NEMA 250; Type 4, inside flanged, recessed cover box for flush mounting, UL listed as raintight. Galvanized cast iron box and plain cover with neoprene gasket and stainless steel cover screws.

E. Flanged type boxes shall be used where installed flush in wall.

2.5 HANDHOLES

A. HH-; Handhole, composite polymer concrete body and cover. Stainless steel hardware. Bolted non-skid cover rated for 10,000 pounds. Design load occasional non-deliberate vehicular traffic. Stack units to achieve depth shown on plans. Units in landscaped areas shall be green in color. 11"W, 18"L, 18"D or dimensions as shown on plans.

1. Manufacturers:

a. Hubbell/Quazite PG####BB18, PG####HA00
b. Armorcast
c. Highline Products
d. Synertech

B. HH-; Handhole, cast iron, hot dipped galvanized with checkered cover sidewalk weatherproof box, flat neoprene cover gasket. Stainless steel screw hardware. Mounted flush in concrete. 12"W, 18"L, 12"D or dimensions as shown on plans.

1. Manufacturers:

a. Appleton Electric WYT Series, WYT 181212
b. OZ Gedney YT Series
c. Crouse Hinds WJBF Series

C. HH-; Handhole, concrete traffic box and galvanized steel checkered cover. Stainless steel hardware. Bolted cover and box rated for H/20 vehicular traffic. Reinforced concrete slab for bottom. 11"W, 18"L, 24"D or dimensions as shown on plans.

1. Manufacturer:

a. Oldcastle Precast B1017 Box

2.6 FOUNDATION - UNDERGROUND SLEEVES AND SEALS

A. Wall Seals ("Link-Seals"):

1. Where shown on the drawings, raceways passing through foundation walls to an underground condition shall have their annual space (sleeve or drilled hole - not tapered hole made with knockout plug) sealed by properly sized sealing element consisting of a synthetic rubber material compounded to resist aging, ozone, sunlight, water and chemical action.
2. Sleeves, if used, shall be standard weight steel with primed finish and waterstop/anchor continuously welded to sleeve.
3. Sleeves shall be at least 2 trade sizes larger than the penetrating raceway.
4. Pressure shall be maintained by stainless steel bolts and accessories. Pressure plates may be of composite materials for Models S and OS.
5. Sealing Elements shall be as follows:

Model	Service	Element Material	Temperature Range

S	Standard (Stainless)	EPDM	-40F to
T	Fire Seals (1 hour)	Silicone	-67F to
FS	Fire Seals (3 hours)	Silicone	-67F to 400F
OS	Oil Resistant / Stainless	Nitrile	-40F to 210F

6. Approved Manufacturers:

    a. Thunderline Corporation "Link-Seals"
    b. O-Z/Gedney Company
    c. Calpico, Inc
    d. Innerlynx
    e. Polywater PGKD Series

2.7 RACEWAY SEALS AND SEALANT

A. Duct Sealant: Field applied expandable duct sealant, closed cell field cured, water tight, air tight. Identified for use with electrical cables, conductors, and raceways. Minimum liquid withstanding of 10-feet head of water (5 PSI). Compatible with conductors and raceways, UL94 Flammability Certified.

1. NOT ALLOWED. Duct seal putty, all-purpose construction sealant.
2. Manufacturers:

    a. Polywater FST / AFT Series
    b. Approved equal

B. Duct Seal Bushing: Custom mechanical seal, liquid tight, gas tight, stainless steel hardware. Minimum liquid withstanding of 10-feet head of water (5 PSI). Coordinate product with raceway size, cable quantities, and cable sizes.

1. Manufacturers:

    a. Polywater PHRD / PHSD Series Varia /PHSI Module Series
    b. Jackmoon Commscope DuctPlug Series
    c. CalAm Manufacturing WedgeSeal Series

2.8 ACCESSORIES

A. Fire Rated Moldable Pads: UL #9700, moldable sheet putty at required thickness on all five sides of back boxes. Kinetics Noise Control - IsoBacker Pad, SpecSeal - SSP Putty and Pads, 3M #MPP-4S or equal.

B. Electric Threaded Ball Swivel: Metallic body, box mounted, threaded conduit, 20-degree ball swivel, rated for weight of application, listed. Thomas and Betts, Appleton, Couse-hinds, or equal. Example applications:

1. Rigid pendant mount with sloped ceiling, vibration, or subject to wind.

PART 3 - EXECUTION

3.1 CONDUIT INSTALLATION SCHEDULE AND SIZING

A. In the event the location of conduit installation represents conflicting installation requirements as specified in the following schedule, a clarification shall be obtained from the Architect/Engineer. If this Contractor is unable to obtain a clarification as outlined above, concealed rigid galvanized steel conduit installed per these specifications and the Electrical Code shall be required.

B. Fire Rated Assemblies:

1. Listed Fire Rated Assemblies: Phenolic RTRC

C. Size conduit as shown on the drawings and specifications. Where not indicated in the contract documents, conduit size shall be according to the Electrical Code. Conduit and conductor sizing shall be coordinated to limit conductor fill to less than 40%, maintain conductor ampere capacity as required by the Electrical Code (to include enlarged conductors due to temperature and quantity derating values) and to prevent excessive voltage drop and pulling tension due to long conduit/conductor lengths.

D. Minimum Conduit Size (Unless Noted Otherwise):

1. Above Grade: 3/4 inch. (The use of 1/2 inch would be allowed for installation conduit to individual light switches, individual receptacles and individual fixture whips from junction box.)
2. Below Grade 5' or less from Building Foundation: 3/4 inch.
3. Below Grade More than 5' from Building Foundation: 3/4 inch.
4. Telecommunication Conduit: 1 inch.
5. Controls Conduit: 1/2 inch.

E. Conduit Embedded in Slabs above Grade:

1. Embedded installation NOT allowed in elevated slabs with metal composite decks nor structural pour in place slabs less than 6 inches in depth unless specifically noted or shown on drawings otherwise.
2. Maximum size 1-1/4 inch for conduits crossing each other.

F. Conduit sizes shall change only at the entrance or exit to a junction box, unless specifically noted on the drawings.

3.2 CONDUIT ARRANGEMENT

A. In general, conduit shall be installed concealed in walls, in finished spaces and where possible or practical, or as noted otherwise. Conduit shall be installed parallel or perpendicular to walls, ceilings, and exposed structural members. In unfinished spaces, mechanical and utility areas, conduit may run either concealed or exposed as conditions dictate and as practical unless noted otherwise on drawings. Installation shall maintain headroom in exposed vicinities of pedestrian or vehicular traffic.

B. Exposed conduit on exterior walls or above roof will not be allowed without prior written approval of Architect/Engineer. A drawing of the proposed routing and a photo of the location shall be submitted 14 days prior to start of conduit rough-in. Routing shall be shown on coordination drawings.

C. Conduit arrangement in elevated slabs (restricted to applications specifically noted or shown on drawings):

1. Conduit size shall not exceed one-third of the structural slab thickness. Place conduit between the top and bottom reinforcing with a minimum of 3" concrete cover.
2. Parallel conduits shall be spaced at least 8 inches apart. Exception: Within 18 inches of commonly served floor boxes, junction boxes, or similar floor devices. Arrange conduits parallel or perpendicular to building lines and walls.

D. Conduit shall not share the same cell as structural reinforcement in masonry walls.

E. Conduit runs shall be routed as shown on large scale drawings. Conduit routing on drawings scaled 1/4"=1'-0" or less shall be considered diagrammatic, unless noted otherwise. The correct routing, when shown diagrammatically shall be chosen by the Contractor based on information in the contract documents, in accordance with manufacturer's written instructions, applicable codes, the NECA's "Standard of Installation", in accordance with recognized industry standards, and coordinated with other contractors.

F. Contractor shall adapt Contractor's work to the job conditions and make such changes as required and permitted by the Architect/Engineer, such as moving to clear beams and joists, adjusting at columns, avoiding interference with windows, etc., to permit the proper installation of other mechanical and/or electrical equipment.

G. Contractor shall cooperate with all contractors on the project. Contractor shall obtain details of other contractor's work to ensure fit and avoid conflict. Any expense due to the failure of This Contractor to do so shall be paid for in full by Contractor. The other trades involved as directed by the Architect/Engineer shall perform the repair of work damaged as a result of neglect or error by This Contractor. The resultant costs shall be borne by This Contractor.

3.3 CONDUIT SUPPORT

A. Conduit runs installed above a suspended ceiling shall be properly supported. In no case shall conduit rest on the suspended ceiling construction, nor utilize ceiling support system for conduit support.

1. Support wire used to independently support raceway and wiring systems above suspending ceilings shall be supported on both ends, minimum 12 gauge suspended ceiling support wire, and distinguishable from ceiling support systems by color (field paint), tagging, or equivalent means.

B. Conduit shall not be supported from ductwork, water, sprinkler piping, or other non-structural members, unless approved by the Architect/Engineer. All supports shall be from structural

slabs, walls, structural members, and bar joists, and coordinated with all other applicable contractors, unless noted otherwise.

C. Conduit shall be held in place by the correct size of galvanized one-hole conduit clamps, twohole conduit straps, patented support devices, clamp back conduit hangers, or by other means if called for on the drawings.

D. Support individual horizontal raceways with separate, malleable-iron pipe hangers or clamps.

E. Spring-steel conduit clips specifically designed for supporting single conduits or tubing may be used in lieu of malleable-iron hangers for 1-1/2" and smaller raceways serving lighting and receptacle branch circuits above accessible ceilings and for securing raceways to slotted channel and angle supports.

F. Group conduits in parallel runs where practical and use conduit racks or trapeze hangers constructed of steel channel, suspended with threaded solid rods or wall mounted from metal channels with conduit straps or clamps. Provide space in each rack or trapeze for 25% additional conduits.

G. Do not exceed 25 lbs. per hanger and a minimum spacing of 2'-0" on center when attaching to metal roof decking (excludes concrete on metal deck). This 25 lbs. load and 2'-0" spacing include adjacent electrical and mechanical items hanging from deck. If the hanger restrictions cannot be achieved, supplemental framing off steel framing will need to be added.

H. Arrange supports in vertical runs so the weight of raceways and enclosed conductors is carried entirely by raceway supports, with no weight load on raceway terminals.

I. Supports for metallic conduit shall be no greater than 10 feet. A smaller interval may be used if necessitated by building construction, but in no event shall support spans exceed the Electrical Code requirements. Conduit shall be securely fastened within 3 feet of each outlet box, junction box, device box, cabinet, or fitting.

J. Supports of flexible conduit shall be within 12 inches of each outlet box, junction box, device box, cabinet, or fitting and at intervals not to exceed 4.5 feet.

K. Supports for non-metallic conduit shall be at sufficiently close intervals to eliminate any sag in the conduit. The manufacturer's recommendations shall be followed, but in no event shall support spans exceed the Electrical Code requirements.

L. Where conduit is to be installed in poured concrete floors or walls, provide concrete-tight conduit inserts securely fastened to forms to prevent conduit misplacement.

M. Finish:

1. Prime coat exposed steel hangers and supports. Hangers and supports in crawl spaces, pipe shafts, and above suspended ceiling spaces are not considered exposed.
2. Trim all ends of exposed field fabricated steel hangers, slotted channel and threaded rod to within 1" of support or fastener to eliminate potential injury to personnel unless shown otherwise on the drawings. Smooth ends and install elastomeric insulation with two coats

of latex paint if exposed steel is within 6'-6" of finish floor and presents potential injury to personnel.

3.4 CONDUIT INSTALLATION

A. Conduit Connections:

1. Shorter than standard conduit lengths shall be cut square using industry standards. The ends of all conduits cut shall be reamed or otherwise finished to remove all rough edges.
2. Metallic conduit connections in slab on grade installation shall be sealed and one coat of rust inhibitor primer applied after the connection is made.
3. Where conduits with tapered threads cannot be coupled with standard couplings, then approved split or Erickson couplings shall be used. Running threads will not be permitted.
4. Install expansion/deflection joints where conduit crosses structure expansion/seismic joints.

B. Conduit terminations for all low voltage wiring shall have nylon bushings installed on each end of every conduit run.

C. Conduit Bends:

1. Use a hydraulic one-shot conduit bender or factory elbows for bends in conduit 2" in size or larger. All steel conduit bending shall be done cold; no heating of steel conduit shall be permitted.
2. All bends of rigid polyvinyl chloride conduit (PVC) shall be made with the manufacturer's approved bending equipment. The use of spot heating devices will not be permitted (i.e., blow torches).
3. A run of conduit shall not contain more than the equivalent of four (4) quarter bends (360 degrees), including those bends located immediately at the outlet or body.
4. Telecommunications conduits shall have no more than two (2) 90-degree bends between pull points and contain no continuous sections longer than 100 feet. Insert pull points or pull boxes for conduits exceeding 100 feet in length.

    a. A third bend is acceptable if:

        1) The total run is not longer than (33) feet.
        2) The conduit size is increased to the next trade size.

5. Telecommunications pull boxes shall not be used in lieu of a bend. Align conduits that enter the pull box from opposite ends with each other. Pull box size shall be twelve (12) times the diameter of the largest conduit. Slip sleeves or gutters can be used in place of a pull box.
6. Telecommunications Conduit(s): Maintain appropriate conduit bend radius at all times. For conduits with an internal diameter of less than 2", maintain a bend radius of at least 6 times the internal diameter. For conduits with an internal diameter 2" or greater, maintain a bend radius of at least 10 times the internal diameter.

7. Rigid polyvinyl chloride conduit (PVC) runs longer than 100 feet or runs which have more than two 90-degree equivalent bends (regardless of length) shall use rigid metal or RTRC factory elbows for bends.
8. Use conduit bodies to make sharp changes in direction (i.e., around beams). D. Conduit Placement:

1. Conduit shall be mechanically continuous from source of current to all outlets. Conduit shall be electrically continuous from source of current to all outlets, unless a properly sized grounding conductor is routed within the conduit. All metallic conduits shall be bonded per the Electrical Code.
2. Route exposed conduit and conduit above suspended ceilings (accessible or not) parallel/perpendicular to the building structural lines, and as close to building structure as possible. Wherever possible, route horizontal conduit runs above water and steam piping.
3. Route conduit through roof openings provided for piping and ductwork where possible. If not provided or routing through provided openings is not possible, route through roof jack with pitch pocket. Coordinate roof penetrations with other trades.
4. Conduits, raceway, and boxes shall not be installed in concealed locations in metal deck roofing or less than 1.5" below bottom of roof decking.
5. Avoid moisture traps where possible. Where unavoidable, provide a junction box with drain fitting at conduit low point.
6. All conduits through walls shall be grouted or sealed into openings. Where conduit penetrates firewalls and floors, seal with a UL listed sealant. Seal penetrations with intumescent caulk, putty, or sheet installed per manufacturer's recommendations. All materials used to seal penetrations of firewalls and floors shall be tested and certified as a system per ASTM E814 Standard for fire tests or through-penetration fire stops as manufactured by 3M or approved equal; refer to Section 260503 for through penetration firestopping requirements.
7. CONTRACTOR SHALL BE RESPONSIBLE FOR ALL OPENINGS REQUIRED IN MASONRY OR EXTERIOR WALLS UNDER THIS DIVISION. A QUALIFIED MASON AT THE EXPENSE OF THIS CONTRACTOR SHALL REPAIR ALL OPENINGS TO MATCH EXISTING CONDITIONS.
8. Seal interior of conduit at exterior entries, air handling units, coolers/freezers, etc., and where the temperature differential can potentially be greater than 20F to prevent moisture penetration. Seal shall be placed where conduit enters warm space. Conduit seal fitting shall be a drain/seal, with sealing compound, identified for use with cable and raceway system.
9. Horizontal conduit routing through slabs above grade

    a. Conduits, if run in concrete structure, shall be in middle one-third of slab thickness, and leave at least 3" min. concrete cover. Conduits shall run parallel to each other and spaced at least 8" apart centerline to centerline. Secure raceways to reinforcing rods to prevent sagging or shifting during concrete placement. Maximum conduit outside diameter 1".

10. Do not route conduits across each other in slabs on grade.

11. Contractor shall provide suitable mechanical protection around all conduits stubbed out from floors, walls or ceilings during construction to prevent bending or damaging of stubs due to carelessness with construction equipment.
12. Contractor shall provide a polypropylene pull cord with 2000 lbs. tensile strength in each empty conduit (indoor and outdoor), except in sleeves and nipples.

3.5 CONDUIT TERMINATIONS

A. Where conduit bonding is indicated or required in the contract documents, the bushings shall be a grounding type sized for the conduit and ground bonding conductor as manufactured by OZ/Gedney, Appleton, Thomas & Betts, Burndy, Regal, Orbit Industries or approved equal.

B. Conduits with termination fittings shall be threaded for one (1) lock nut on the outside and one (1) lock nut and bushing on the inside of each box.

C. Where conduits terminate in boxes with knockouts, they shall be secured to the boxes with lock nuts and provided with approved screw type tinned iron bushings or fittings with plastic inserts.

D. Where conduits terminate in boxes, fittings, or bodies with threaded openings, they shall be tightly screwed against the shoulder portion of the threaded openings.

E. Rigid polyvinyl chloride conduit (PVC) shall be terminated using fittings and bodies produced by the manufacturer of the conduit, unless noted otherwise. Prepare conduit as per manufacturer's recommendations before joining. All joints shall be solvent welded by applying full even coat of plastic cement to the entire areas that will be joined. Turn the conduit at least a quarter to one half turn in the fitting and let the joint cure for 1-hour minimum or as per the manufacturer's recommendations.

F. All conduit ends shall be sealed with plastic immediately after installation to prevent the entrance of any foreign matter during construction. The seals shall be removed and the conduits blown clear of all foreign matter prior to any wires or pull cords being installed.

3.6 UNDERGROUND CONDUIT INSTALLATION

A. Conduit Connections:

1. Conduit joints in a multiple conduit run shall be staggered at least one foot apart. B.

Conduit Bends (Lateral):

1. Conduits shall have long sweep radius elbows instead of standard elbows wherever special bends are indicated and noted on the drawings, or as required by the manufacturer of the equipment or system being served.
2. Telecommunications conduit bend radius shall be six times the diameter for conduits under 2" and ten times the diameter for conduits over 2". Where long cable runs are involved, sidewall pressures may require larger radius bends. Coordinate with Architect/Engineer prior to conduit installation to determine bend radius. C. Conduit Elbows (vertical):

1. Minimum metal or RTRC elbow radiuses shall be 30 inches for primary conduits (greater than 600V) and 18 inches for secondary conduits (less than 600V). Increase radius, as required, based on pulling tension calculation requirements.

D. Expansion Fittings at Finished Grade: Provide underground raceways with an expansion fitting after emerging from finished grade and exterior equipment pads. Field locate the expansion fitting above and within 24 inches of finished grade. Raceways extending less than 12 inches above finished grade, transitioning to LFMC within 12 inches of finished grade, and interior concrete building slabs do not require an expansion fitting unless required by code. E. Conduit Placement:

1. Conduit runs shall be pitched a minimum of 4" per 100 feet to drain toward the terminations. Duct runs shall be installed deeper than the minimum wherever required to avoid any conflicts with existing or new piping, tunnels, etc.
2. For parallel runs, use suitable separators and chairs installed not greater than 4' on centers. Band conduit together with suitable banding devices. Securely anchor conduit to prevent movement during concrete placement or backfilling.
3. Where concrete is required, the materials for concreting shall be thoroughly mixed to a minimum f'c = 2500 and immediately placed in the trench around the conduits. No concrete that has been allowed to partially set shall be used.
4. Before the Contractor pulls any cables into the conduit, Contractor shall have a mandrel 1/4" smaller than the conduit inside diameter pulled through each conduit and if any concrete or obstructions are found, the Contractor shall remove them and clear the conduit. Spare conduit shall also be cleared of all obstructions.
5. Conduit terminations in manholes, masonry pull boxes, or masonry walls shall be with malleable iron end bell fittings.
6. All spare conduits not terminated in a covered enclosure shall have its terminations plugged as described above.
7. Ductbanks and conduit shall be installed a minimum of 24" below finished grade, unless otherwise noted on the drawings or elsewhere in these specifications.
8. All non-metallic conduit installed underground outside of a slab shall be rigid. F.

Horizontal Directional Drilling:

1. Entire drill path shall be accurately surveyed, with entry and exit stakes placed and coordinated with other contractors. If using a magnetic guidance system, entire drill path shall be surveyed for any surface geo-magnetic variations or anomalies.
2. Any utility locates within 20 feet of the bore path shall have the exact location physically verified by hand digging or vacuum excavation. Restore inspection holes to original condition after verification.

G. Raceway Seal (Exterior to Raceway):

1. All power, telecommunication, electrical conduits and innerducts shall be sealed between the raceway and the building foundation. The raceway penetration shall be sealed liquidtight, water-tight, non-corrosive.

2. Below Grade Installation Options:

a. Cast-in-place concrete installation.
b. Hydraulic cement, hydraulic group, hydraulic epoxy.
c. Foundation - Underground Sleeves and Seals; refer to Part 2-Products for product information.

3. Above Grade Installation Options:

a. Masonry grout for masonry applications.

H. Raceway Seal (Interior to Raceway, with Cables or Empty):

1. All power, telecommunication, electrical conduits and innerducts, including those with cables, shall be sealed at the building and vault entry. The seal shall prevent the entry of liquids or gases. Seal must be compatible with conductors and raceway system. Spare or unused raceways shall also be sealed.

2. Installation Schedule, nominal size:

a. 2" or less: Duct Seal Bushing or Duct Sealant
b. 2-1/2" through 4": Duct Seal Bushing
c. 5" and 6": Wall Sleeve Duct Seal System

3.7 BOX INSTALLATION SCHEDULE

A. Galvanized steel boxes may be used in:

1. Concealed interior locations above ceilings and in hollow studded partitions.
2. Exposed interior locations in mechanical rooms and in rooms without ceilings; higher than 8' above the highest platform level.
3. Direct contact with concrete except slab on grade. B. Cast boxes shall be used in:

1. Exterior locations.
2. Direct contact with earth.
3. Direct contact with concrete in slab on grade.
4. Wet locations.

3.8 COORDINATION OF BOX LOCATIONS

A. Provide electrical boxes as shown on the drawings, and as required for splices, taps, wire pulling, equipment connections, and code compliance.

B. Electrical box locations shown on the Contract Drawings are approximate, unless dimensioned. Verify location of floor boxes and outlets in offices and work areas prior to rough-in.

C. Locate and install boxes to allow access. Avoid interferences with ductwork, piping, structure, equipment, etc. Recessed luminaires shall not be used as access to outlet, pull, and junction boxes. Where installation is inaccessible, provide access doors. Coordinate locations and sizes of required access doors with the Architect/Engineer and General Contractor. D. Locate and install to maintain headroom and to present a neat appearance.

E. Coordinate locations with Heating Contractor to avoid baseboard radiation cabinets.

3.9 PULL AND JUNCTION BOX INSTALLATION

A. Locate pull boxes and junction boxes above accessible ceilings or in unfinished areas.

B. Support pull and junction boxes independent of conduit.

C. Do not install boxes back-to-back in walls.

1. Provide a minimum horizontal separation of 6 inches between boxes installed on opposite sides of non-rated stud walls.
2. Provide a minimum horizontal separation of 24 inches between boxes installed on opposite sides of fire-rated walls. When the minimum separation cannot be maintained, the box is greater than 16 square inches or the total box area (all trades) per 100 square feet is greater than or equal to 100 square inches, install fire-rated moldable pads to all five sides of the back box to maintain the fire rating of the wall. Install moldable pads in accordance with UL listing for the specific product. Sound insulation pads are not acceptable for use in fire-rated wall applications unless the product carries the necessary fire rating.

D. Install sound insulation pads on all five sides of the back of all boxes in sound-rated wall assemblies. Sound-rated wall assemblies are defined as partition types carrying a Sound Transmission Class (STC) rating.

3.10 EXPOSED BOX INSTALLATION

A. Boxes shall be secured to the building structure with proper size screws, bolts, hanger rods, or structural steel elements.

B. On brick, block and concrete walls or ceilings, exposed boxes shall be supported with no less than two (2) Ackerman-Johnson, Paine, Phillips, or approved equal screw anchors or expansion shields and round head machine screws. Cast boxes shall not be drilled.

C. On steel structures, exposed boxes shall be supported to the steel member by drilling and tapping the member and fastening the boxes by means of round head machine screws.

D. Boxes may be supported on steel members by APPROVED beam clamps if conduit is supported by beam clamps.

E. Boxes shall be fastened to wood structures by means of a minimum of two (2) wood screws adequately large and long to properly support. (Quantity depends on size of box.) F. Wood, plastic, or fiber plugs shall not be used for fastenings.

G. Explosive devices shall not be used unless specifically allowed.

END OF SECTION

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SECTION 260553 - ELECTRICAL IDENTIFICATION

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Nameplates and Signs

1.2 RELATED SECTIONS AND WORK

A. Section 260500 - Basic Electrical Requirements

B. Section 262811 - Arc Reduction Earthing System

1.3 REFERENCES

A. NFPA 70E - Standard for Electrical Safety in the Workplace

B. NFPA 70 - National Electrical Code (NEC)

C. ANSI A13.1 - Standard for Pipe Identification

D. ANSI Z535.4 - Standard for Product Safety Signs and Labels

PART 2 - PRODUCTS

2.1 NAMEPLATES AND SIGNS

A. Engraved, Plastic-Laminated Labels, Signs and Instruction Plates: Engraving stock melamine plastic laminate, 1/16-inch minimum thick for signs up to 20 square inches, or 8 inches in length; 1/8 inch thick for larger sizes. Labels shall be punched for mechanical fasteners. B. Text Sizes:

1. The following information shall be used for text heights, fonts, and size, unless otherwise noted.

a. Text Height: 3/8 inch minimum

C. Baked-Enamel Signs for interior Use: Preprinted aluminum signs, punched, or drilled for fasteners, with colors, legend, and size required for application. Mounting ¼" grommets in corners.

D. Exterior, Metal-Backed, Butyrate Signs: Weather-resistant, nonfading, preprinted, celluloseacetate butyrate signs with 0.0396 inch galvanized-steel backing: and with colors, legend, and size required for application. Mounting 1/4" grommets in corners.

E. Safety Signs: Comply with 29 CFR, Chapter XVII, Part 1910.145.

F. Fasteners for Plastic-Laminated Signs; Self-tapping stainless steel screws or number 10/32 stainless steel machine screws with nuts and flat and lock washers.

2.2 PRODUCT COLORS

A. Adhesive Markings and Field Labels:

1. All Labels: Black letters on white face
2. Normal Power and General Labels: Black letters on white face
3. Control Labels: Black letters on white face
4. Emergency: Red letters on white face B. Nameplates and Signs:

1. NORMAL POWER: Black letters on white face
2. Control Labels: Black letters on white face
3. EMERGENCY: White letters on red face
4. GROUNDING: White letters on green face. C. Raceways and Conduit:

1. Provide color coded conduit as indicated below. Conduit shall be colored by the manufacturer:

a. Normal Power and General Distribution: Silver
b. Fire Alarm System: Red
c. Temperature Controls: Refer to mechanical cover sheet for color
d. Ground: Green D. Box Covers:

1. Box covers shall be painted to correspond with system type as follows:

a. Normal Power and General: Silver
b. Temperature Controls: Refer to mechanical cover sheet for color
c. Ground: Green

2. Box cover colors shall match conduit colors listed above.

E. Conductor Color Identification: Refer to Part 3 for additional information.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Lettering and Graphics: Coordinate names, abbreviations, colors, and other designations used in electrical identification work with corresponding designations specified or indicated. Install numbers, lettering, and colors as required by code.

B. Electrical System Color Chart: This Contractor shall furnish and install framed 8" x 12" charts of the color-coded identification scheme used for the electrical system in all electrical rooms and next to the main fire alarm panel.

C. Install identification devices in accordance with manufacturer's written instruction and requirements of Electrical Code.

D. Sequence of Work: Where identification is to be applied to surfaces that require finish, install identification after completion of finish work. All mounting surfaces shall be cleaned and degreased prior to identification installation.

E. Circuit Identification: Tag or label conductors as follows:

1. Multiple Power or Lighting Circuits in Same Enclosure: Where multiple branch circuits are terminated or spliced in a box or enclosure, label each conductor with source and circuit number.
2. Multiple Control Wiring and Communication/Signal Circuits in Same Enclosure: For control and communications/signal wiring, use wire/cable marking tape at terminations in wiring boxes, troughs, and control cabinets. Use consistent letter/number conductor designations throughout on wire/cable marking tape.
3. Match identification markings with designations used in panelboards shop drawings, Contract Documents, and similar previously established identification schemes for the facility's electrical installations.

F. Apply Danger, Warning, Caution and instruction signs as follows:

1. Install Danger, Warning, Caution or instruction signs where required by Electrical Code, where indicated, or where reasonably required to assure safe operation and maintenance of electrical systems and of the items to which they connect. Install engraved plasticlaminated instruction signs with approved legend where instructions or explanations are needed for system or equipment operation. Install metal-backed butyrate signs for outdoor items.
2. 'Danger' indicates a hazardous situation which, if not avoided, will result in death or serious injury. ANSI standard red background, white letters.
3. 'Warning' indicates a hazardous situation which, if not avoided, could result in death or serious injury. ANSI standard orange background, black letters.
4. 'Caution' indicates a hazardous situation which, if not avoided, may result in minor or moderate injury. ANSI standard yellow background, black letters.

5. Emergency Operating Signs: Install, where required by Electrical Code, where indicated, or where reasonably required to assure safe operation and maintenance of electrical systems and of the items to which they connect, engraved laminate signs with white legend on red background with minimum 3/8-inch high lettering for emergency instructions on power transfer, load shedding, or other emergency operations.

G. Apply circuit/control/item designation labels of engraved plastic laminate for pushbuttons, pilot lights, alarm/signal components, and similar items, except where labeling is specified elsewhere.

H. Install labels parallel to equipment lines at locations as required and at locations for best convenience of viewing without interference with operation and maintenance of equipment.

I. Install ARC FLASH WARNING signs on all switchboards, switchgear, distribution panels, branch panelboards, industrial control panels, and motor control centers.

1. Sample Label:

! WARNING
ARC FLASH AND SHOCK HAZARD
APPROPRIATE PPE REQUIRED
FAILURE TO COMPLY CAN RESULT IN DEATH OR INJURY
REFER TO NFPA 70E

J. Circuits with more than 600V: Identify raceway and cable with "DANGER-HIGH VOLTAGE" in black letters 2 (50mm) inches high on orange background at 10'-0 foot intervals.

1. Entire floor area directly above conduits running beneath and within 12 inches of a basement or ground floor that is in contact with earth or is framed above unexcavated space.
2. Wall surfaces directly external to conduits concealed within wall.
3. All accessible surfaces of concrete envelope around conduits in vertical shafts, exposed in building, or concealed above suspended ceilings.

K. Selective Coordination Label: Install caution signs on all switchboards, distribution panels, panelboards, disconnects, and other equipment with selectively coordinated overcurrent protection devices. Sign at a minimum shall contain:

1. CAUTION: OVERCURRENT DEVICES IN THIS ENCLOSURE ARE SELECTIVELY COORDINATED. EQUIVALENT REPLACEMENTS AND TRIP SETTINGS ARE REQUIRED.

L. Underground Electrical Lines: For exterior underground power, control, signal, and communication lines, install continuous underground plastic line marker located directly above line at 6 (150mm) to 8 (205mm) inches below grade. A single plastic line marker is permitted when the width of the common trench does not exceed 16 inches; provide a second plastic line marker to mark each edge of the trench when 16 inches of width is exceeded. Install line marker for underground wiring, both direct-buried cables and cables in raceway.

3.2 FEEDER AND BRANCH CIRCUIT DIRECTORIES A.

Product:

1. Adhesive labels and field markings
2. Nameplates and signs

B. Feeder Directories Branch: Provide each feeder, branch circuit, feeder modification, and branch circuit modification with a typed circuit directory label. Refer to technical equipment specification sections for additional requirements. Include the following with each label:

1. Load Description: Lighting, receptacles, specific equipment, spare, space, or similar description.
2. Location: Room name, number, location.

C. Provide a factory or custom clear plastic sleeve for each branch panel directory and secure to inside panel cover.

3.3 BOX LABELING

A. Products:

1. Adhesive labels and field markings

B. Identify Junction, Pull and Connection Boxes: Labeling shall be 3/8-inch Kroy tape OR Brother self-laminating vinyl label, letters/numbers color coded same as conduits. C. All junction, pull, and connection boxes shall be identified as follows:

1. For power and lighting circuits, indicate system voltage and identity of contained circuits ("120V, 1LA1-3,5,7").
2. For other wiring, indicate system type and description of wiring ("FIRE ALARM NAC #1").

3.4 CONDUCTOR COLOR CODING

A. Products:

1. All wire and cables shall be color coded by the manufacturer.
2.

B. Color coding shall be applied at all panels, switches, junction boxes, pull boxes, vaults, manholes etc., where the wires and cables are visible and terminations are made. The same color coding shall be used throughout the entire electrical system, therefore maintaining proper phasing throughout the entire project.

C. Colored cable ties shall be applied in groups of three ties of specified color to each conductor at each terminal or splice point starting 3 inches from the termination and spaced at 3- inches centers. Tighten to a snug fit, and cut off excess length.

D. Where more than one nominal voltage system exists in a building or facility, each ungrounded conductor of a multi-wire branch circuit, where accessible, shall be identified by phase and system.

E. Conductors shall be color coded as follows:

1. 120/240 Volt, 3-Wire:

a. A-Phase - Black

b. B-Phase - Red
c. Neutral - White
d. Ground Bond - Green

2. 208Y/120 Volt, 4-Wire:

a. A-Phase - Black
b. B-Phase - Red
c. C-Phase - Blue
d. Neutral - White
e. Ground Bond - Green

3. 480Y/277 Volt, 4-Wire:

a. A-Phase - Brown
b. B-Phase - Orange
c. C-Phase - Yellow
d. Neutral - Gray
e. Ground Bond - Green

4. Grounding Conductors:

a. Equipment grounding conductors, main/system/supply-side bonding jumpers: Green.
b. Isolated Equipment Ground Conductors: Green with colored distinctive yellow stripe along the entire length of the conductor. Isolated ground for feeders, use colored tape with alternating bands of green and yellow to provide a minimum of three bands of green and two bands of yellow.

3.5 POWER DISTRIBUTION EQUIPMENT IDENTIFICATION A.

Products:

1. Nameplates and signs

B. Provide identification on the front of all power distribution equipment such as panelboards, switchboards, switchgear, motor control centers, generators, UPS, storage battery disconnects, transfer switches, etc. Labels shall be visible on the exterior of the gear, correspond to the oneline diagram nomenclature, and identify each cubicle of multi-section gear.

1. Interior Equipment: The identification material shall be engraved plastic-laminated labels.
2. Exterior Equipment: The identification material shall be engraved vinyl labels.
3. Labeling shall include:

a. Equipment type and contract documents designation of equipment.
b. Voltage of the equipment.

c. Name of the upstream equipment and location of the upstream equipment if it is not located within sight.
d. Rating and type of the overcurrent protection device serving the equipment if it is not located within sight ("FED BY 400A/3P BREAKER").
e. Sample Label:

DISTRIBUTION PANEL DP-H1
480Y/277V
FED FROM SWITCHBOARD "SB-1" (LOCATED IN MAIN ELEC ROOM)

4. Provide the following on a separate label, installed below the label above:

a. Available fault current; refer to one-line diagram or panel schedules
b. Date of fault current study; refer to one-line diagram
c. Sample Label:

22,000 AMPS AVAILABLE FAULT CURRENT
DATE OF STUDY: 1 JAN 2017

C. Distribution panelboards and switchboards shall have each overcurrent protection device identified with name and location of the load being served ("AHU-1 LOCATED IN PENTHOUSE 1"). Provide a separate engraved plastic laminate label adjacent to each overcurrent projection device with feeder wire size, feeder wire quantity, conductor material and distance in feet. Provide label separate from load identification label and adjustable trip settings label.

1. Sample Labels for Feeders:

4#3/0 CU & 1#6 CU GND, 125FT
4#250KCM AL & 1#6 GND CU, 125FT
2 SETS 4#400KCM CU & 1#1 GND CU, 125FT

D. Branch panelboards shall be provided with typed panel schedules upon completion of the project. Existing panelboards shall have their existing panel schedules typed, with all circuit changes, additions or deletions also typed on the panel schedules. A copy of all panel schedules for the project shall be turned over as part of the O&M Manuals. Refer to Section 260500 for other requirements.

END OF SECTION

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SECTION 262416 - PANELBOARDS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Service and distribution panelboards: DP-#, DP-#

1.2 RELATED SECTIONS AND WORK

A. Refer to the Electrical Distribution Diagram and Electrical Schedules for size, rating, and configuration.

1.3 REFERENCES

A. NEMA AB 1 - Molded Case Circuit Breakers

B. NEMA PB 1 - Panelboards

C. NEMA PB 1.1 - Instructions for Safe Installation, Operation and Maintenance of Panelboards Rated 600 Volts or Less

D. NEMA PB 1.2 - Application Guide for Ground-fault Protective Devices for Equipment

E. UL 67 - Panelboards

1.4 SUBMITTALS

A. Submit shop drawings for equipment and component devices under provisions of Section 260500.

B. Include outline and support point dimensions, voltage, main bus ampacity, integrated short circuit ampere rating, circuit breaker and fusible switch arrangement and sizes.

C. Selective Coordination Study: Submit study to prove that all essential electrical systems, emergency systems and legally required standby system panelboards are selectively coordinated with all supply side overcurrent protective devices.

D. Refurbished branch panel enclosure documentation for new branch panelboards installed in existing enclosures.

E. Submit manufacturer's instructions under provisions of Section 260500.

1.5 SPARE PARTS

A. Keys: Furnish four (4) each to the Owner.

B. Fuses: Furnish 10% or a minimum of three (3) spare fuses of each type and rating installed to the Owner.

C. Fuse Pullers: Furnish one (1) fuse puller to the Owner.

PART 2 - PRODUCTS

2.1 RATINGS

A. Definitions:

1. Series rated equipment shall be defined as equipment that can achieve a required UL AIC rating with an upstream device such as a main breaker or a combination of devices to meet or exceed a required UL AIC rating. All series rated equipment shall have a permanently attached nameplate indicating that device rating must be maintained. See Section 260553 for additional requirements.
2. Fully rated equipment shall be defined as equipment where all devices in that equipment shall carry a minimum of the AIC rating that is specified.

B. The panelboards for this project shall be fully rated unless otherwise specifically noted in the Drawings or Specifications.

2.2 MAIN AND DISTRIBUTION PANELBOARDS A. General

1. Manufacturers:

a. Square D QMB, I-Line
b. Siemens F2, P4
c. Eaton PRL4, PRL5

B. Panelboards: NEMA PB 1; type as shown on the drawings.

C. Enclosure: NEMA PB 1; Type 1.

D. Provide cabinet front with hinged trim on door to allow access to wiring gutters without removal of trim and flush lock. Door hardware shall provide swing clear operation (180-degree swing). Finish in manufacturer's standard gray enamel.

E. Provide panelboards with copper bus, ratings as scheduled on the drawings. Provide copper ground bus in all panelboards.

F. All spaces shown on the one-line diagram shall be fully prepared spaces for future breakers.

G. Minimum Integrated Short Circuit Rating: 100,000 amperes rms symmetrical for 240-volt panelboards; 50,000 amperes rms symmetrical for 480-volt panelboards, or as shown on the drawings.

H. Fusible Switch Assemblies: NEMA KS 1; quick-make, quick-break, load interrupter enclosed knife switch with externally operable handle. Provide interlock to prevent opening front cover with switch in ON position. Handle lockable in OFF position.

I. Fuse Clips (Switches 600 Amperes and Smaller): Provide with Class 'R' rejection clips. Fuse Clips (601 Amperes and Larger): Designed to accommodate Class 'L' fuses.

J. Molded Case Circuit Breakers: Provide circuit breakers with integral thermal and instantaneous magnetic trip in each pole.

K. Molded Case Circuit Breakers with Current Limiters: Provide circuit breakers with replaceable current limiting elements, in addition to integral thermal and instantaneous magnetic trip in each pole.

L. Current Limiting Molded Case Circuit Breakers: Provide circuit breakers with integral thermal and instantaneous magnetic trip in each pole, coordinated with automatically resetting current limiting elements in each pole. Interrupting rating 100,000 symmetrical amperes, let-through current and energy level less than permitted for same size Class RK-5 fuse.

M. Solid State Molded Case Circuit Breakers: (All breakers identified on plans as solid-state with 1,200 ampere frame sizes and below.) Provide molded case switch with electronic sensing, timing, and tripping circuits for fully adjustable time current characteristic settings including ground fault trip, instantaneous trip, long time trip, long time delay, short time trip, and short time delay. Trip setting shall be field programmable with restricted access and a sealable clear cover.

N. Suitable for use as service entrance equipment. Provide line side (service style) barriers.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install panelboards plumb as indicated on the drawings in conformance with NEMA PB 1.1.

B. Height: 6 feet to handle of highest device.

C. Provide filler plates for unused spaces in panelboards.

D. Provide custom typed circuit directory for each branch circuit panelboard. Provide updated custom typed circuit directory for each existing branch circuit panelboard with new or revised circuits per the scope of work. Label shall include equipment name or final approved room name, room number, and load type for each circuit (examples: SUMP SP-1 or ROOM 101 RECEPT). Revise directory to reflect circuit changes required to balance phase loads. Printed copies of the bid document panel schedules are not acceptable as circuit directories.

3.2 FIELD QUALITY CONTROL

A. Measure steady state load currents at each panelboard feeder. Should the difference at any panelboard between phases exceed 20 percent, rearrange circuits in the panelboard to balance the phase loads within 20 percent. Take care to maintain proper phasing for multi-wire branch circuits.

B. Visual and Mechanical Inspection: Inspect for physical damage, proper alignment, anchorage, and grounding. Check proper installation and tightness of connections for circuit breakers, fusible switches, and fuses.

END OF SECTION

Attachment B

CONTRACT

BETWEEN

THE ANN ARBOR HOUSING DEVELOPMENT CORPORATION

AND

CONTRACTOR NAME

INTRODUCTION

This contract by and between the Ann Arbor Housing Development Corporation (hereinafter "AAHDC" or "the HC"), located at 2000 S. Industrial Highway, Ann Arbor MI 48104 and CONTRACTOR NAME (hereinafter ABREVIATED CONTRACTOR NAME IF APPLICABLE" or "the Contractor"), located at address, is hereby entered into this MONTH DAY, 20__.

Services pursuant to this contract **shall begin MONTH DAY, 20__, and shall end no later than MONTH DAY, 20__** unless otherwise extended, modified, terminated or renewed by the parties as provided for within this contract. Unless otherwise detailed herein, all references to "days" shall be calendar days (in the case that the last day referenced falls on a Saturday, Sunday or legal holiday, then the period of time shall be automatically extended to include the next workday). Also, whenever the term "herein" is referred to, such refers to this contract form, the appendices, and all listed attachments.

1.0 Definitions:

1.1 Housing Commission (HC): Any reference herein or within any appendix to the "Housing Commission" shall be interpreted to mean the same as the AAHC or its affiliated legal entity, the Ann Arbor Affordable Housing Corporation.

1.2 Purchasing Manager (PM): The HC purchasing manager, acting on behalf of the HC.

2.0 Services and Payment:

2.1 Scope of Services: [full, detailed scope of work placed in Appendix No. 1]. Said services shall be provided on the dates and times determined by the HC at the designated HC community and facilities.

2.3 Cost/Value of Services:

2.3.1 Contract Value: The current total Not-To-Exceed (NTE) value of this contract is: $_____. Any other services provided related to this contract must be as negotiated between Contractor and the AAHC.

Contractor exceeds the NTE amount at the Contractor's own risk. The Contractor is under no obligation to provide additional services that would cause the Contractor's fees to exceed the NTE amount without prior revision of this amount by written change order.

2.4 Renewal Options: There are no renewal options with this contract.

2.5 Time Performance: The Contractor will complete each assigned task as detailed within the executed Scope of Services.

2.6 Billing Method:

2.6.1 To receive payment for services rendered pursuant to this contract the Contractor shall submit a fully completed invoice for work previously performed to:

Ann Arbor Housing Development Corporation
HCaccountspayable@a2gov.org
Attn. Accounts Payable
2000 S. Industrial Hwy
Ann Arbor, MI 48104

2.6.2 At a minimum, the invoice shall detail the following information:

2.6.2.1 Unique invoice number;
2.6.2.2 Contractor's name, address and telephone number;
2.6.2.3 Date of invoice and/or billing period;
2.6.2.4 Applicable Purchase Order No.;
2.6.2.5 Brief description of services rendered, including applicable time frame, total hours being billed for each service at each detailed site, and at the approved rate (may be submitted in the form of a report or invoice);
2.6.2.6 If applicable, Task Order, approved by the HC Executive Director; and
2.6.2.7 Total dollar amount being billed.

2.6.3 The HC will pay each such properly completed invoice received on a **Net/30 basis**. Any invoice received not properly completed will not be paid unless and/or until Contractor complies with the applicable provisions of this contract.

3.0 HC's Obligations: The HC agrees to purchase the specific services detailed herein and:

1.1 Agrees to not assign work to the Contractor outside the scope of services without the prior written approval of the HC's Executive Director and the Contractor.

4.0 Contractor's Obligations: Contractor agrees to provide the specific services detailed herein:

4.1 Supervision and Oversight: Contractor shall be solely responsible for providing supervision and oversight to all of the Contractor's personnel that are assigned to the HC properties pursuant to this contract.

4.2 Qualified Personnel: Contractor warrants and represents that it will assign only qualified personnel to perform the services outlined herein and within the appendices. For the purposes of this contract, the term "qualified personnel" shall mean those

personnel that have been investigated, tested and trained in the manner described within this contract and, as proposed by the Contractor within its proposal or as provided by the Contractor during the Contractor's normal conduct of business. "Qualified Personnel" includes Contractor's employees, subcontractors, and agents.

4.2.1 The AAHC will have the right to require the Contractor to remove any personnel deemed incompetent, careless or otherwise objectionable, or any personnel whose actions or appearance are deemed inconsistent with the best interests of the AAHC. The decision of the HC will be final as to what constitutes incompetent or objectionable behavior.

4.2.2 All personnel employed by the Contractor will have the requisite skills to perform their designated tasks. Necessary training shall be performed at the Contractor's expense and untrained individuals will not be brought into the premises for so-called "ON THE JOB" training.

4.3 Compliance with Federal and State Laws: All work performed by the Contractor, pursuant to this contract, shall be done in accordance with applicable all Federal, State and local laws, regulations, codes and ordinances.

4.3.1 Iran Economic Sanctions Act: The Contractor certifies that it is not an Iran linked business as defined by the Michigan Iran Economic Sanctions Act (Michigan Compiled Laws §129.311-16).

4.4 Insurance Requirements:

4.4.1 The Contractor will secure and maintain during the term of the contract insurance from an insurance company authorized to do business in the State of Michigan that will protect Contractors and sub-contractors and the HC from all liability (public liability, personal injury and property damage) claims which may arise from operations under the contract.

4.4.1.1 The Contractor will furnish insurance certificates within seven (7) days of being notified of acceptance of his/her bid. Execution of this contract will not occur until evidence of all required insurance has been submitted and approved by the HCy.

4.4.1.2 Failure to maintain the above-reference insurance coverage, including naming the HC as an additional insured (where appropriate) during the term(s) of this contract shall constitute a material breach thereof. The Contractor must cease work if any of the required insurance is canceled or expires.

4.4.2 The Certificate shall specifically name the ANN ARBOR AFFORDALBE HOUSING CORPORATION and the Ann Arbor Housing Commission as additional insured parties. **In the area for the listing of additional insured on the binder it must read: "The Ann Arbor Housing Commission, and Ann Arbor Housing Development Corporation, acting by and through the Ann Arbor Housing Commission."**

4.4.3 The Contractor shall not allow any work under the contract to be performed by a subcontractor unless evidence of similar insurance covering the activities of the subcontractor is submitted to and approved by the HC.

4.4.4 The limits of insurance shall not be less than the following:

4.4.4.1 Policy of General Liability Insurance, $1,000,000 per occurrence, $2,000,000 aggregate together with damage to premises and fire damage of $300,000 and medical expenses for any one person of $5,000 with a deductible not greater than $1,000.

4.4.4.2 Policy of Professional Liability Insurance or Errors & Omissions coverage, minimum of $1,000,000 each occurrence, general aggregate minimum limit of $2,000,000 with a deductible of not greater than $1,000, when applicable;

4.4.4.3 Automobile Liability coverage in a combined single limit of $1,000,000. For every vehicle utilized during the term of this contract, when not owned by the entity, each vehicle must have evidence of automobile insurance coverage with limits of no less than $50,000/$100,000 and medical pay of $5,000 with a deductible not greater than $1,000.

4.4.4.4 Worker's compensation coverage evidencing carrier and coverage amount required by the State of Michigan.

4.4.4.5 Insurance certificate(s)/endorsement(s) shall be delivered to the following person representing the HC:

ANN ARBOR HOUSING DEVELOPMENT CORPORATION
FINANCIAL DEPARTMENT
HCAccountspayable@a2gov.org
734 794-6720
2000 S. Industrial Hwy
ANN ARBOR, MI 48104

4.5 Licensing: The Contractor shall also provide to the HC a copy of the required State of Michigan Business License. Failure to maintain this license in a current status during the term(s) of this contract shall constitute a material breach thereof.

4.6 Financial Viability and Regulatory Compliance:

4.6.1 If other than an individual/sole proprietor, Contractor warrants and represents that its corporate entity is in good standing with all applicable federal, state and local licensing authorities and that it possesses all requisite licenses to perform the services required by this contract.

4.6.2 Contractor agrees to promptly disclose to the HC any licensure suspension or revocation that adversely affect its capacity to perform this contract. Contractor's failure to immediately disclose such issue to the HC will constitute a material breach of this contract.

4.6.3 Contractor agrees to promptly disclose to the HC any change of more than 50% of its ownership and/or any declaration of bankruptcy that the Contractor undergoes during the term(s) of this contract. Contractor's failure to immediately disclose any change of more than 50% of its ownership and/or its declaration of bankruptcy shall constitute a material breach of this contract.

4.6.4 All disclosures made pursuant to this section of the contract shall be made in writing.

5.0 **Modification:** This contract shall not be modified, revised, amended or extended except by written addendum, executed by both parties.

6.0 **Severability:** If any provision of this agreement or any portion or provision hereof applicable to any particular situation or circumstance is held invalid, the remainder of this agreement or the remainder of such provision (as the case may be), and the application thereof to other situations or circumstances shall not be affected thereby.

7.0 Applicable Laws:

7.1 **Jurisdiction and Venue:** The laws of the State of Michigan shall govern the validity, construction and effect of this contract, unless said laws are superseded by, or conflict with, applicable federal laws and/or federal regulations. This contract will be binding upon the parties, their heirs, beneficiaries, and devisees of the parties hereto. The parties agree that Washtenaw County, Michigan is the appropriate forum for any action relating to this contract. This agreement may be executed in multiple counterparts which shall be considered binding.

7.2 **Interest of Contractor and the Housing Commission**: The Contractor promises that it has no interest which would conflict with the performance of services required by this contract. The Contractor also promises that, in the performance of this contract, no officer, agent, employee of the Commission, or member of its governing bodies, may participate in any decision relating to this contract which affects his/her personal interest or the interest of any corporation, partnership or association in which he/she is directly or indirectly interested or has any personal or pecuniary interest. This paragraph does not apply if all parties are in compliance with the provisions of Michigan Compiled Laws §15.323 and 24 CFR PART 85.36(b), as applicable.

8.0 Notices:

8.1 All legal notices submitted to the HC by the Contractor pursuant to this contract shall be in writing via email, facsimile or other electronic means and delivered to the attention of the following person representing the HC:

ANN ARBOR HOUSING COMMISSION
ATTN: EXECUTIVE DIRECTOR
JHALL@A2GOV.ORG
2000 S. INDUSTRIAL HWY
ANN ARBOR, MI 48104
Ph. 734-794-6720
Fax 734-996-3018

8.2 All legal notices submitted to the Contractor pursuant to this contract shall be in writing via email, facsimile or other electronic means and delivered to the attention of:

ENTITY NAME
EMAIL
ADDRESS LINE 1
ADDRESS LINE 2
Ph. xxx-xxx-xxxx

Fax xxx-xxx-xxxx

9.0 Breach and Retention of Records: The HC and the Contractor each agree to comply with the following provisions:

9.1 Remedies for Contractor Breach: Pertaining to contract-related issues, it is the responsibility of both the HC and the Contractor to communicate with each in as clear and complete a manner as possible. If at any time during the term of this contract the HC or the Contractor is not satisfied with any issue, it is the responsibility of that party to deliver to the other party communication, in writing, fully detailing the issue and corrective action the HC has the right to issue unilateral addendums to this contract, but the Contractor does not have the same right). The other party shall, within 30 days, respond in writing (the HC reserves the right, if conditions warrant, to require the Contractor to respond in a shorter period of time). HC shall, at a minimum, employ the following steps in dealing with the Contractor as to any performance issues:

9.1.1 If the Contractor is in material breach of the contract, the HC may terminate the contract for cause. Such termination must be delivered to the Contractor in writing and shall fully detail the cause of and justification for the termination.

9.1.2 Prior to termination, the HC may choose to warn the Contractor, orally or in writing, of any non-compliant or unsatisfactory performance. Such written warning may include giving the Contractor a certain period of time to correct the deficiencies or potentially suffer termination. If the Contractor does not agree with such action, the Contractor shall have ten 10 days to dispute or protest, in writing, such action; if the Contractor does not do so within the 10-day period, it be deemed to accept and agree with the HC's position on the issue. The written protest must detail all pertinent information pertaining to the dispute, including justification detailing the HC's alleged incorrect action(s).

9.1.3 After termination, if the Contractor does not agree with the HC's justification for the termination, the Contractor shall have 10 days to dispute, in writing, such action; if the Contractor does not do so within the 10-day period, it shall be deemed to accept and agree with the HC's position on the issue. The written protest must detail all pertinent information pertaining to the dispute, including justification detailing the HC's alleged incorrect action(s).

9.1.4 The response to any protest received shall be conducted in accordance with Section No. 4.0 of this document.

9.2 Reporting: The parties hereby agree to comply with any reporting requirements that may be detailed herein.

9.3 Copyrights/Rights in Data: The HC has unlimited rights to any data, including computer software, developed by the Contractor in the performance of the contract.

9.4 Access to Records: Access to any books, documents, papers, and records of the contractor which are directly pertinent to that specific contract for the purpose of making audit, examination, excerpts, and transcriptions.

9.5 **Retention of Records:** Retention of all required records for three years after HC make final payments and all other pending matters are closed.

9.6 **Contractor Certification:** The Contractor hereby assures and certifies that it will comply with all of the applicable requirements of the foregoing sections 10.0-10.6, as the same may be amended from time to time.

10.0 Additional Considerations:

10.1 **Non-Escalation:** Unless otherwise specified within a Request for Proposal or Quote document, the unit prices reflected on the contract shall remain firm with no provision for price increases during the term of the contract.

10.2 **Funding Restrictions and Order Quantities:** The HC reserves the right to reduce or increase estimated or actual quantities in whatever amount necessary without prejudice or liability to the HC, if:

10.2.1 Funding is not available;
10.2.2 Legal restrictions are placed upon the expenditure of monies for this category of service or supplies; or
10.2.3 The HC's requirements in good faith change after award of the contract.

10.3 Unless otherwise stated in a Request for Proposal or Quote document, all local, State or Federal permits which may be required to provide the services ensuing from award of this contract, regardless of whether they are known to HC or Contractor at the time of the proposal submittal deadline or the award, shall be the sole responsibility of the Contractor and any costs submitted by the Contractor in response to a Request for Proposal or Quote shall reflect all costs required by the Contractor to procure and provide such necessary permits.

10.5 **Taxes:** The Housing Commission is exempt from paying Michigan State Sales and Use Taxes and Federal Excise Taxes. A letter of Tax Exemption will be provided upon request. MI

10.6 **Government Standards:** It is the responsibility of the proposer to ensure that all items and services proposed conform to all local, State and Federal law concerning safety (OSHA and MIOSHA) and environmental control (EPA and City of Ann Arbor Pollution Regulations) and any other ordinance, code, law or regulation. Contractor shall be responsible for all costs incurred for compliance with any such possible ordinance, code, law or regulation. No time extensions shall be granted or financial consideration given to the Contractor for time or monies lost due to violations of any ordinance, code, law or regulations that may occur.

10.7 **Freight on Bill and Delivery:** All costs submitted by the proposer shall reflect the cost of delivering the proposed items and/or services to the locations(s) specified within the proposal.

10.7.1 Contractor agrees to deliver to the designated location(s) on or before the date as specified in the finalized contract. Failure to deliver on or before the specified date constitutes an event of default by Contractor. Upon default, Contractor agrees that the HC may, at its option, rescind this contract under the default clause herein and seek compensatory damages as provided by law.

10.8 **Backorders:**

10.8.1 The HC PM must be notified in writing by the Contractor within 10 days of any and all backordered materials and/or any incomplete services; and the estimated delivery date.

10.8.2 Unless otherwise stipulated in the contract, if any order will be delayed more than 10 days past the original agreed upon delivery date, the HC may at its option cancel the order, if, in the opinion of the HC PM, it is in the best interests of the HC to do so.

10.9 Work on HC Property: If the Contractor's work under the contract involves operations by the Contractor on HC premises, the Contractor shall take all necessary precautions to prevent the occurrence of any injury to persons or property during the progress of such work and, except to the extent that any such injury is caused solely and directly by the HC's negligence, shall indemnify the HC, and its officers, agents, servants and employees against all loss which may result in any way from any act or omission of the Contractor, its agents, employees, or subcontractors.

10.9.1 The Contractor shall be responsible for repairing any unintentional damage that the Contractor causes during the course of the Contractor's work. Such damages include, but are not limited to, ruts caused by machinery or breaking paving materials not included in this contract.

10.10 Official, Agent and Employees of the HC Not Personally Liable: No official, officer, employee, or agent of the HC in any way be personally liable or responsible for any covenant or agreement herein contained whether expressed or implied, or for any statement, representation or warranty made herein or in any connection with this agreement.

10.11 Sub-Contractors: Unless otherwise stated, the Contractor may not use any sub-contractors to accomplish any portion of the services described within the documents or the contract without the prior written permission of the HC PM.

10.12 Salaries and Expenses Relating to the Contractors Employees: Unless otherwise stated within the procurement documents, the Contractor shall pay all salaries and expenses of, and all Federal, Social Security taxes, Federal and State Unemployment taxes, and any similar taxes relating to its employees used in the performance of the contract. The Contractor shall comply with all Federal, State and local wage and hour laws and all licensing laws applicable to its employees or **other** personnel furnished under this agreement.

10.13 Attorney Fees: In the event that litigation is commenced by one party against the other in connection with the enforcement of any provision of this agreement, and the Contractor is the losing party, Contractor shall pay all of HC's court costs and other expenses of such litigation, including reasonable attorney fees. The attorney fees shall be taxed to the Contractor as costs of the suit, unless prohibited by law.

10.14 Independent Contractor: Contractor is an independent Contractor. Nothing herein shall create any association, agency, partnership or joint venture between the parties hereto and neither shall have any authority to bind the other in any way.

10.15 Waiver of Breach: A waiver of either party of any terms or condition of this agreement in any instance shall not be deemed or construed as a waiver of such term or condition for the future, or of any subsequent breach thereof. All remedies, rights, undertakings, obligations, and agreements contained in this agreement shall be cumulative and none of them shall be in limitation of any other remedy, right, obligation or agreement of either party.

10.16 Time of the Essence: Time is of the essence under this agreement as to each provision in which time of performance is a factor.

10.17 Limitation of Liability: In no event shall the HC be liable to the Contractor for any indirect, incidental, consequential or exemplary damages.

10.18 Indemnification:

10.18.1 The Contractor shall indemnify, defend, and hold the HC (and its officers, employees, and agents) harmless from and against any and all claims, damages, losses, suits, actions, decrees, judgments, attorney fees, court costs and other expenses of any kind or character, which are caused by, arise out of, or occur due to any failure of the Contractor to (1) abide by any of the applicable professional standards within its industry, or (2) comply with the terms, conditions, or covenants that are contained in this contract,
(3) comply with the "Michigan Industrial Insurance Act," or any other law, ordinance, or decree; or (4) ensure that the any sub-contractors abide by the terms of this provision and this contract; provided, however, that Contractor will not be required to indemnify the HC against any loss or damage which was specifically caused by the HC providing inaccurate information to the Contractor, failing to provide necessary and requested information to the Contractor, or refusal to abide by any recommendation of the Contractor.

10.18.2 The Contractor shall, at its own expense, defend the HC, its officers, employees, and agents, against any and all claims, suits or actions which may be brought against them, or any of them, as a result of, or by reason of, or arising out of, or on account of, or in consequence of any act or failure to act the consequences of which the Contractor has indemnified the HC. If the Contractor shall fail to do so, the HC shall have the right, but not the obligation, to defend the same and to charge all direct and incidental costs of such defense to the Contractor including attorney fees and court costs.

10.18.3 Any money due to the Contractor under and by virtue of this contract, which the HC believes must be withheld from the Contractor to protect the HC, may be retained by the HC so long as it is reasonably necessary to ensure the HC's protection; or in case no money is due, its surety may be held until all applicable claims have been settled and suitable evidence to that effect furnished to the HC provided, however, neither the Corporation's payments shall not be withheld, and its surety shall be released, if the Contractor is able to demonstrate that it has adequate liability and property damage insurance to protect the HC from any potential claims.

10.18.4 The Contractor shall provide that any contractual arrangement with a sub-contractor shall be in conformance with the terms of this Contract including the terms of this indemnity provision. The Contractor guarantees that it will promptly handle and rectify any and all claims for materials, supplies and

labor, or any other claims that may be made against it or any of its sub-contractors in connection with the contract.

11.0 Appendices:

11.1 The following noted documents are placed under each of the noted appendix and are a part of this contract:

Appendix No. 1: Scope of Work

Appendix No. 2: Contractor Certification of Asbestos-Free Product Installation

11.2 In the case of any discrepancy between this contract and any of the above noted documents, the requirement(s) listed within the body of this contract shall take precedence, then the requirement(s) listed within each appendix shall take precedence in the order they are listed above (i.e. the requirement(s) listed the lower listed item may not supercede any requirement(s) within a higher listed item), except as otherwise required by law.

11.3 Any document referenced herein that has not been attached is hereby incorporated herein by reference, and a copy of each such document is available from the HC upon written request.

12.0 CERTIFICATIONS:

The undersigned representatives of each party acknowledge by signature below that they have reviewed the foregoing and understand and agree to abide by their respective obligations as detailed herein:

By:_____ **DATE:**_____

FIRST LAST
TITLE
ENTITY
ADDRESS LINE 1
ADDRESS LINE 2
EMAIL
PHONE

By:_____ **DATE:**_____

Jennifer Hall, Secretary-Treasurer
Ann Arbor Housing Development Corporation
2000 S. Industrial Hwy
Ann Arbor, MI 48104
734-794-6721

Appendix No. 1: Full Scope of Work

Addendix No 2:

Employer/Employee/Tenant Notification

As required by the OSHA Regulation building and/or facility owners shall notify the following persons of the presence, location and quantity of ACM or PACM, at the work sites in their buildings and facilities. Notification either shall be inwriting or shall consist of a personal communication between the owner and the person to whom notification must be given or their authorized representative:

A. Prospective employers applying or bidding for work whose employees reasonably can be expected to work inadjacent to areas containing such material;

B. Employees of the owner who will work in or adjacent to areas containing such materials;

C. On Multi-employer worksites, all employers of employees who will be performing work within or adjacent toareas containing such material;

D. Tenants who will occupy areas containing such materials.

Please complete this form and return it to: _____

_____

I _____, representing and having authority for_____(company), hereby indicate and agree that a representative of the building/facility,_____(name), (title) has provided me information regarding the specific locations and materials that are asbestos-containing and which may be encountered or have the potential of being encountered during the courseof activities involving _____(project name and/or number) in the above-mentioned building.

I expressly agree that neither I, nor any of my employees, agents, sub-contractors or other individuals or entities over whom I have any responsibility or control, will disturb asbestos-containing materials for the above- mentioned building. Ifurther understand and agree that should I, my employees, agents, sub-contractors or other individuals or entities over whom I have control, encounter any material(s) suspected of containing asbestos, said material(s) shall not be disturbed without first notifying the office of the building/facility owner, and receiving written approval that such material(s) maybe disturbed.

_____
Print Name

_____
Signature

_____
Company

_____
Position

_____
Date

Contractor Certification of Asbestos-Free Product Installation

Name of building: _____

1. Contractor name and address:

_____
Name

_____
Street City State Zip

2. Brief scope of contracted activities:

_____

_____

_____

3. Certification statement:

I _____, representing and having authority for _____ _____(company), hereby certify that any and all products/materials which will be and/or have been installed or introduced into the above-mentioned building, _____ (project name and/or number) are asbestos free (or less than 1% asbestos by weight).

_____
Print Name

_____
Signature

_____
Company

_____
Position

_____
Date

ATTACHMENT C
LEGAL STATUS OF BIDDER

(The bidder shall fill out the appropriate form and strike out the other three.)

Bidder declares that it is:

* A corporation organized and doing business under the laws of the State of _____, for whom _____, bearing the office title of _____, whose signature is affixed to this Bid, is authorized to execute contracts.

NOTE: If not incorporated in Michigan, please attach the corporation's Certificate of Authority

• A limited liability company doing business under the laws of the State of _____, whom _____ bearing the title of _____ whose signature is affixed to this proposal, is authorized to execute contract on behalf of the LLC.

* A partnership, organized under the laws of the state of _____ and filed in the county of _____, whose members are (list all members and the street and mailing address of each) (attach separate sheet if necessary):

_____

_____

_____

_____

_____

* An individual, whose signature with address, is affixed to this Bid: _____ (initial here)

Authorized Official

_____ **Date** _____**,** 202_

(Print) Name _____ Title _____

Company: _____

Address: _____

Contact Phone ( ) _____ Fax ( ) _____

Email _____

ATTACHMENT D

BID FORM

Company: _____

Schedule of Pricing/Cost –

No.	Item Description	Price
1	Material	$
2	Labor	$
3	Permits	$
4	General Conditions/Other	$
5	Contractor's Fee	$

Base Bid $ _____

Voluntary Alternate # _____

Description:

Add/(Deduct) $ _____

_____

Name Title Date

ATTACHMENT E

Non-Discrimination Ordinance Poster

CITY OF ANN ARBOR NON-DISCRIMINATION ORDINANCE

Relevant provisions of Chapter 112, Nondiscrimination, of the Ann Arbor City Code are included below.
You can review the entire ordinance at www.a2gov.org/humanrights.

Intent: **It is the intent of the city that no individual be denied equal protection of the laws; nor shall any individual be denied the enjoyment of his or her civil or political rights or be discriminated against because of actual or perceived age, arrest record, color, disability, educational association, familial status, family responsibilities, gender expression, gender identity, genetic information, height, HIV status, marital status, national origin, political beliefs, race, religion, sex, sexual orientation, source of income, veteran status, victim of domestic violence or stalking, or weight.**

Discriminatory Employment Practices: **No person shall discriminate in the hire, employment, compensation, work classifications, conditions or terms, promotion or demotion, or termination of employment of any individual. No person shall discriminate in limiting membership, conditions of membership or termination of membership in any labor union or apprenticeship program.**

Discriminatory Effects: **No person shall adopt, enforce or employ any policy or requirement which has the effect of creating unequal opportunities according to actual or perceived age, arrest record, color, disability, educational association, familial status, family responsibilities, gender expression, gender identity, genetic information, height, HIV status, marital status, national origin, political beliefs, race, religion, sex, sexual orientation, source of income, veteran status, victim of domestic violence or stalking, or weight for an individual to obtain housing, employment or public accommodation, except for a bona fide business necessity. Such a necessity does not arise due to a mere inconvenience or because of suspected objection to such a person by neighbors, customers or other persons.**

Nondiscrimination by City Contractors: **All contractors proposing to do business with the City of Ann Arbor shall satisfy the contract compliance administrative policy adopted by the City Administrator in accordance with the guidelines of this section. All city contractors shall ensure that applicants are employed and that employees are treated during employment in a manner which provides equal employment opportunity and tends to eliminate inequality based upon any classification protected by this chapter. All contractors shall agree not to discriminate against an employee or applicant for employment with respect to hire, tenure, terms, conditions, or privileges of employment, or a matter directly or indirectly related to employment, because of any applicable protected classification. All contractors shall be required to post a copy of Ann Arbor's Non- Discrimination Ordinance at all work locations where its employees provide services under a contract with the city.**

Complaint Procedure: **If any individual believes there has been a violation of this chapter, he/she may file a complaint with the City's Human Rights Commission. The complaint must be filed within 180 calendar days from the date of the individual's knowledge of the allegedly discriminatory action or 180 calendar days from the date when the individual should have known of the allegedly discriminatory action. A complaint that is not filed within this timeframe cannot be considered by the Human Rights Commission. To file a complaint, first complete the complaint form, which is available at www.a2gov.org/humanrights. Then submit it to the Human Rights Commission by e- mail (hrc@a2gov.org), by mail (Ann Arbor Human Rights Commission, PO Box 8647, Ann Arbor, MI 48107), or in person (City Clerk's Office). For further information, please call the commission at 734-794-6141 or e-mail the commission at hrc@a2gov.org.**

Private Actions For Damages or Injunctive Relief: **To the extent allowed by law, an individual who is the victim of discriminatory action in violation of this chapter may bring a civil action for appropriate injunctive relief or damages or both against the person(s) who acted in violation of this chapter.**

THIS IS AN OFFICIAL GOVERNMENT NOTICE AND
MUST BE DISPLAYED WHERE EMPLOYEES CAN READILY SEE IT.

2017 Rev. 0

ATTACHMENT F

Non-Discrimination Ordinance Compliance Form

CITY OF ANN ARBOR DECLARATION OF COMPLIANCE

Non-Discrimination Ordinance

The "non discrimination by city contractors" provision of the City of Ann Arbor Non-Discrimination Ordinance (Ann Arbor City Code Chapter 112, Section 9:158) requires all contractors proposing to do business with the City to treat employees in a manner which provides equal employment opportunity and does not discriminate against any of their employees, any City employee working with them, or any applicant for employment on the basis of actual or perceived age, arrest record, color, disability, educational association, familial status, family responsibilities, gender expression, gender identity, genetic information, height, HIV status, marital status, national origin, political beliefs, race, religion, sex, sexual orientation, source of income, veteran status, victim of domestic violence or stalking, or weight. It also requires that the contractors include a similar provision in all subcontracts that they execute for City work or programs.

In addition the City Non-Discrimination Ordinance requires that all contractors proposing to do business with the City of Ann Arbor must satisfy the contract compliance administrative policy adopted by the City Administrator. A copy of that policy may be obtained from the Purchasing Manager

The Contractor agrees:

(a) To comply with the terms of the City of Ann Arbor's Non-Discrimination Ordinance and contract compliance administrative policy, including but not limited to an acceptable affirmative action program if applicable.

(b) To post the City of Ann Arbor's Non-Discrimination Ordinance Notice in every work place or other location in which employees or other persons are contracted to provide services under a contract with the City.

(c) To provide documentation within the specified time frame in connection with any workforce verification, compliance review or complaint investigation.

(d) To permit access to employees and work sites to City representatives for the purposes of monitoring compliance, or investigating complaints of non-compliance.

The undersigned states that he/she has the requisite authority to act on behalf of his/her employer in these matters and has offered to provide the services in accordance with the terms of the Ann Arbor Non-Discrimination Ordinance. The undersigned certifies that he/she has read and is familiar with the terms of the Non-Discrimination Ordinance, obligates the Contractor to those terms and acknowledges that if his/her employer is found to be in violation of Ordinance it may be subject to civil penalties and termination of the awarded contract.

_____
Company Name

_____
Signature of Authorized Representative Date

_____
Print Name and Title

_____
Address, City, State, Zip

_____
Phone/Email Address

Questions about the Notice or the City Administrative Policy, Please contact:
Procurement Office of the City of Ann Arbor (734)
794-6500

ATTACHMENT G

City of Ann Arbor Living Wage Ordinance

CITY OF ANN ARBOR
LIVING WAGE ORDINANCE

RATE EFFECTIVE APRIL 30, 2025 - ENDING APRIL 29, 2026

$17.08 per hour
If the employer provides health care benefits*

$19.04 per hour
If the employer does **NOT** provide health care benefits*

Employers providing services to or for the City of Ann Arbor or recipients of grants or financial assistance from the City of Ann Arbor for a value of more than $10,000 in a twelve-month period of time must pay those employees performing work on a City of Ann Arbor contract or grant, the above living wage.

ENFORCEMENT

The City of Ann Arbor may recover back wages either administratively or through court action for the employees that have been underpaid in violation of the law. Persons denied payment of the living wage have the right to bring a civil action for damages in addition to any action taken by the City.

Violation of this Ordinance is punishable by fines of not more than $500/violation plus costs, with each day being considered a separate violation. Additionally, the City of Ann Arbor has the right to modify, terminate, cancel or suspend a contract in the event of a violation of the Ordinance.

* Health Care benefits include those paid for by the employer or making an employer contribution toward the purchase of health care. The employee contribution must not exceed $.50 an hour for an average work week; and the employer cost or contribution must equal no less than $1/hr for the average work week.

The Law Requires Employers to Display This Poster Where Employees Can Readily See It.

For Additional Information or to File a Complaint contact Colin Spencer at 734/794-6500 or cspencer@a2gov.org

ATTACHMENT H
LIVING WAGE DECLARATION OF COMPLIANCE FORM

CITY OF ANN ARBOR
LIVING WAGE ORDINANCE DECLARATION OF COMPLIANCE

The Ann Arbor Living Wage Ordinance (Section 1:811-1:821 of Chapter 23 of Title I of the Code) requires that an employer who is (a) a contractor providing services to or for the City for a value greater than $10,000 for any twelve- month contract term, or (b) a recipient of federal, state, or local grant funding administered by the City for a value greater than $10,000, or (c) a recipient of financial assistance awarded by the City for a value greater than $10,000, shall pay its employees a prescribed minimum level of compensation (i.e., Living Wage) for the time those employees perform work on the contract or in connection with the grant or financial assistance. The Living Wage must be paid to these employees for the length of the contract/program.

Companies employing fewer than 5 persons and non-profits employing fewer than 10 persons are exempt from compliance with the Living Wage Ordinance. If this exemption applies to your company/non-profit agency please check here [___] *No. of employees* __

The Contractor or Grantee agrees:

(a) To pay each of its employees whose wage level is not required to comply with federal, state or local prevailing wage law, for work covered or funded by a contract with or grant from the City, no less than the Living Wage. The current Living Wage is defined as $17.08/hour for those employers that provide employee health care (as defined in the Ordinance at Section 1:815 Sec. 1 (a)), or no less than $19.04/hour for those employers that do not provide health care. The Contractor or Grantor understands that the Living Wage is adjusted and established annually on April 30 in accordance with the Ordinance and covered employers shall be required to pay the adjusted amount thereafter to be in compliance with Section 1:815(3).

Check the applicable box below which applies to your workforce

[___] Employees who are assigned to any covered City contract/grant will be paid at or above the applicable living wage without health benefits

[___] Employees who are assigned to any covered City contract/grant will be paid at or above the applicable living wage with health benefits

(b) To post a notice approved by the City regarding the applicability of the Living Wage Ordinance in every work place or other location in which employees or other persons contracting for employment are working.

(c) To provide to the City payroll records or other documentation within ten (10) business days from the receipt of a request by the City.

(d) To permit access to work sites to City representatives for the purposes of monitoring compliance, and investigating complaints or non-compliance.

(e) To take no action that would reduce the compensation, wages, fringe benefits, or leave available to any employee covered by the Living Wage Ordinance or any person contracted for employment and covered by the Living Wage Ordinance in order to pay the living wage required by the Living Wage Ordinance.

The undersigned states that he/she has the requisite authority to act on behalf of his/her employer in these matters and has offered to provide the services or agrees to accept financial assistance in accordance with the terms of the Living Wage Ordinance. The undersigned certifies that he/she has read and is familiar with the terms of the Living Wage Ordinance, obligates the Employer/Grantee to those terms and acknowledges that if his/her employer is found to be in violation of Ordinance it may be subject to civil penalties and termination of the awarded contract or grant of financial assistance.

Company Name	Street Address
Signature of Authorized Representative Date	City, State, Zip
Print Name and Title	Phone/Email address

ATTACHMENT I

VENDOR CONFLICT OF INTEREST DISCLOSURE FORM

Vendor Conflict of Interest Disclosure Form

All vendors interested in conducting business with the City of Ann Arbor must complete and return the Vendor Conflict of Interest Disclosure Form in order to be eligible to be awarded a contract. Please note that all vendors are subject to comply with the City of Ann Arbor's conflict of interest policies as stated within the certification section below.

If a vendor has a relationship with a City of Ann Arbor official or employee, an immediate family member of a City of Ann Arbor official or employee, the vendor shall disclose the information required below.

1. No City official or employee or City employee's immediate family member has an ownership interest in vendor's company or is deriving personal financial gain from this contract.
2. No retired or separated City official or employee who has been retired or separated from the City for less than one (1) year has an ownership interest in vendor's Company.
3. No City employee is contemporaneously employed or prospectively to be employed with the vendor.
4. Vendor hereby declares it has not and will not provide gifts or hospitality of any dollar value or any other gratuities to any City employee or elected official to obtain or maintain a contract.
5. Please note any exceptions below:

Conflict of Interest Disclosure*	
Name of City of Ann Arbor employees, elected officials or immediate family members with whom there may be a potential conflict of interest.	( ) Relationship to employee _____ ( ) Interest in vendor's company ( ) Other (please describe in box below)

*Disclosing a potential conflict of interest does not disqualify vendors. In the event vendors do not disclose potential conflicts of interest and they are detected by the City, vendor will be exempt from doing business with the City.

I certify that this Conflict of Interest Disclosure has been examined by me and that its contents are true and correct to my knowledge and belief and I have the authority to so certify on behalf of the Vendor by my signature below:		
Vendor Name	**Vendor Phone Number**	
Signature of Vendor Authorized Representative	**Date**	**Printed Name of Vendor Authorized Representative**

Questions about this form? Contact Procurement Office City of Ann Arbor Phone: 734/794-6500, procurement@a2gov.org

ATTACHMENT J

Responsible Bidder Questionnaire

How long have you been in business?

_____

What level of experience does your key staff have?

_____
_____
_____
_____

Has your company been profitable for at least the last 3 out of 5 years? _____

Please list 3 vendors with whom you have an active line of credit.

_____
_____
_____

How many jobs do you plan to have running concurrently with this one? _____

How many full-time staff do you have?

_____

Who is the contact at your company for billing questions?

_____

Have you ever been sued? What was it over and what was the result? Do you have any pending claims or active litigation involving performance under a contract?

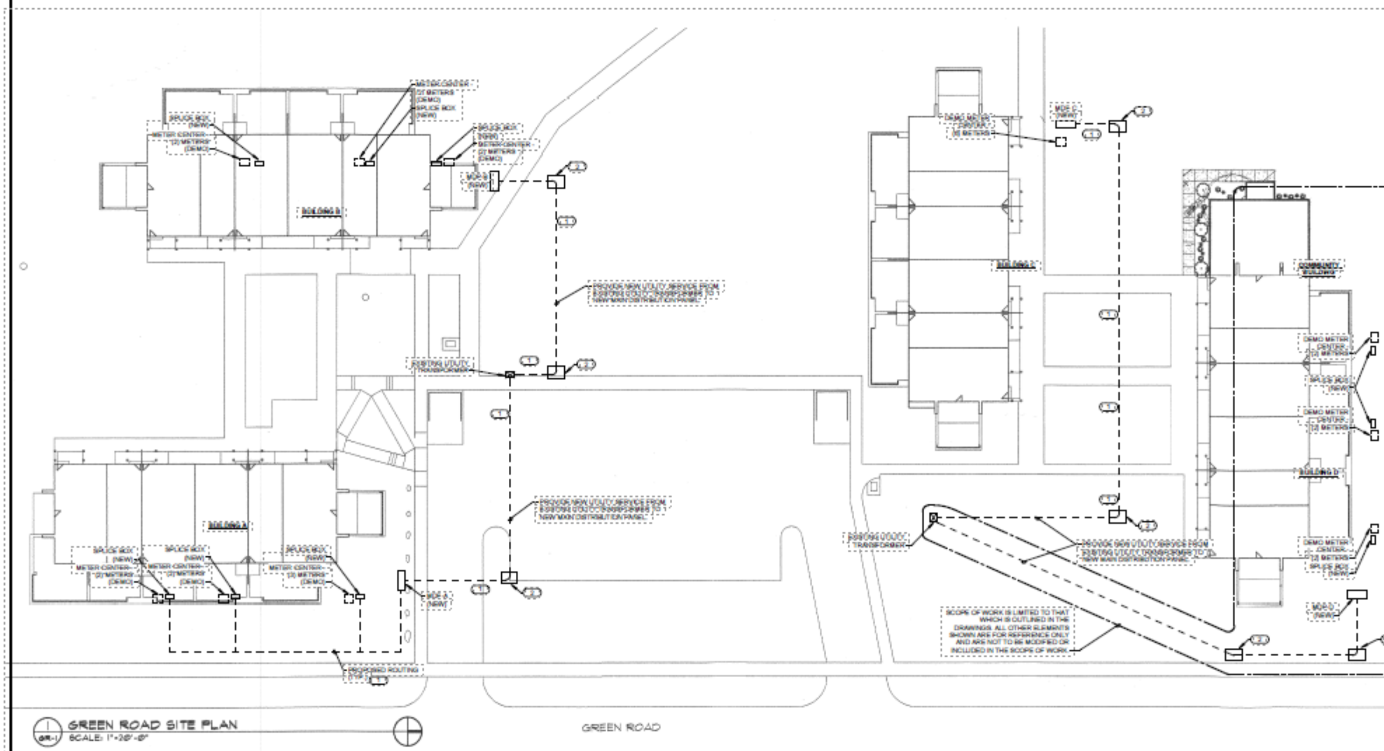
_____
_____
_____
_____

Are you qualified and eligible to receive an award under applicable laws and regulations, including not being suspended, debarred or under a HUD-imposed LDP? _____

ATTACHMENT K
IMEG DRAWINGS

ELECTRICAL KEY NOTES

1. CONTRACTOR RESPONSIBLE FOR ANY DAMAGE TO SIDEWALK CONCRETE AND SHALL REPAIR ANY DAMAGE WHEN ROUTING CONDUIT.
2. NEW ELECTRICAL QUAZITE BOX APPROXIMATE SIZE IS 24"L X 24"W X 24"D



Ann Arbor Housing
Green Baxter

AACH CPF 501-03 Green Road
Ann Arbor, MI

IMEG

201 S. ANN ARBOR STREET
SALINE, MI 48176
P: 734.429.9900

PROFESSIONAL SEAL

CONSULTANT

KEY PLAN

AGENCY APPROVAL

DISCLAIMER

REVISIONS

No.	Date	Revision / Issue
1	4/18/2025	PROGRESS SET

SHEET INFORMATION

Issue	Permit Set
Date	8/15/25
Project #	23004726.00
Drawn	DavHam
Checked	AndDzi
Approved	AndDzi

SHEET TITLE

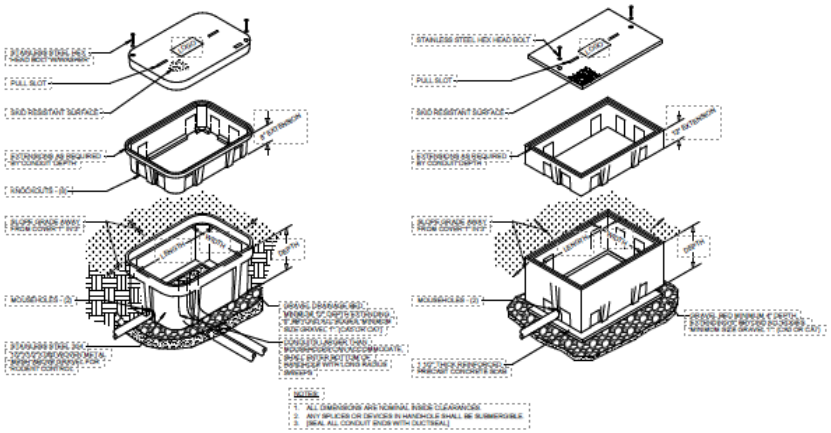
LEVEL 01 PLAN - POWER

SCALE

Scale

SHEET NUMBER

E201



1 EXTERIOR HANDHOLE DETAIL
NO SCALE

Ann Arbor Housing
Green Baxter
AACH CPF 501-03 Green Road
Ann Arbor, MI

IMEG
201 S. ANN ARBOR STREET
SALINE, MI 48176
P 734.429.8600

PROFESSIONAL SEAL

CONSULTANT

SEAL/ROE

AGENCY APPROVAL

DISCLAIMER

REVISIONS

No.	Date	Description

SHEET INFORMATION

Issue	Permit Set
Date	8/18/25
Project #	23004726.00
Drawn	Author
Checked	Checker
Scale	As shown

SHEET TITLE
ELECTRICAL DETAILS

SCALE
Note 12" = 1'-0"

SHEET NUMBER
E400

8/18/2025 10:23:33 AM Green Baxter
23004726.00

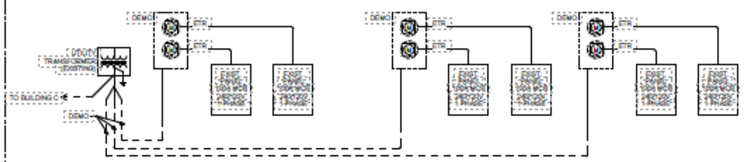
ELECTRICAL GENERAL NOTES:

1. THE EXISTING RESIDENTIAL UNITS ARE CURRENTLY METERED SEPARATELY.
2. A NEW SINGLE METER, PER BUILDING, WILL BE PROVIDED. A NEW SERVICE WILL BE FED FROM THE EXISTING UTILITY TRANSFORMER TO THE NEW METER BASE.
3. A NEW MAIN DISTRIBUTION PANEL (MDP) SHALL BE PROVIDED AND SHALL BE USED TO REFEED THE EXISTING RESIDENTIAL UNITS.
4. NEW INDIVIDUAL FEEDERS SHALL BE PROVIDED FROM THE MDP TO A SPLICE BOX TO INTERCEPT THE EXISTING RESIDENTIAL PANEL FEEDERS.

ELECTRICAL KEY NOTES

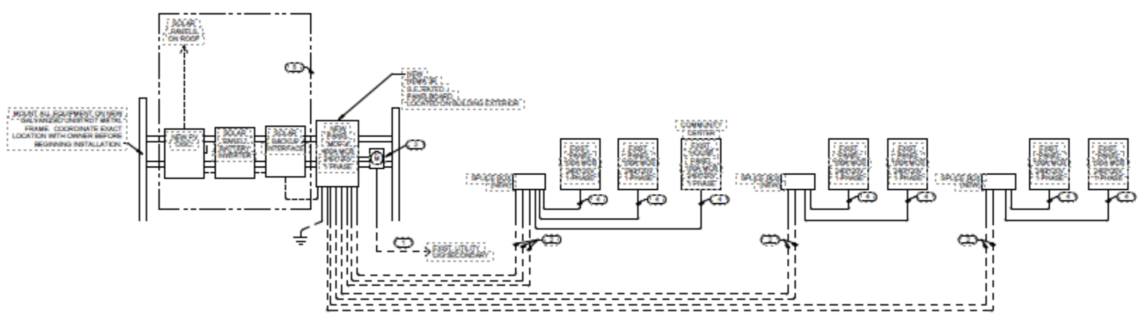
1. PROVIDE NEW 3 #500 KCMIL, #3 EGC, 4"C UTILITY SERVICE FROM EXISTING UTILITY TRANSFORMER TO NEW MAIN DISTRIBUTION PANEL.
2. PROVIDE NEW FEEDER CONDUCTORS TO NEW EXTERIOR MOUNTED SPLICE BOX, SPLICE TO EXISTING TENANT FEEDERS. REFER TO KEYNOTE 4 FOR ADDITIONAL INFORMATION.
3. PROVIDE NEW 400A METER BASE. COORDINATE METER TYPE WITH ELECTRIC UTILITY COMPANY.
4. REUSE EXISTING FEEDER CONDUCTOR ASSEMBLY TO TENANT PANEL. CONTRACTOR SHALL VERIFY THAT EXISTING FEEDERS MEET CURRENT AND LOCAL BUILDING CODES.
5. SOLAR EQUIPMENT DESIGN, AND INSTALLATION PROVIDED UNDER SEPERATE CONTRACT. SOLAR EQUIPMENT WILL BE INSTALLED ON STRUCTURE PROVIDED UNDER THIS CONTRACT.

SCOPE OF WORK IS LIMITED TO THAT WHICH IS OUTLINED IN THE DRAWINGS. ALL OTHER ELEMENTS SHOWN ARE FOR REFERENCE ONLY AND ARE NOT TO BE MODIFIED OR INCLUDED IN THE SCOPE OF WORK.



1 DEMO WORK RISER DIAGRAM - BUILDING D

NO SCALE



2 NEW WORK RISER DIAGRAM - BUILDING D

NO SCALE

Ann Arbor Housing
Green Baxter

AACH CPF 501-03 Green Road
Ann Arbor, MI

IMEG

201 S. ANN ARBOR STREET
SALINE, MI 48176
P: 734.429.8600

PROFESSIONAL SEAL

STATE OF MICHIGAN
ANDREW J. DZIENNY
License No.
6201309704

CONSULTANT

KEY PLAN

AGENCY APPROVAL

DISCLAIMER

REF. SCALE IN INCHES
PROJECT MANAGER

REVISIONS

No.	Date	Revision / Issue
1	4/18/2025	PROGRESS SET

SHEET INFORMATION

Issue	Permit Set
Date	8/15/25
Project #	23004726.00
Drawn	DavHam
Checked	AndDzi
Approved	AndDzi

SHEET TITLE

ELECTRICAL DIAGRAMS - BUILDING D

SCALE

Scale: 12" = 1'-0"

SHEET NUMBER

E503

23004726.00 8/15/2025 10:32:35 AM Green Baxter

PANEL MDP-A

MOUNTING: SURFACE
ENCLOSURE: NEMA 3R

SINGLE TUB
SOLID NEUTRAL
GROUND BUS

MAIN: 400 MCB
VOLTS: 120/240 Single
PHASE: 1
WIRE: 3
SCCR: 40 kA

NOTES: NEW MAIN DISTRIBUTION PANEL FOR BUILDING A

KEY	CKT NO.	LOAD DESCRIPTION	OCPD AMPS	OCPD P	WIRE SIZE H	WIRE SIZE N	WIRE SIZE G	A		B		WIRE SIZE G	WIRE SIZE N	WIRE SIZE H	OCPD P	OCPD AMPS	LOAD DESCRIPTION	CKT NO.	KEY
	1	BUILDING A - UNIT 1701	100	2	1	–	8	4.2	4.2			8	–	1	2	100	BUILDING A - UNIT 1703	2	
–	3	–	–	–	–	–	–			4.2	4.2	–	–	–	–	–	–	4	–
	5	BUILDING A - UNIT 1705	100	2	1	–	8	4.2	4.2			8	–	1	2	100	BUILDING A - UNIT 1707	6	
–	7	–	–	–	–	–	–			4.2	4.2	–	–	–	–	–	–	8	–
	9	BUILDING A - UNIT 1709	100	2	1	–	8	4.2	4.2			8	–	1	2	100	BUILDING A - UNIT 1711	10	
–	11	–	–	–	–	–	–			4.2	4.2	–	–	–	–	–	–	12	–
–	13	BUILDING A - FUTURE SOLAR ARRAY	150	2	–	–	–	0	4.2			8	–	1	2	100	BUILDING A AND B HOUSE PNL.	14	
–	15	–	–	–	–	–	–			0	4.2	–	–	–	–	–	–	16	–
	17																	18	
	19																	20	
	21																	22	
	23																	24	
	25																	26	
	27																	28	
	29																	30	

	A	B
Total Load:	29.40 kVA	29.40 kVA
Total Amps:	245.00	245.00

LOAD SUMMARY

LOAD CLASSIFICATION	CONNECTED LOAD	DEMAND FACTOR	ESTIMATED DEMAND
Power	58.8 kVA	100.00%	58.8 kVA

TOTALS*	
TOTAL CONNECTED LOAD:	58.80 kVA
TOTAL ESTIMATED DEMAND LOAD:	58.8 kVA
TOTAL CONNECTED AMPS:	245.00 A
TOTAL ESTIMATED DEMAND AMPS:	245

*TOTAL DEMAND CALCS SUBTRACT ANY REDUNDANT LOAD AND THE SMALLER OF ANY NONCOINCIDENT HVAC LOADS. THIS CALC IS DONE AT EACH PANEL.

CIRCUIT KEY NOTES:

PANEL MDP-B

MOUNTING: SURFACE
ENCLOSURE: NEMA 3R

SINGLE TUB
SOLID NEUTRAL
GROUND BUS

MAIN: 400 MCB
VOLTS: 120/240 Single
PHASE: 1
WIRE: 3
SCCR: 40 kA

NOTES: NEW MAIN DISTRIBUTION PANEL FOR BUILDING B

KEY	CKT NO.	LOAD DESCRIPTION	OCPD AMPS	OCPD P	WIRE SIZE H	WIRE SIZE N	WIRE SIZE G	A		B		WIRE SIZE G	WIRE SIZE N	WIRE SIZE H	OCPD P	OCPD AMPS	LOAD DESCRIPTION	CKT NO.	KEY
	1	BUILDING B - UNIT 1713	100	2	1	–	8	4.2	4.2			8	–	1	2	100	BUILDING B - UNIT 1715	2	
–	3	–	–	–	–	–	–			4.2	4.2	–	–	–	–	–	–	4	–
	5	BUILDING B - UNIT 1717	100	2	1	–	8	4.2	4.2			8	–	1	2	100	BUILDING B - UNIT 1719	6	
–	7	–	–	–	–	–	–			4.2	4.2	–	–	–	–	–	–	8	–
	9	BUILDING B - UNIT 1721	100	2	1	–	8	4.2	4.2			8	–	1	2	100	BUILDING B - UNIT 1723	10	
–	11	–	–	–	–	–	–			4.2	4.2	–	–	–	–	–	–	12	–
–	13	BUILDING B - FUTURE SOLAR ARRAY	150	2	–	–	–	0										14	
–	15	–	–	–	–	–	–			0								16	
	17																	18	
	19																	20	
	21																	22	
	23																	24	
	25																	26	
	27																	28	
	29																	30	

	A	B
Total Load:	25.20 kVA	25.20 kVA
Total Amps:	210.00	210.00

LOAD SUMMARY

LOAD CLASSIFICATION	CONNECTED LOAD	DEMAND FACTOR	ESTIMATED DEMAND
Power	50.4 kVA	100.00%	50.4 kVA

TOTALS*	
TOTAL CONNECTED LOAD:	50.40 kVA
TOTAL ESTIMATED DEMAND LOAD:	50.4 kVA
TOTAL CONNECTED AMPS:	210.00 A
TOTAL ESTIMATED DEMAND AMPS:	210

*TOTAL DEMAND CALCS SUBTRACT ANY REDUNDANT LOAD AND THE SMALLER OF ANY NONCOINCIDENT HVAC LOADS. THIS CALC IS DONE AT EACH PANEL.

CIRCUIT KEY NOTES:

PANEL MDP-C

MOUNTING: SURFACE
ENCLOSURE: NEMA 3R

SINGLE TUB
SOLID NEUTRAL
GROUND BUS

MAIN: 400 MCB
VOLTS: 120/240 Single
PHASE: 1
WIRE: 3
SCCR: 40 kA

NOTES: NEW MAIN DISTRIBUTION PANEL FOR BUILDING C

KEY	CKT NO.	LOAD DESCRIPTION	OCPD AMPS	OCPD P	WIRE SIZE H	WIRE SIZE N	WIRE SIZE G	A		B		WIRE SIZE G	WIRE SIZE N	WIRE SIZE H	OCPD P	OCPD AMPS	LOAD DESCRIPTION	CKT NO.	KEY
	1	BUILDING C - UNIT 1725	100	2	1	–	8	4.2	4.2			8	–	1	2	100	BUILDING C - UNIT 1727	2	
–	3	–	–	–	–	–	–			4.2	4.2	–	–	–	–	–	–	4	–
	5	BUILDING C - UNIT 1729	100	2	1	–	8	4.2	4.2			8	–	1	2	100	BUILDING C - UNIT 1731	6	
–	7	–	–	–	–	–	–			4.2	4.2	–	–	–	–	–	–	8	–
	9	BUILDING C - UNIT 1733	100	2	1	–	8	4.2	4.2			8	–	1	2	100	BUILDING C - UNIT 1735	10	
–	11	–	–	–	–	–	–			4.2	4.2	–	–	–	–	–	–	12	–
–	13	BUILDING C - FUTURE SOLAR ARRAY	150	2	–	–	–	0										14	
–	15	–	–	–	–	–	–			0								16	
	17																	18	
	19																	20	
	21																	22	
	23																	24	
	25																	26	
	27																	28	
	29																	30	

	A	B
Total Load:	25.20 kVA	25.20 kVA
Total Amps:	210.00	210.00

LOAD SUMMARY

LOAD CLASSIFICATION	CONNECTED LOAD	DEMAND FACTOR	ESTIMATED DEMAND
Power	50.4 kVA	100.00%	50.4 kVA

TOTALS*	
TOTAL CONNECTED LOAD:	50.40 kVA
TOTAL ESTIMATED DEMAND LOAD:	50.4 kVA
TOTAL CONNECTED AMPS:	210.00 A
TOTAL ESTIMATED DEMAND AMPS:	210

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CIRCUIT KEY NOTES:

PANEL MDP-D

MOUNTING: SURFACE
ENCLOSURE: NEMA 3R

SINGLE TUB
SOLID NEUTRAL
GROUND BUS

MAIN: 400 MCB
VOLTS: 120/240 Single
PHASE: 1
WIRE: 3
SCCR: 40 kA

NOTES: NEW MAIN DISTRIBUTION PANEL FOR BUILDING D

KEY	CKT NO.	LOAD DESCRIPTION	OCPD AMPS	OCPD P	WIRE SIZE H	WIRE SIZE N	WIRE SIZE G	A		B		WIRE SIZE G	WIRE SIZE N	WIRE SIZE H	OCPD P	OCPD AMPS	LOAD DESCRIPTION	CKT NO.	KEY
	1	BUILDING D - UNIT 1737	100	2	1	–	8	4.2	4.2			8	–	1	2	100	BUILDING D - UNIT 1739	2	
–	3	–	–	–	–	–	–			4.2	4.2	–	–	–	–	–	–	4	–
	5	BUILDING D - UNIT 1741	100	2	1	–	8	4.2	4.2			8	–	1	2	100	BUILDING D - UNIT 1743	6	
–	7	–	–	–	–	–	–			4.2	4.2	–	–	–	–	–	–	8	–
	9	BUILDING D - UNIT 1745	100	2	1	–	8	4.2	4.2			8	–	1	2	100	BUILDING D - UNIT 1747	10	
–	11	–	–	–	–	–	–			4.2	4.2	–	–	–	–	–	–	12	–
–	13	BUILDING D - FUTURE SOLAR ARRAY	150	2	–	–	–	0	4.2			8	–	1	2	100	BUILDING D - COMMUNITY CENTER	14	
–	15	–	–	–	–	–	–			0	4.2	–	–	–	–	–	–	16	–
	17																	18	
	19																	20	
	21																	22	
	23																	24	
	25																	26	
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	29																	30	

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CIRCUIT KEY NOTES:

Ann Arbor Housing
Green Baxter
AACH CPF 501-03 Green Road
Ann Arbor, MI

IMEG
201 S. ANN ARBOR STREET
SALINE, MI 48176
P: 734.429.8900

PROFESSIONAL SEAL

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CONSULTANT

KEY PLAN

AGENCY APPROVAL

DISCLAIMER

REVISIONS

No.	Date	Revision / Issue
1	4/18/2025	PROGRESS SET

SHEET INFORMATION

Issue	Permit Set
Date	8/15/25
Project #	23004726.00
Drawn	DavHam
Checked	AndDzi
Approved	AndDzi

SHEET TITLE

ELECTRICAL PANEL SCHEDULES

SCALE

Scale

SHEET NUMBER

E700

23004726.00 8/15/2025 10:32:36 AM Green Baxter