

PROJECT MANUAL

FOR

**Generator Project for
Pleasant Valley Town Hall
Fire Station and Community Center
S10414 County Road HHI
Eleva, WI 54738**

Project # 24011

June 12, 2026

DESIGNER

Apex Engineering
110A East Grand Avenue
Eau Claire, WI 54701
(715) 835 7736

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1 **DOCUMENT 00 11 16**
2 **INVITATION TO BID**

3
4 **PROJECT INFORMATION**

5 Notice to Bidders: Bidders are invited to submit bids for Project as described in this Document.

6
7 Project Identification: **Generator Project, Pleasant Valley Town Hall**
8 Project Location: **S10414 County Road HHI, Eleva, WI 54738**
9 Designer: **Apex Engineering, 110 E Grand Avenue, Eau Claire, WI 54701**
10 Designer Project Number: **24011**
11

12 **Project Description:**

13 This project consists of the removal of an existing manual transfer switch for a portable generator and
14 replacement with an automatic transfer switch and permanent generator. Existing manual transfer
15 switch serves power for a portion of the facility. Upon completion of remodel work, automatic transfer
16 switch and permanent generator to be able to provide power for the entire facility. Associated LP
17 piping rework/extension to new generator also included in work.
18

19 **This project has less than a 30-day bid advertisement period.**

20
21 Pre-bid Tour: A mandatory pre-bid walk through will be conducted on **June 25th, starting at 8:00 AM.**
22 All participants shall meet at the project site at door 15 on the South side of the building located at S10414
23 County Rd HHI, Eleva, WI 54738 (located in Cleghorn).
24

25 **BID SUBMITTAL AND OPENING**

26 The Owner will receive bids as indicated below:

27
28 The bidder must provide a Certificate of Insurance with the bid submission.

29 The Town Board reserves the right to reject any and all bids or to accept that bid deemed most
30 advantageous to the town.
31

32 **Bid Date:** July 8, 2026.

33 **Bid Opening:** 2:00 p.m., local time, all bids must be submitted before 2:00 p.m.

34 **Location:** Pleasant Valley Town Hall, S10414 County Road HHI, Eleva, WI 54738

35 Bids will be thereafter **publicly** opened.

36 The project will be awarded after the Town Board Meeting on July 13th.
37

38 All questions are due June 26, 2026. An addenda will be issued the following week.

39 Direct all question to Apex Engineering, landonj@apexengineering.biz.
40

41 Bids can be mailed, hand delivered, or placed in the locked drop box located on the front of Town Hall

42 S10414 County Road HHI, Eleva, WI 54738;

43 Reference: Generator Project, Attention: Jen Meyer Clerk/Treasurer

44 Bids can also be emailed to: office@pleasantvalleywi.gov
45

46 **DOCUMENTS**

47 Bid Documents can be obtained after June 15, 2026 through any of the following site(s): [La Crosse](#)
48 [Builders Exchange](#), and [Northwest Regional Builders Exchange](#); and the [Town Website](#)
49

50 **TIME OF COMPLETION**

51 Bidders shall begin the Work on receipt of the Notice to Proceed.

52 Project Start Date: August 1, 2026

53 Substantial Completion Date: December 1, 2026
54

1 **BIDDER'S QUALIFICATIONS**

2 Bidders must be properly licensed under the laws governing their respective trades and be able to obtain
3 insurance and bonds required for the Work.

4

5 **INTERPRETATION**

6 No verbal explanation or instructions will be given in regard to the meaning of the drawings or
7 specifications during the bid period. Bidders shall bring inadequacies, omissions, or conflicts to the
8 Architect/Engineer's attention at least ten (10) business days before the date set for bid opening. Prompt
9 clarification will be supplied to all bidders of record by addendum.

10

11 Failure to so request clarification or interpretation of the drawings and specifications will not relieve the
12 successful Bidder of responsibility. Signing of the contract will be considered as implicitly denoting that
13 the Contractor has thorough understanding of the scope of work and comprehension of the contract
14 documents.

15

16

END OF SECTION

1
2
3
4 **SECTION 00 21 00**
5 **INSTRUCTIONS TO BIDDERS**

6 **DEFINITIONS**

7 Bidding Documents include the Bidding Requirements and the Proposed Contract Documents. The Bidding
8 Requirements consist of the invitation to bid, Instructions to Bidders, the bid form, and any other bidding
9 forms. The Proposed Contract Documents consist of the unexecuted form of Agreement between the
10 Owner and Contractor and that Agreement's Exhibits, Conditions of the Contract (General, Supplementary
11 and other Conditions), Drawings, Specifications, and all Addenda.

12 Addenda are written or graphic instruments issued prior to Bid Deadline which modify or interpret the
13 bidding documents, including Drawings and Specifications, by addition, deletion, clarification and/or
14 correction. Addenda become part of the Contract Documents.

15 A Bidder is a person or entity who submits a Bid and who meets the requirements set forth in the Bidding
16 Documents.

17 A Sub-bidder is a person or entity who submits a bid to a Bidder for materials, equipment, or labor for a
18 portion of the Work.

19 The terms, Architect and A/E shall mean Apex Engineering.
20

21 **BIDDERS REPRESENTATION**

22 Each bidder by making his bid represents that he has read and understands the bidding documents and that
23 he has visited the site and familiarized himself with the local conditions under which the Work is to be
24 performed.
25

26 **BIDDING PROCEDURES**

27 All bids must be prepared on the form provided in this Project Manual and submitted in accordance with
28 the Instructions to Bidders. **REMOVE FORM FROM PROJECT MANUAL.** Do not submit entire
29 project manual. Submit only one Bid Form. Bid shall be completed in accordance with the requirements
30 stated in this section.
31

32 **The bidder must provide a Certificate of Insurance with the bid submission.**
33

34 If bids are hand delivered, place bid in an opaque envelope and seal. No other information shall be
35 included with the Bid Form except any required bond or information requested herein or by Addendum.
36 Mark the exterior of the envelope as follows:
37

38 **CONTRACTORS PROPOSAL**

39 Generator Project
40 Attn: Jen Meyer, Clerk/Treasurer
41 (Contractor's Name)
42 (Contractor's Address)
43
44

45 No bidder shall modify, withdraw, or cancel his bid or any part thereof for sixty (60) days after the Bid
46 Deadline.
47

48 The Town Board reserves the right to reject any and all bids or to accept that bid deemed most
49 advantageous to the town.
50

51 A bid is invalid if it has not been deposited at the designated location prior to the Bid Deadline. Such a bid
52 will not be opened and will be returned to the bidder.
53

1 Bids will be received for contracts as provided in the Bid/Proposal form.

2
3 **ADDENDA**

4 Addenda will be made available through the same online platform as the Bid Documents.

5
6 **EXAMINATION OF BIDDING DOCUMENTS**

7 Each bidder shall examine the bidding documents carefully and, not later than three (3) business days prior
8 to the date for receipt of bids, shall make requests to the A/E for interpretation or correction of any
9 ambiguity, inconsistency or error therein. Any interpretation or correction will be issued as an Addendum.
10 Only a written interpretation or correction by Addendum shall be binding. No bidder shall rely upon any
11 interpretation or correction given by any other method.

12
13 **BID GUARANTEE**

14 Provide a certified check, a cashier's check, or a bid bond, payable to the owner in an amount not less than
15 five percent (5%) of the maximum bid with each bid as a guarantee. If the bid is accepted, the bidder will
16 execute and deliver the proposed contract and bonds within ten (10) days after being notified in writing to
17 do so.

18
19 If the successful bidder executes and delivers the contract and bond, the bid guarantee will be returned to
20 him. If the bidder fails to furnish such contract and bond, the bid guarantee shall be forfeited to the owner
21 as liquidated damages.

22
23 The company issuing the bid bond shall be licensed to do business in the State of Wisconsin. Bid Bond
24 may be submitted on AIA document A310 Bid Bond, or other form acceptable by the Owner.

25
26 **INSURANCE REQUIREMENTS**

27 The bidder must provide a Certificate of Insurance with the bid submission.

28
29 The Contractor shall purchase and maintain property insurance upon the entire Work at the site to the full
30 insurable value thereof. This insurance shall include the interests of the Owner, the Contractor,
31 Subcontractors and Sub-subcontractors in the Work and shall insure against the perils of fire and extended
32 coverage and shall include "all risk" insurance for physical loss or damage including, without duplication
33 coverage, theft, vandalism and malicious mischief.

34
35 **SUBSTITUTIONS**

36 Each bidder represents that their bid is based upon the materials and equipment described in the bidding
37 documents.

38
39 No substitution will be considered unless written request has been submitted to the A/E for approval at least
40 five (5) business days prior to the date for receipt of bids. Each such request shall include a complete
41 description of the proposed substituted, drawings, cuts, performance and test data and any other data or
42 information necessary for a complete evaluation. Approval of substitutions will be set forth by Addendum.

43
44 Approval by the A/E of a manufacturer for specified items shall not be deemed as approval of all products
45 or models that the manufacturer can furnish but only the single product which most closely duplicates the
46 item originally specified.

47
48 The responsibility for all revisions to the work required by substitutions shall be borne solely by the
49 Contractor who utilizes the substitution, including the following:

- 50
51 Additional work by other Contractors.
52 Changes to the building structure or room sizes.
53 Additional associated devices, connections, wiring, etc.
54 Properly notifying other contractors as to the effect of such substitutions on their contract.

1 **PRODUCT OR MATERIAL AVAILABILITY**

2 Prior to the receipt of bids, verify that all specified items, products, materials, etc., will be available for
3 timely inclusion in the work. Should any item not be available, notify the A/E. Extra costs resulting from
4 delays caused by failure to determine availability of specified items shall be borne by the Contractor.
5

6 **QUALIFICATION OF BIDDERS**

7 Before the award of any contract, the owner shall be satisfied that the bidder, (1) maintains a permanent
8 place of business, (2) has adequate equipment to do the work properly, (3) has a suitable financial status to
9 meet obligations incident to the work, (4) has appropriate technical experience, and (5) has satisfactorily
10 completed contracts of similar nature and magnitude.
11

12 **AWARD OR REJECTION OF BIDS**

13 Review the Bid Form for procedures to be followed should the bid be accepted by the Owner. Notice that
14 prompt delivery of the required documents is required. The bidder acknowledges the right of the Owner to
15 reject any or all bids and to waive any informality or irregularity in any bid received. In addition, the
16 bidder recognizes the right of the Owner to reject a bid if the bidder failed to furnish any required bid
17 security, or to submit the data required by the bidding documents, or if the bid is in any way incomplete or
18 irregular.
19

20 The Town Board reserves the right to reject any and all bids or to accept that bid deemed most
21 advantageous to the town.
22

23 **SUBMISSION OF POST-BID INFORMATION**

24 Upon request by the A/E or Owner, the selected bidder shall within seven (7) days thereafter submit the
25 following:
26

27 A W9 and Certificate of Liability Insurance.

28 A statement of costs for each major item of Work included in the bid.

29 A designation of the Work to be performed by the bidder with his own forces.

30 A list of names of the Subcontractors or other persons or organizations (including those who are to
31 furnish materials or equipment fabricated to a special design) proposed for the principal portions
32 of the Work.
33

34 **PERFORMANCE BOND AND PAYMENT BOND**

35 The Bidder who is awarded the work shall furnish and pay for bonds covering the faithful performance of
36 the Contract and the payment of all obligations arising thereunder in such form as the Owner may prescribe
37 and with such sureties secured through the bidder's usual sources as may be agreeable to the parties. The
38 amount of each bond shall be 100% of the Contract Amount. Bonds shall be dated not later than the date of
39 execution of the Contract. The attorney-in-fact who executes the required bonds on behalf of the surety
40 shall affix thereto a certified and current copy of his power-of-attorney indicating the limit of such power.
41

42 Bond form shall be AIA Document WIS. A311, latest edition, "Private Improvement Performance Bond"
43 and "Private Improvement Labor and Material Payment Bond", or in a form acceptable to the Owner.
44

45 **ALTERNATE BIDS**

46 If alternate bids are requested, bidder shall state the amount to be added to or deducted from the base bid
47 for making the changes required under each alternate. The stated sum shall include all
48 incidental work and adjustments as may be necessary or required to fully complete the alternate work.
49 Space is provided on the bid form for alternates. If there is no price change, the bidder shall state "NO
50 CHANGE".
51

52
53
54

1 **UNIT PRICES**

2 If unit prices are requested, they will be listed on the Bid Form, if included in the Contract, will be used for
3 additions to or deductions from amount of work required under the Contract. Unit prices shall include all
4 costs of materials, labor, insurance, taxes, overhead and profit. The Owner reserves the right to reject any
5 unit prices as given in the bid if they are considered excessive or unreasonable, or to accept any or all of the
6 unit prices that may be considered fair and reasonable.

7

8 **RETAINAGE**

9 Retainage will be accumulated at 10% of the amount due until 50% completion. Upon substantial
10 completion, payments shall be increased to 98% of the amount due, less allowance for incomplete and
11 unsatisfactory work.

12

13

END OF SECTION

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1 **ACKNOWLEDGMENT OF ADDENDA**

2 The undersigned Bidder acknowledges receipt of and use of the following Addenda in the preparation of
3 this Bid:

4
5 Addendum No. 1, dated _____.

6
7 Addendum No. 2, dated _____.

8
9 Addendum No. 3, dated _____.

10
11 Addendum No. 4, dated _____.

12
13 **CONTRACTOR INSURANCE**

14 The bidder must provide a Certificate of Insurance with this bid submission.

15
16 **CONTRACTOR'S LICENSE**

17 The undersigned further states that it is a duly licensed contractor, for the type of work proposed, and that
18 all fees, permits, etc., pursuant to submitting this proposal have been paid in full.

19
20 **SUBMISSION OF BID**

21
22 Respectfully submitted this _____ day of _____, 2026.

23
24 Submitted By: _____ (Name of bidding firm or corporation).

25
26 Authorized Signature: _____ (Signature).

27
28 Signed By: _____ (Print name).

29
30 Title: _____ (Owner/Partner/President/Vice President).

31
32 Witnessed By: _____ (Handwritten signature).

33
34 Street Address _____ .

35
36 City, State, Zip: _____ .

37
38 Phone: _____ .

39
40 License No.: _____ .

41
42 **The bidder must provide a Certificate of Insurance with this bid submission.**

43
44 **END OF DOCUMENT**

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1 Comply with limitations on use of public streets and with other requirements of authorities having
2 jurisdiction.

3
4 **On-Site Work Hours:**

5 Limit work to normal business working hours, as governed by local ordinances and Owner, Monday
6 through Friday, unless otherwise indicated.

7
8 Work can not be conducted on August 10 & 11 or November 2 & 3 due to the Elections.

9 Harvest Fest will be September 9-13; it is recommended that Contractors avoid schedule work that week.

10
11 **Existing Utility Interruptions:**

12 Notify Owner not less than two days in advance of proposed utility interruptions.

13
14 **Restricted Substances:** Use of tobacco products and other controlled substances within the existing building
15 on Project site is not permitted.

16
17 **SPECIFICATION AND DRAWING CONVENTIONS**

18 Specification Content: The Specifications use certain conventions for the style of language and the intended
19 meaning of certain terms, words, and phrases when used in particular situations. These conventions are as
20 follows:

21
22 Imperative mood and streamlined language are generally used in the Specifications. The words "shall,"
23 "shall be," or "shall comply with," depending on the context, are implied where a colon (:) is used
24 within a sentence or phrase.

25 Specification requirements are to be performed by Contractor unless specifically stated otherwise.

26
27 **Division 01 General Requirements:** Requirements of Sections in Division 01 apply to the Work of all
28 Sections in the Specifications.

29
30 **PART 2 - PRODUCTS (Not Used)**
31 **PART 3 - EXECUTION (Not Used)**

32
33 **END OF SECTION**

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SECTION 01 29 00
PAYMENT PROCEDURES

PART 1 - GENERAL

SUMMARY

Section includes administrative and procedural requirements necessary to prepare and process Applications for Payment.

SCHEDULE OF VALUES

Coordination: Coordinate preparation of the schedule of values with preparation of Contractor's construction schedule.

Coordinate line items in the schedule of values with items required to be indicated as separate activities in Contractor's construction schedule.

Submit the schedule of values to Designer at earliest possible date, but no later than seven days before the date scheduled for submittal of initial Applications for Payment.

Format and Content: Use Project Manual table of contents as a guide to establish line items for the schedule of values. Provide at least one line item for each Specification Section.

Arrange schedule of values consistent with format of AIA Document G703, or another format acceptable to Owner.

Provide a breakdown of the Contract Sum in enough detail to facilitate continued evaluation of Applications for Payment and progress reports. Provide multiple line items for principal subcontract amounts in excess of five percent of the Contract Sum.

APPLICATIONS FOR PAYMENT

Each Application for Payment following the initial Application for Payment shall be consistent with previous applications and payments.

Application for Payment Forms: Use AIA Document G702 and AIA Document G703 as form for Applications for Payment. Other form may be used if approved by Owner.

Application Preparation: Complete every entry on form. Execute by a person authorized to sign legal documents on behalf of Contractor. Incomplete applications will be returned.

Entries shall match data on the schedule of values and Contractor's construction schedule. Use updated schedules if revisions were made.

Include amounts for work completed following previous Application for Payment, whether or not payment has been received. Include only amounts for work completed at time of Application for Payment.

Include amounts of Change Orders and Construction Change Directives issued before last day of construction period covered by application.

Initial Application for Payment: Administrative actions and submittals that must precede or coincide with submittal of first Application for Payment include the following if not already provided:

List of subcontractors.

Schedule of values.

Contractor's construction schedule (preliminary if not final).

List of Contractor's principal consultants.

Copies of building permits.

Copies of authorizations and licenses from authorities having jurisdiction for performance of the Work.

Certificates of insurance and insurance policies.

1 Performance and payment bonds.

2
3 Application for Payment at Substantial Completion: After Designer issues the Certificate of Substantial
4 Completion, submit an Application for Payment showing 100 percent completion for portion of the Work
5 claimed as substantially complete.

6
7 Final Payment Application: After completing Project closeout requirements, submit final Application for
8 Payment with releases and supporting documentation not previously submitted and accepted, including, but
9 not limited, to the following:

10
11 Evidence of completion of Project closeout requirements.

12 Insurance certificates for products and completed operations where required and proof that taxes, fees,
13 and similar obligations were paid.

14 Updated final statement, accounting for final changes to the Contract Sum.

15
16 **PART 2 - PRODUCTS (Not Used)**

17
18 **PART 3 - EXECUTION (Not Used)**

19
20 **END OF SECTION**

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SECTION 01 31 00
PROJECT MANAGEMENT AND COORDINATION

PART 1 - GENERAL

RELATED DOCUMENTS

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

SUMMARY

Section includes administrative provisions for coordinating construction operations on Project including, but not limited to, the following:

- General coordination procedures.
- Coordination drawings.
- RFIs.
- Digital project management procedures.
- Project meetings.

DEFINITIONS

BIM: Building Information Modeling.

RFI: Request for Information. Request from Owner, Architect, or Contractor seeking information required by or clarifications of the Contract Documents.

Architect: the term Architects refers to Apex Engineering.

INFORMATIONAL SUBMITTALS

Subcontract List: Prepare a written summary identifying individuals or firms proposed for each portion of the Work, including those who are to furnish products or equipment fabricated to a special design. Include the following information in tabular form:

- Name, address, telephone number, and email address of entity performing subcontract or supplying products.
- Number and title of related Specification Section(s) covered by subcontract.
- Drawing number and detail references, as appropriate, covered by subcontract.

GENERAL COORDINATION PROCEDURES

Coordination: Coordinate construction operations included in different Sections of the Specifications to ensure efficient and orderly installation of each part of the Work. Coordinate construction operations included in different Sections that depend on each other for proper installation, connection, and operation.

- Schedule construction operations in sequence required to obtain the best results where installation of one part of the Work depends on installation of other components, before or after its own installation.
- Coordinate installation of different components to ensure maximum performance and accessibility for required maintenance, service, and repair.
- Make adequate provisions to accommodate items scheduled for later installation.

Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities and scheduled activities of other contractors to avoid conflicts and to ensure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:

- Preparation of Contractor's construction schedule.
- Preparation of the schedule of values.

- 1 Installation and removal of temporary facilities and controls.
- 2 Delivery and processing of submittals.
- 3 Progress meetings.
- 4 Pre-installation conferences.
- 5 Project closeout activities.
- 6 Startup and adjustment of systems.

7
8 **COORDINATION DRAWINGS**

9 Coordination Drawings, General: Prepare coordination drawings according to requirements in individual
10 Sections, and additionally where installation is not completely indicated on Shop Drawings, where limited
11 space availability necessitates coordination, or if coordination is required to facilitate integration of
12 products and materials fabricated or installed by more than one entity.

13
14 Content: Project-specific information, drawn accurately to a scale large enough to indicate and resolve
15 conflicts. Do not base coordination drawings on standard printed data. Include the following
16 information, as applicable:

17
18 Indicate functional and spatial relationships of components of architectural, structural, civil,
19 mechanical, and electrical systems.

20 Indicate dimensions shown on Drawings. Specifically note dimensions that appear to be in conflict
21 with submitted equipment and minimum clearance requirements. Provide alternative sketches to
22 Architect indicating proposed resolution of such conflicts. Minor dimension changes and
23 difficult installations will not be considered changes to the Contract.

24
25 Coordination Drawing Organization: Organize coordination drawings as follows:

26
27 Floor Plans and Reflected Ceiling Plans: Show architectural and structural elements, and mechanical,
28 plumbing, fire-protection, fire-alarm, and electrical Work. Show locations of visible ceiling-mounted
29 devices relative to acoustical ceiling grid. Supplement plan drawings with section drawings where
30 required to adequately represent the Work.

31 Mechanical Rooms: Provide coordination drawings for mechanical rooms showing plans and
32 elevations of mechanical, plumbing, fire-protection, fire-alarm, and electrical equipment.

33 Structural Penetrations: Indicate penetrations and openings required for all disciplines.

34 Slab Edge and Embedded Items: Indicate slab edge locations and sizes and locations of embedded
35 items for metal fabrications, sleeves, anchor bolts, bearing plates, angles, door floor closers, slab
36 depressions for floor finishes, curbs and housekeeping pads, and similar items.

37 Review: Architect will review coordination drawings to confirm that in general the Work is being
38 coordinated, but not for the details of the coordination, which are Contractor's responsibility.

39
40 **REQUEST FOR INFORMATION (RFI)**

41 General: Immediately on discovery of the need for additional information, clarification, or interpretation of
42 the Contract Documents, Contractor shall prepare and submit an RFI in the form specified.

43
44 All RFI's shall be submitted to the Construction Manager for initial processing. Architect will return
45 without response those RFIs submitted to Architect by entities other than the Construction Manager.

46 Coordinate and submit RFIs in a prompt manner so as to avoid delays in Contractor's work or work of
47 subcontractors.

48
49 Content of the RFI: Include a detailed, legible description of item needing information or interpretation and
50 the following:

- 51
- 52 Project name.
- 53 Project number.
- 54 Date.
- 55 Name of Contractor.

1 Name of Architect.
2 RFI number, numbered sequentially.
3 RFI subject.
4 Specification Section number and title and related paragraphs, as appropriate.
5 Drawing number and detail references, as appropriate.
6 Field dimensions and conditions, as appropriate.
7 Contractor's suggested resolution. If Contractor's suggested resolution impacts the Contract Time or
8 the Contract Sum, Contractor shall state impact in the RFI.
9 Contractor's signature.
10 Attachments: Include sketches, descriptions, measurements, photos, Product Data, Shop Drawings,
11 coordination drawings, and other information necessary to fully describe items needing
12 interpretation.
13

14 PDF Document Preparation: Where PDFs are required to be submitted to Architect, prepare as follows:
15

16 Assemble complete submittal package into a single indexed file incorporating submittal requirements
17 of a single Specification Section and transmittal form with links enabling navigation to each item.
18 Name file with submittal number or other unique identifier, including revision identifier.
19 Certifications: Where digitally submitted certificates and certifications are required, provide a digital
20 signature with digital certificate on where indicated.
21

22 **PROJECT MEETINGS**

23 General: Schedule and conduct meetings and conferences at Project site unless otherwise indicated.
24

25 Preconstruction Conference: Construction Manager will schedule and conduct a preconstruction
26 conference before starting construction, at a time convenient to Owner and Architect.
27

28 Attendees: Authorized representatives of Owner, Owner's Commissioning Authority, Architect, and
29 their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other
30 concerned parties shall attend the conference. Participants at the conference shall be familiar with
31 Project and authorized to conclude matters relating to the Work.

32 Agenda: Discuss items of significance that could affect progress, including the following:
33

34 Responsibilities and personnel assignments.
35 Tentative construction schedule.
36 Critical work sequencing and long lead items.
37 Designation of key personnel and their duties.
38 Lines of communications.
39 Procedures for processing field decisions and Change Orders.
40 Procedures for RFIs.
41 Procedures for testing and inspecting.
42 Procedures for processing Applications for Payment.
43 Distribution of the Contract Documents.
44 Submittal procedures.
45 Use of the premises and existing building.
46 Work restrictions.
47 Working hours.
48 Owner's occupancy requirements.
49 Responsibility for temporary facilities and controls.
50 Procedures for moisture and mold control.
51 Procedures for disruptions and shutdowns.
52 Construction waste management and recycling.
53 Parking availability.
54 Office, work, and storage areas.
55 Equipment deliveries and priorities.

1 First aid.
2 Security.
3 Progress cleaning.
4

5 Minutes: Entity responsible for conducting meeting will record and distribute meeting minutes.
6

7 Pre-installation Conferences: Conduct a preinstallation conference at Project site before each construction
8 activity when required by other sections and when required for coordination with other construction.
9

10 Attendees: Installer and representatives of manufacturers and fabricators involved in or affected by the
11 installation and its coordination or integration with other materials and installations that have
12 preceded or will follow, shall attend the meeting. Advise Architect, and Owner's Commissioning
13 Authority of scheduled meeting dates.

14 Agenda: Review progress of other construction activities and preparations for the particular activity
15 under consideration, including requirements for the following:
16

17 Contract Documents.
18 Options.
19 Related RFIs.
20 Related Change Orders.
21 Purchases.
22 Deliveries.
23 Submittals.
24 Sustainable design requirements.
25 Review of mockups.
26 Possible conflicts.
27 Compatibility requirements.
28 Time schedules.
29 Weather limitations.
30 Manufacturer's written instructions.
31 Warranty requirements.
32 Compatibility of materials.
33 Acceptability of substrates.
34 Temporary facilities and controls.
35 Space and access limitations.
36 Regulations of authorities having jurisdiction.
37 Testing and inspecting requirements.
38 Installation procedures.
39 Coordination with other work.
40 Required performance results.
41 Protection of adjacent work.
42 Protection of construction and personnel.
43

44 Record significant conference discussions, agreements, and disagreements, including required
45 corrective measures and actions.

46 Do not proceed with installation if the conference cannot be successfully concluded. Initiate whatever
47 actions are necessary to resolve impediments to performance of the Work and reconvene the
48 conference at earliest feasible date.
49

50 Progress Meetings: Conduct progress meetings at regular intervals.
51

52 Coordinate dates of meetings with preparation of payment requests.

53 Attendees: In addition to representatives of Owner, Owner's Commissioning Authority and Architect,
54 each contractor, subcontractor, supplier, and other entity concerned with current progress or
55 involved in planning, coordination, or performance of future activities shall be represented at these

1 meetings. All participants at the meeting shall be familiar with Project and authorized to conclude
2 matters relating to the Work.

3 Agenda: Review and correct or approve minutes of previous progress meeting. Review other items of
4 significance that could affect progress. Include topics for discussion as appropriate to status of
5 Project.

6
7 Contractor's Construction Schedule: Review progress since the last meeting. Determine whether
8 each activity is on time, ahead of schedule, or behind schedule, in relation to Contractor's
9 construction schedule. Determine how construction behind schedule will be expedited; secure
10 commitments from parties involved to do so. Discuss whether schedule revisions are required to
11 ensure that current and subsequent activities will be completed within the Contract Time.

12
13 Review schedule for next period.

14
15 Review present and future needs of each entity present, including the following:

16
17 Interface requirements.

18 Sequence of operations.

19 Status of submittals.

20 Status of sustainable design documentation.

21 Deliveries.

22 Off-site fabrication.

23 Access.

24 Site use.

25 Temporary facilities and controls.

26 Progress cleaning.

27 Quality and work standards.

28 Status of correction of deficient items.

29 Field observations.

30 Status of RFIs.

31 Status of Proposal Requests.

32 Pending changes.

33 Status of Change Orders.

34 Pending claims and disputes.

35 Documentation of information for payment requests.

36
37 Minutes: Entity responsible for conducting the meeting will record and distribute the meeting minutes
38 to each party present and to parties requiring information.

39
40 Schedule Updating: Revise Contractor's construction schedule after each progress meeting where
41 revisions to the schedule have been made or recognized. Issue revised schedule concurrently
42 with the report of each meeting.

43
44 **PART 2 - PRODUCTS (Not Used)**

45
46 **PART 3 - EXECUTION (Not Used)**

47
48 **END OF SECTION**

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SECTION 01 33 00
SUBMITTAL PROCEDURES

PART 1 - GENERAL

SUMMARY

Section Includes:

- Submittal schedule requirements.
- Administrative and procedural requirements for submittals.

DEFINITIONS

Action Submittals: Written and graphic information and physical samples that require Architect's responsive action. Action submittals are those submittals indicated in individual Specification Sections as "action submittals."

Informational Submittals: Written and graphic information and physical samples that do not require Architect's responsive action. Submittals may be rejected for not complying with requirements. Informational submittals are those submittals indicated in individual Specification Sections as "informational submittals."

Architect: the term Architect refers to Apex Engineering.

SUBMITTAL FORMATS

Submittal Information: Include the following information in each submittal:

- Project name.
- Date.
- Name of Architect.
- Name of Contractor.
- Names of subcontractor, manufacturer, and/or supplier.
- Unique submittal number, including revision identifier. Include Specification Section number with sequential alphanumeric identifier; and alphanumeric suffix for resubmittals.
- Category and type of submittal.
- Submittal purpose and description.
- Number and title of Specification Section, with paragraph number and generic name for each of multiple items.
- Drawing number and detail references, as appropriate.
- Indication of full or partial submittal.
- Other necessary identification.
- Remarks.

Options: Identify options requiring selection by Architect.

Deviations and Additional Information: On each submittal, clearly indicate deviations from requirements in the Contract Documents, including minor variations and limitations; include relevant additional information and revisions, other than those requested by Architect on previous submittals. Indicate by highlighting on each submittal or noting on attached separate sheet.

Electronic Submittals: Prepare submittals as PDF package, incorporating complete information into each PDF file. Name PDF file with submittal number. Email submittal to landonj@apexengineering.biz

SUBMITTAL PROCEDURES

Prepare and submit submittals required by individual Specification Sections. Types of submittals are indicated in individual Specification Sections.

1 Email: Prepare submittals as PDF package, and transmit to Architect by sending via email. Include
2 PDF transmittal form. Include information in email subject line as requested by Architect.

3
4 Coordination: Coordinate preparation and processing of submittals with performance of construction
5 activities.

6
7 Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related
8 activities that require sequential activity.

9 Submit all submittal items required for each Specification Section concurrently unless partial
10 submittals for portions of the Work are indicated on approved submittal schedule.

11
12 Processing Time: Allow time for submittal review, including time for resubmittals, as follows. Time for
13 review shall commence on Architect's receipt of submittal. No extension of the Contract Time will be
14 authorized because of failure to transmit submittals enough in advance of the Work to permit processing,
15 including resubmittals.

16
17 Resubmittals: Make resubmittals in same form and number of copies as initial submittal.

18
19 Distribution: Furnish copies of final submittals to manufacturers, subcontractors, suppliers, fabricators,
20 installers, authorities having jurisdiction, and others as necessary for performance of construction activities.
21 Show distribution on transmittal forms.

22 23 **SUBMITTAL REQUIREMENTS**

24 Product Data: Collect information into a single submittal for each element of construction and type of
25 product or equipment.

26
27 If information must be specially prepared for submittal because standard published data are unsuitable
28 for use, submit as Shop Drawings, not as Product Data.

29 Mark each copy of each submittal to show which products and options are applicable.

30 Include the following information, as applicable:

- 31
32 Manufacturer's catalog cuts.
- 33 Manufacturer's product specifications.
- 34 Standard color charts.
- 35 Statement of compliance with specified referenced standards.
- 36 Testing by recognized testing agency.
- 37 Application of testing agency labels and seals.
- 38 Notation of coordination requirements.
- 39 Availability and delivery time information.

40
41 For equipment, include the following in addition to the above, as applicable:

- 42
43 Wiring diagrams that show factory-installed wiring.
- 44 Printed performance curves.
- 45 Operational range diagrams.
- 46 Clearances required to other construction, if not indicated on accompanying Shop Drawings.

47
48 Submit Product Data before Shop Drawings, and before or concurrent with Samples.

49
50 Shop Drawings: Prepare Project-specific information, drawn accurately to scale. Do not base Shop
51 Drawings on reproductions of the Contract Documents or standard printed data.

52
53 Preparation: Fully illustrate requirements in the Contract Documents. Include the following
54 information, as applicable:

- 55
56 Identification of products.

- 1 Schedules.
- 2 Compliance with specified standards.
- 3 Notation of coordination requirements.
- 4 Notation of dimensions established by field measurement.
- 5 Relationship and attachment to adjoining construction clearly indicated.
- 6 Seal and signature of professional engineer if specified.

7
8 Samples: Submit Samples for review of kind, color, pattern, and texture for a check of these characteristics
9 with other materials.

10
11 Transmit Samples that contain multiple, related components such as accessories together in one
12 submittal package.

13 Email Transmittal: Provide PDF transmittal. Include digital image file illustrating Sample
14 characteristics, and identification information for record.

15 Paper Transmittal: Include paper transmittal including complete submittal information indicated.

16 Samples for Initial Selection: Submit manufacturer's color charts consisting of units or sections of units
17 showing the full range of colors, textures, and patterns available.

18
19 Number of Samples: Submit one full set(s) of available choices where color, pattern, texture, or
20 similar characteristics are required to be selected from manufacturer's product line. Architect
21 will return submittal with options selected.

22
23 **CONTRACTOR'S REVIEW**

24 Action Submittals and Informational Submittals: Review each submittal and check for coordination with
25 other Work of the Contract and for compliance with the Contract Documents. Note corrections and field
26 dimensions. Mark with approval stamp before submitting to Architect.

27
28 Contractor's Approval: Indicate Contractor's approval for each submittal with a uniform approval stamp.
29 Include name of reviewer, date of Contractor's approval, and statement certifying that submittal has been
30 reviewed, checked, and approved for compliance with the Contract Documents.

31
32 Architect will not review submittals received from Contractor that do not have Contractor's review and
33 approval.

34
35 **ARCHITECT'S REVIEW**

36 Action Submittals: Architect will review each submittal, indicate corrections or revisions required, and
37 return it.

38
39 PDF Submittals: Architect will indicate, via markup on each submittal, the appropriate action.

40
41 Informational Submittals: Architect will review each submittal and will not return it, or will return it if it
42 does not comply with requirements. Architect will forward each submittal to appropriate party.

43
44 Partial submittals prepared for a portion of the Work will be reviewed when use of partial submittals has
45 received prior approval from Architect.

46
47 Incomplete submittals are unacceptable, will be considered nonresponsive, and will be returned for
48 resubmittal without review.

49
50 Architect will discard submittals received from sources other than Contractor.

51
52 Submittals not required by the Contract Documents will be returned by Architect without action.

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56

PART 2 - PRODUCTS (Not Used)
PART 3 - EXECUTION (Not Used)
END OF SECTION

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SECTION 01 50 00
TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

SUMMARY

Section includes requirements for temporary utilities, support facilities, and security and protection facilities.

Related Requirements:

Section 01 10 00 "Summary" for work restrictions and limitations on utility interruptions.

USE CHARGES

General: Installation and removal of and use charges for temporary facilities shall be included in the Contract Sum unless otherwise indicated. Allow other entities engaged in the Project to use temporary services and facilities without cost, including, but not limited to, Owner's construction forces, Architect, occupants of Project, testing agencies, and authorities having jurisdiction.

Water and Sewer Service from Existing System: Provide connections and extensions of services as required for construction operations, coordinate installation of temporary and new metering.

Electric Power Service from Existing System: Provide connections and extensions of services as required for construction operations, coordinate installation of temporary and new metering.

INFORMATIONAL SUBMITTALS

Site Utilization Plan: Show temporary facilities, temporary utility lines and connections, staging areas, construction site entrances, vehicle circulation, and parking areas for construction personnel.

Project Identification and Temporary Signs: Show fabrication and installation details, including plans, elevations, details, layouts, typestyles, graphic elements, and message content.

Fire-Safety Program: Show compliance with requirements of NFPA 241 and authorities having jurisdiction. Indicate Contractor personnel responsible for management of fire-prevention program.

Moisture-and Mold-Protection Plan: Describe procedures and controls for protecting materials and construction from water absorption and damage and mold.

QUALITY ASSURANCE

Electric Service: Comply with NECA, NEMA, and UL standards and regulations for temporary electric service. Install service to comply with NFPA 70.

Tests and Inspections: Arrange for authorities having jurisdiction to test and inspect each temporary utility before use. Obtain required certifications and permits.

Accessible Temporary Egress: Comply with applicable provisions in the United States Access Board's ADA-ABA Accessibility Guidelines and ICC/ANSI A117.1.

PROJECT CONDITIONS

Temporary Use of Permanent Facilities: Engage Installer of each permanent service to assume responsibility for operation, maintenance, and protection of each permanent service during its use as a construction facility before Owner's acceptance, regardless of previously assigned responsibilities.

1 **PART 2 - PRODUCTS**

2
3 **TEMPORARY FACILITIES**

4 Field Offices, General: Prefabricated or mobile units with serviceable finishes, temperature controls, and
5 foundations adequate for normal loading. Owner will provide a field office for contractor use.

6
7 **DUMPSTERS**

8 Construction Manager and owner will provide necessary dumpsters for construction waste disposal.

9
10 **EQUIPMENT**

11 Fire Extinguishers: Portable, UL rated; with class and extinguishing agent as required by locations and
12 classes of fire exposures.

13
14 **PART 3 - EXECUTION**

15
16 **TEMPORARY FACILITIES, GENERAL**

17 Conservation: Coordinate construction and use of temporary facilities with consideration given to
18 conservation of energy, water, and materials. Coordinate use of temporary utilities to minimize waste.

19
20 Salvage materials and equipment involved in performance of, but not actually incorporated into, the
21 Work. See other Sections for disposition of salvaged materials that are designated as Owner's
22 property.

23
24 **INSTALLATION, GENERAL**

25 Locate facilities where they will serve Project adequately and result in minimum interference with
26 performance of the Work. Relocate and modify facilities as required by progress of the Work.

27
28 Provide each facility ready for use when needed to avoid delay. Do not remove until facilities are no longer
29 needed or are replaced by authorized use of completed permanent facilities.

30
31 **TEMPORARY UTILITY INSTALLATION**

32 General: Install temporary service or connect to existing service.

33
34 Arrange with utility company, Owner, and existing users for time when service can be interrupted, if
35 necessary, to make connections for temporary services.

36
37 Sanitary Facilities: Provide temporary toilets, wash facilities, and drinking water for use of construction
38 personnel. Comply with requirements of authorities having jurisdiction for type, number, location,
39 operation, and maintenance of fixtures and facilities.

40
41 Electric Power Service: Provide electric power service and distribution system of sufficient size, capacity,
42 and power characteristics required for construction operations.

43
44 Lighting: Provide temporary lighting with local switching that provides adequate illumination for
45 construction operations, observations, inspections, and traffic conditions.

46
47 Install and operate temporary lighting that fulfills security and protection requirements without
48 operating entire system.

49
50 **SECURITY AND PROTECTION FACILITIES INSTALLATION**

51 Protection of Existing Facilities: Protect existing vegetation, equipment, structures, utilities, and other
52 improvements at Project site and on adjacent properties, except those indicated to be removed or altered.
53 Repair damage to existing facilities.

1 Where access to adjacent properties is required in order to affect protection of existing facilities, obtain
2 written permission from adjacent property owner to access property for that purpose.

3

4 **OPERATION, TERMINATION, AND REMOVAL**

5 Supervision: Enforce strict discipline in use of temporary facilities. To minimize waste and abuse, limit
6 availability of temporary facilities to essential and intended uses.

7

8 Maintenance: Maintain facilities in good operating condition until removal.

9

10 Maintain operation of temporary enclosures, heating, cooling, humidity control, ventilation, and
11 similar facilities on a 24-hour basis where required to achieve indicated results and to avoid
12 possibility of damage.

13

14 Temporary Facility Changeover: Do not change over from using temporary security and protection
15 facilities to permanent facilities until Substantial Completion.

16

17 Termination and Removal: Remove each temporary facility when need for its service has ended, when it
18 has been replaced by authorized use of a permanent facility, or no later than Substantial Completion.
19 Complete or, if necessary, restore permanent construction that may have been delayed because of
20 interference with temporary facility. Repair damaged Work, clean exposed surfaces, and replace
21 construction that cannot be satisfactorily repaired.

22

23 Materials and facilities that constitute temporary facilities are property of Contractor. Owner reserves
24 right to take possession of Project identification signs.

25 At Substantial Completion, repair, renovate, and clean permanent facilities used during construction
26 period. Comply with final cleaning requirements specified in Section 01 77 00 "Closeout
27 Procedures."

28

29

END OF SECTION

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2 **SECTION 01 74 19**
3 **CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL**

4 **PART 1 - GENERAL**

5
6 **SUMMARY**

7 Section includes administrative and procedural requirements for the following:

- 8 Salvaging nonhazardous demolition and construction waste.
9 Recycling nonhazardous demolition and construction waste.
10 Disposing of nonhazardous demolition and construction waste.

11
12 Related Requirements:

- 13 Section 04 20 00 "Unit Masonry" for disposal requirements for masonry waste.
14

15 **DEFINITIONS**

16 Construction Waste: Building, structure, and site improvement materials and other solid waste resulting
17 from construction, remodeling, renovation, or repair operations. Construction waste includes packaging.

18
19 Demolition Waste: Building, structure, and site improvement materials resulting from demolition
20 operations.

21
22 Disposal: Removal of demolition or construction waste and subsequent salvage, sale, recycling, or deposit
23 in landfill, incinerator acceptable to authorities having jurisdiction, or designated spoil areas on Owner's
24 property.

25
26 Recycle: Recovery of demolition or construction waste for subsequent processing in preparation for reuse.

27
28 Salvage: Recovery of demolition or construction waste and subsequent sale or reuse in another facility.

29
30 Salvage and Reuse: Recovery of demolition or construction waste and subsequent incorporation into the
31 Work.

32
33 Architect: this refers to Apex Engineering.
34

35 **QUALITY ASSURANCE**

36 Waste Management Conference(s): Conduct conference(s) at Project site to comply with requirements in
37 Section 01 31 00 "Project Management and Coordination."
38

39 **WASTE MANAGEMENT PLAN**

40 General: Develop a waste management plan according to requirements in this Section.
41

42 **PART 2 - PRODUCTS**

43
44 **PERFORMANCE REQUIREMENTS**

45 General: Review with Owner and Architect what items will be salvaged, recycled, or disposed of.
46

47 **PART 3 - EXECUTION**

48
49 **PLAN IMPLEMENTATION**

50 General: Implement approved waste management plan. Provide handling, containers, storage, signage,
51 transportation, and other items as required to implement waste management plan during the entire duration
52 of the Contract.
53

54 Site Access and Temporary Controls: Conduct waste management operations to ensure minimum
55 interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.

1
2 Designate and label specific areas on Project site necessary for separating materials that are to be
3 salvaged and recycled.

4 Comply with Section 01 50 00 "Temporary Facilities and Controls" for controlling dust and dirt,
5 environmental protection, and noise control.

6 7 **SALVAGING DEMOLITION WASTE**

8 Comply with requirements in Section 02 41 19 "Selective Demolition" for salvaging demolition waste.

9
10 Salvaged Items for Owner's Use:

11 Clean salvaged items.

12 Pack or crate items after cleaning. Identify contents of containers with label indicating elements, date
13 of removal, quantity, and location where removed.

14 Store items in a secure area until delivery to Owner.

15 Protect items from damage during transport and storage.
16

17 18 **RECYCLING WASTE, GENERAL**

19 General: Recycle paper and beverage containers used by on-site workers.

20
21 Preparation of Waste: Prepare and maintain recyclable waste materials according to recycling or reuse
22 facility requirements. Maintain materials free of dirt, adhesives, solvents, petroleum contamination, and
23 other substances deleterious to the recycling process.

24
25 Procedures: Separate recyclable waste from other waste materials, trash, and debris. Separate recyclable
26 waste by type at Project site to the maximum extent practical according to approved construction waste
27 management plan.

28 29 **RECYCLING DEMOLITION WASTE**

30 Asphalt Paving: Break up and transport paving to asphalt-recycling facility.

31
32 Concrete: Remove reinforcement and other metals from concrete and sort with other metals.

33
34 Masonry: Remove metal reinforcement, anchors, and ties from masonry and sort with other metals.

35
36 Wood Materials: Sort and stack members according to size, type, and length. Separate lumber, engineered
37 wood products, panel products, and treated wood materials.

38
39 Metals: Separate metals by type.

40 Structural Steel: Stack members according to size, type of member, and length.

41 Remove and dispose of bolts, nuts, washers, and other rough hardware.
42

43
44 Metal Suspension System: Separate metal members, including trim and other metals from acoustical panels
45 and tile, and sort with other metals.

46
47 Piping: Reduce piping to straight lengths and store by material and size. Separate supports, hangers, valves,
48 sprinklers, and other components by material and size.

49
50 Conduit: Reduce conduit to straight lengths and store by material and size.

51
52 Lamps: Separate lamps by type and store according to requirements in 40 CFR 273.

53 54 **RECYCLING CONSTRUCTION WASTE**

55 Packaging:
56

1 Cardboard and Boxes: Break down packaging into flat sheets. Bundle and store in a dry location.
2 Polystyrene Packaging: Separate and bag materials.
3 Pallets: As much as possible, require deliveries using pallets to remove pallets from Project site. For
4 pallets that remain on-site, break down pallets into component wood pieces and comply with
5 requirements for recycling wood.
6 Crates: Break down crates into component wood pieces and comply with requirements for recycling
7 wood.

8
9 **Wood Materials:**

10 Clean Cut-Offs of Lumber: Grind or chip into small pieces.
11 Clean Sawdust: Bag sawdust that does not contain painted or treated wood.
12
13

14 **DISPOSAL OF WASTE**

15 General: Except for items or materials to be salvaged or recycled, remove waste materials from Project site
16 and legally dispose of them in a landfill or incinerator acceptable to authorities having jurisdiction.
17

18 Except as otherwise specified, do not allow waste materials that are to be disposed of accumulate on-
19 site.

20 Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
21

22 General: Except for items or materials to be salvaged or recycled, remove waste materials and legally
23 dispose of at designated spoil areas on Owner's property.
24

25 Burning: Do not burn waste materials.
26

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**SECTION 01 77 00
CLOSEOUT PROCEDURES**

PART 1 - GENERAL

SUMMARY

Section includes administrative and procedural requirements for contract closeout, including, but not limited to, the following:

- Substantial Completion procedures.
- Final completion procedures.
- Warranties.
- Final cleaning.
- Repair of the Work.

ACTION SUBMITTALS

- Product Data: For each type of cleaning agent.
- Contractor's List of Incomplete Items: Initial submittal at Substantial Completion.
- Certified List of Incomplete Items: Final submittal at final completion.

CLOSEOUT SUBMITTALS

- Certificates of Release: From authorities having jurisdiction.
- Certificate of Insurance: For continuing coverage.
- Field Report: For pest control inspection.

SUBSTANTIAL COMPLETION PROCEDURES

Contractor's List of Incomplete Items: Prepare and submit a list of items to be completed and corrected (Contractor's punch list), indicating the value of each item on the list and reasons why the Work is incomplete.

Submittals Prior to Substantial Completion: Complete the following a minimum of 10 days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.

- Certificates of Release: Obtain and submit releases from authorities having jurisdiction permitting Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
- Submit closeout submittals specified in other Division 01 Sections, including project record documents, operation and maintenance manuals, damage or settlement surveys, property surveys, and similar final record information.
- Submit closeout submittals specified in individual Sections, including specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.
- Submit maintenance material submittals specified in individual Sections, including tools, spare parts, extra materials, and similar items, and deliver to location designated by Architect. Label with manufacturer's name and model number.
- Submit testing, adjusting, and balancing records.
- Submit sustainable design submittals not previously submitted.
- Submit changeover information related to Owner's occupancy, use, operation, and maintenance.

1 Procedures Prior to Substantial Completion: Complete the following a minimum of 10 days prior to
2 requesting inspection for determining date of Substantial Completion. List items below that are incomplete
3 at time of request.

- 4
- 5 Advise Owner of pending insurance changeover requirements.
- 6 Make final changeover of permanent locks and deliver keys to Owner. Advise Owner's personnel of
7 changeover in security provisions.
- 8 Complete startup and testing of systems and equipment.
- 9 Perform preventive maintenance on equipment used prior to Substantial Completion.
- 10 Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and
11 systems. Submit demonstration and training video recordings specified in Section 01 79 00
12 "Demonstration and Training."
- 13 Advise Owner of changeover in utility services.
- 14 Participate with Owner in conducting inspection and walkthrough with local emergency responders.
- 15 Terminate and remove temporary facilities from Project site, along with mockups, construction tools,
16 and similar elements.
- 17 Complete final cleaning requirements.
- 18 Touch up paint and otherwise repair and restore marred exposed finishes to eliminate visual defects.
- 19

20 Inspection: Submit a written request for inspection to determine Substantial Completion a minimum of 10
21 days prior to date the Work will be completed and ready for final inspection and tests. On receipt of
22 request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements.
23 Architect will prepare the Certificate of Substantial Completion after inspection or will notify Contractor of
24 items, either on Contractor's list or additional items identified by Architect, that must be completed or
25 corrected before certificate will be issued.

26 **FINAL COMPLETION PROCEDURES**

27 Submittals Prior to Final Completion: Before requesting final inspection for determining final completion,
28 complete the following:
29

- 30
- 31 Submit a final Application for Payment according to Section 01 29 00 "Payment Procedures."
- 32 Certified List of Incomplete Items: Submit certified copy of Architect's Substantial Completion
33 inspection list of items to be completed or corrected (punch list), endorsed and dated by Architect.
34 Certified copy of the list shall state that each item has been completed or otherwise resolved for
35 acceptance.
- 36 Certificate of Insurance: Submit evidence of final, continuing insurance coverage complying with
37 insurance requirements.
- 38 Submit pest-control final inspection report.
- 39

40 Inspection: Submit a written request for final inspection to determine acceptance a minimum of 10 days
41 prior to date the work will be completed and ready for final inspection and tests. On receipt of request,
42 Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will
43 prepare a final Certificate for Payment after inspection or will notify Contractor of construction that must
44 be completed or corrected before certificate will be issued.

45 **LIST OF INCOMPLETE ITEMS (PUNCH LIST)**

46 Organization of List: Include name and identification of each space and area affected by construction
47 operations for incomplete items and items needing correction including, if necessary, areas disturbed by
48 Contractor that are outside the limits of construction.
49

- 50
- 51 Organize list of spaces in sequential order, starting with exterior areas first.
- 52 Organize items applying to each space by major element, including categories for ceiling, individual
53 walls, floors, equipment, and building systems.
- 54 Submit list of incomplete items in the following format:
55

1 PDF electronic file. Architect will return annotated file.

2
3 **SUBMITTAL OF PROJECT WARRANTIES**

4 Time of Submittal: Submit written warranties on request of Architect for designated portions of the Work
5 where warranties are indicated to commence on dates other than date of Substantial Completion, or when
6 delay in submittal of warranties might limit Owner's rights under warranty.

7
8 Organize warranty documents into an orderly sequence based on the table of contents of Project Manual.

9
10 Warranty Electronic File: Provide warranties and bonds in PDF format. Assemble complete warranty and
11 bond submittal package into a single electronic PDF file with bookmarks enabling navigation to each item.
12 Provide bookmarked table of contents at beginning of document.

13
14 Submit on digital media acceptable to Architect.

15
16 Warranties in Paper Form:

17
18 Bind warranties and bonds in heavy-duty, three-ring, vinyl-covered, loose-leaf binders, thickness as
19 necessary to accommodate contents, and sized to receive 8-1/2-by-11-inch paper.

20
21 Provide additional copies of each warranty to include in operation and maintenance manuals.

22
23 **PART 2 - PRODUCTS**

24
25 **MATERIALS**

26 Cleaning Agents: Use cleaning materials and agents recommended by manufacturer or fabricator of the
27 surface to be cleaned. Do not use cleaning agents that are potentially hazardous to health or property or that
28 might damage finished surfaces.

29
30 **PART 3 - EXECUTION**

31
32 **FINAL CLEANING**

33 General: Perform final cleaning. Conduct cleaning and waste-removal operations to comply with local laws
34 and ordinances and Federal and local environmental and antipollution regulations.

35
36 Cleaning: Clean each surface or unit, comply with manufacturer's written instructions.

37
38 Complete the following cleaning operations before requesting inspection for certification of
39 Substantial Completion for entire Project or for a designated portion of Project:

40
41 Clean Project site, yard, and grounds, in areas disturbed by construction activities, including
42 landscape development areas, of rubbish, waste material, litter, and other foreign substances.

43 Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains,
44 films, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces.

45 Restore reflective surfaces to their original condition.

46 Sweep concrete surfaces.

47 Clean light fixtures, lamps, globes, and reflectors to function with full efficiency.

48 Leave Project clean.

49
50 Pest Control: Comply with pest control requirements in Section 01 50 00 "Temporary Facilities and
51 Controls." Prepare written report.

52
53 Construction Waste Disposal: Comply with waste disposal requirements in Section 01 50 00 "Temporary
54 Facilities and Controls."

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REPAIR OF THE WORK

Complete repair and restoration operations, before requesting inspection for determination of Substantial Completion.

Repair, or remove and replace, defective construction. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment. Where damaged or worn items cannot be repaired or restored, provide replacements. Remove and replace operating components that cannot be repaired. Restore damaged construction and permanent facilities used during construction to specified condition.

END OF SECTION

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SECTION 01 78 23
OPERATION AND MAINTENANCE DATA

PART 1 - GENERAL

SUMMARY

Section includes administrative and procedural requirements for preparing operation and maintenance manuals, including the following:

- Operation and maintenance documentation directory manuals.
- Systems and equipment operation manuals.
- Systems and equipment maintenance manuals.
- Product maintenance manuals.

CLOSEOUT SUBMITTALS

Submit operation and maintenance manuals indicated. Provide content for each manual as specified in individual Specification Sections, and as reviewed and approved at the time of Section submittals. Submit reviewed manual content formatted and organized as required by this Section.

Format: Submit on digital media acceptable to Architect. Enable reviewer comments on draft submittals.

Final Manual Submittal: Submit (2) Two manuals in final form prior to requesting inspection for Substantial Completion before commencing demonstration and training.

Correct or revise each manual to comply with Architect's comments.

Comply with Section 01 77 00 "Closeout Procedures" for schedule for submitting operation and maintenance documentation.

FORMAT OF OPERATION AND MAINTENANCE MANUALS

Manuals, Electronic File (1) One File: Submit manuals in the form of a multiple file composite electronic PDF file for each manual type required.

Electronic Files: Use electronic files prepared by manufacturer where available. Where scanning of paper documents is required, configure scanned file for minimum readable file size.

File Names and Bookmarks: Bookmark individual documents based on file names. Name document files to correspond to system, subsystem, and equipment names used in manual directory and table of contents. Group documents for each system and subsystem into individual composite bookmarked files, then create composite manual, so that resulting bookmarks reflect the system, subsystem, and equipment names in a readily navigated file tree. Configure electronic manual to display bookmark panel on opening file.

Manuals, Paper Copies (2) Two Bound Books: Submit manuals in the form of hard-copy, bound and labeled volumes.

Binders: Heavy-duty, three-ring, vinyl-covered, loose-leaf binders, in thickness necessary to accommodate contents, sized to hold 8-1/2-by-11-inch paper; with clear plastic sleeve on spine to hold label describing contents and with pockets inside covers to hold folded oversize sheets.

Drawings: Attach reinforced, punched binder tabs on drawings and bind with text.

If oversize drawings are necessary, fold drawings to same size as text pages and use as foldouts.

If drawings are too large to be used as foldouts, fold and place drawings in labeled envelopes and bind envelopes in rear of manual. At appropriate locations in manual, insert typewritten pages indicating drawing titles, descriptions of contents, and drawing locations.

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SECTION 01 79 00
DEMONSTRATION AND TRAINING

PART 1 - GENERAL

SUMMARY

Section includes administrative and procedural requirements for instructing Owner's personnel, including the following:

Instruction in operation and maintenance of systems, subsystems, and equipment.

QUALITY ASSURANCE

Preinstruction Conference: Conduct conference at Project site to comply with requirements in Section 01 31 00 "Project Management and Coordination."

COORDINATION

Coordinate instruction schedule with Owner's operations. Adjust schedule as required to minimize disrupting Owner's operations and to ensure availability of Owner's personnel.

INSTRUCTION PROGRAM

Program Structure: Develop an instruction program that includes training modules for each system and for equipment not part of a system, as required by individual Specification Sections.

INSTRUCTION

Training Location and Reference Material: Conduct training on-site in the completed and fully operational facility using the actual equipment in-place. Conduct training using final Operation and Maintenance Manual.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

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**SECTION 02 41 19
SELECTIVE DEMOLITION**

PART 1 - GENERAL

SUMMARY

Section Includes:

- Demolition and removal of selected portions of building or structure.
- Salvage of existing items to be reused or recycled.

MATERIALS OWNERSHIP

Unless otherwise indicated, demolition waste becomes property of Contractor.

Historic items, relics, antiques, and similar objects including, but not limited to, cornerstones and their contents, commemorative plaques and tablets, and other items of interest or value to Owner that may be uncovered during demolition remain the property of Owner.

Carefully salvage in a manner to prevent damage and promptly return to Owner.

PREINSTALLATION MEETINGS

Predemolition Conference: Conduct conference at Project site.

INFORMATIONAL SUBMITTALS

Proposed Protection Measures: Submit report if requested by Owner, that indicates the measures proposed for protecting individuals and property, for environmental protection, for dust control and, for noise control. Indicate proposed locations and construction of barriers.

Pre-demolition photographs or video for Contractors records.

CLOSEOUT SUBMITTALS

Inventory of items that have been removed and salvaged.

FIELD CONDITIONS

Owner will occupy portions of building immediately adjacent to selective demolition area. Conduct selective demolition so Owner's operations will not be disrupted.

Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.

Notify Architect of discrepancies between existing conditions and Drawings before proceeding with selective demolition.

Storage or sale of removed items or materials on-site is not permitted.

Utility Service: Maintain existing utilities indicated to remain in service and protect them against damage during selective demolition operations.

Maintain fire-protection facilities in service during selective demolition operations.

Arrange selective demolition schedule so as not to interfere with Owner's operations.

WARRANTY

Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during selective demolition, by methods and with materials and using approved contractors so as not to void existing warranties.

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2 **PART 2 - PRODUCTS**
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4 **PERFORMANCE REQUIREMENTS**

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

7
8 Standards: Comply with ANSI/ASSP A10.6 and NFPA 241.
9

10 **PART 3 - EXECUTION**

11
12 **EXAMINATION**

13 Verify that utilities have been disconnected and capped before starting selective demolition operations.

14
15 Inventory and record the condition of items to be removed and salvaged.
16

17 **UTILITY SERVICES AND MECHANICAL/ELECTRICAL SYSTEMS**

18 Existing Services/Systems to Remain: Maintain services/systems indicated to remain and protect them
19 against damage.
20

21 Existing Services/Systems to Be Removed, Relocated, or Abandoned: Locate, identify, disconnect, and seal
22 or cap off utility services and mechanical/electrical systems serving areas to be selectively demolished.
23

24 Arrange to shut off utilities with utility companies.

25 If services/systems are required to be removed, relocated, or abandoned, provide temporary
26 services/systems that bypass area of selective demolition and that maintain continuity of
27 services/systems to other parts of building.

28 Disconnect, demolish, and remove fire-suppression systems, plumbing, and HVAC systems,
29 equipment, and components indicated on Drawings to be removed.
30

31 Piping to Be Removed: Remove portion of piping indicated to be removed and cap or plug
32 remaining piping with same or compatible piping material.

33 Piping to Be Abandoned in Place: Drain piping and cap or plug piping with same or compatible
34 piping material and leave in place.

35 Equipment to Be Removed: Disconnect and cap services and remove equipment.

36 Equipment to Be Removed and Reinstalled: Disconnect and cap services and remove, clean, and
37 store equipment; when appropriate, reinstall, reconnect, and make equipment operational.

38 Equipment to Be Removed and Salvaged: Disconnect and cap services and remove equipment and
39 deliver to Owner.

40 Ducts to Be Removed: Remove portion of ducts indicated to be removed and plug remaining ducts
41 with same or compatible ductwork material.

42 Ducts to Be Abandoned in Place: Cap or plug ducts with same or compatible ductwork material
43 and leave in place.
44

45 **PROTECTION**

46 Temporary Protection: Provide temporary barricades and other protection required to prevent injury to
47 people and damage to adjacent buildings and facilities to remain.
48

49 Remove temporary barricades and protections where hazards no longer exist.
50

51 **SELECTIVE DEMOLITION**

52 General: Demolish and remove existing construction only to the extent required by new construction and as
53 indicated. Use methods required to complete the Work within limitations of governing regulations and as
54 follows:
55

1 Neatly cut openings and holes plumb, square, and true to dimensions required. Use cutting methods
2 least likely to damage construction to remain or adjoining construction. Use hand tools or small
3 power tools designed for sawing or grinding, not hammering and chopping. Temporarily cover
4 openings to remain.
5 Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing
6 finished surfaces.
7 Do not use cutting torches until work area is cleared of flammable materials. At concealed spaces, such
8 as duct and pipe interiors, verify condition and contents of hidden space before starting flame-cutting
9 operations. Maintain portable fire-suppression devices during flame-cutting operations.
10 Locate selective demolition equipment and remove debris and materials so as not to impose excessive
11 loads on supporting walls, floors, or framing.
12 Dispose of demolished items and materials promptly.
13

14 Site Access and Temporary Controls: Conduct selective demolition and debris-removal operations to
15 ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used
16 facilities.
17

18 **Removed and Salvaged Items:**

19
20 Clean salvaged items.
21 Pack or crate items after cleaning. Identify contents of containers.
22 Store items in a secure area until delivery to Owner.
23 Transport items to Owner's storage area designated by Owner.
24 Protect items from damage during transport and storage.
25

26 **Removed and Reinstalled Items:**

27
28 Clean and repair items to functional condition adequate for intended reuse.
29 Pack or crate items after cleaning and repairing. Identify contents of containers.
30 Protect items from damage during transport and storage.
31 Reinstall items in locations indicated. Comply with installation requirements for new materials and
32 equipment. Provide connections, supports, and miscellaneous materials necessary to make item
33 functional for use indicated.
34

35 Existing Items to Remain: Protect construction indicated to remain against damage and soiling during
36 selective demolition. When permitted by Architect, items may be removed to a suitable, protected storage
37 location during selective demolition and cleaned and reinstalled in their original locations after selective
38 demolition operations are complete.
39

40 **CLEANING**

41 Remove demolition waste materials from Project site and dispose of them in an EPA-approved construction
42 and demolition waste landfill acceptable to authorities having jurisdiction.
43

44 Do not allow demolished materials to accumulate on-site.
45 Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
46 Remove debris from elevated portions of building by chute, hoist, or other device that will convey
47 debris to grade level in a controlled descent.
48

49 **Burning:** Do not burn demolished materials.
50

51 Clean adjacent structures and improvements of dust, dirt, and debris caused by selective demolition
52 operations. Return adjacent areas to condition existing before selective demolition operations began.
53

54 **END OF SECTION**

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SECTION 26 01 00

BASIC ELECTRICAL REQUIREMENTS

PART 1 GENERAL

1.01 SCOPE OF PROJECT

- A. This project consists of a new generator added to an existing building with a rough area and shall include all material to provide for the completion of all work associated with the following, but not be limited to the following:
 - 1. Minor demolition work.
 - 2. Low voltage conduit and wire.
 - 3. Engine generator and transfer switch.
- B. Electrical Contractor shall be Prime.

1.02 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this and the other sections of Division 26.

1.03 REQUIREMENTS OF REGULATORY AGENCIES AND STANDARDS

- A. Equipment, fixtures, material and installation shall conform to the requirements of the local Building Department, the serving utility companies, the National Electrical Code, National Electrical Safety Code, Life Safety Code, Occupational Safety and Health Act, and applicable national, state, and local codes, ordinances, and regulations.
- B. All equipment shall be equal to, or exceed, the minimum requirements of NEMA, IEEE, and UL.
- C. Should any change in Drawings or Specifications be required to comply with governmental regulations, the Contractor shall notify Architect/Engineer prior to execution of the Work. The work shall be carried out according to the requirements of such code in accordance with the instruction of the Architect/Engineer and at no additional cost to the Owner.
- D. The provisions of Standards, Codes, Laws, Ordinances, etc., shall be considered minimum requirements. In case of conflict between their published requirements, the Owner's Representative shall determine which is to be followed and his decision shall be binding. Specific requirements of this specification or the drawings, which exceed the published requirements, shall take precedence over them.

1.04 QUALITY ASSURANCE

- A. Work under this Division shall be supervised by a person who holds a certification issued by the Wisconsin Department of Safety and Professional Services as a certified electrical contractor, certified electrical contractor-restricted or certified master electrician.
- B. Work under this Division shall be executed by a person who holds a certification issued by the Wisconsin Department of Safety and Professional Services as a certified electrical contractor, certified electrical contractor-restricted, certified master electrician, certified journeyman electrician or certified beginning electrician.

1.05 FEES

- A. All local fees, permits, and services of inspection authorities shall be obtained and paid for by the Contractor. The Contractor shall cooperate fully with local utilities with respect to their services. The owner is responsible for any costs to be incurred relative to power service (primary and/or secondary) and telephone service provided by the utilities.

1.06 SCOPE OF WORK

- A. Electrical Installations: This division of the specifications covers the electrical systems of the project. It includes work performed by the electrical trades as well as trades not normally considered as electrical trades.
- B. Provide all incidentals, equipment, appliances, services, hoisting, scaffolding, supports, tools, supervision, labor consumable items, fees, licenses, etc., necessary to provide complete systems. Perform start-up and checkout on each item and system to provide fully operable systems.
- C. Examine and compare the Electrical Drawings with these specifications, and report any discrepancies between them to the Engineer and obtain from him written instructions for changes necessary in the work. At time of bid the most stringent requirements must be included in the bid.
- D. Examine and compare the Electrical Drawings and Specifications with the Drawings and Specifications of other trades, and report any discrepancies between them to the Engineer and obtain from him written instructions for changes necessary in the work. At time of bid, the most stringent requirements must be included in said bid.
- E. Install and coordinate the electrical work in cooperation with other trades installing interrelated work. Before installation, make proper provisions to avoid interferences in a manner approved by the Engineer. All changes required in the work of the Contractor, caused by his neglect to do so, shall be made by him at his own expense.
- F. It is the intent of the Drawings and Specifications to provide a complete workable system ready for the Owner's operation. Any item not specifically shown on the Drawings or called for in the Specifications, but normally required to conform with the intent, are to be considered a part of the Contract.

- G. All materials furnished by the Contractor shall be new and unused (temporary lighting and power products are excluded) and free from defects. All materials used shall bear the Underwriter's Laboratory, Inc. label provided a standard has been established for the material in question.
- H. Except for conduit, conduit fittings, outlet boxes, wire and cable, all items of equipment or material shall be the product of one manufacturer throughout the entire project. Multiple manufacturers will not be permitted.

1.07 DEFINITIONS

- A. "PROVIDE" means to furnish, install, purchase, transport, place, erect, connect, wire, test, and turn over to Owner, complete and ready for regular operation, the particular Work referred to.
- B. "INSTALL" means to set in place, join, unite, fasten, link, attach, wire, set up, or otherwise connect together before testing and turning over to Owner, complete and ready for regular operation, the particular Work referred to.
- C. "FURNISH" means to purchase, supply, and deliver to job site, all materials, equipment, testing apparatus, controls, tests, accessories, and all other items customarily required for the proper and complete application for the particular Work referred to.
- D. "WIRE", "WIRING" means the inclusion of all raceways, fittings, conductors, connectors, tape, junction and outlet boxes, connections, splices, and all other items necessary and/or required in connection with such Work.
- E. "CONDUIT" means the inclusion of all fittings, hangers, supports, sleeves, etc
- F. "AS DIRECTED" means as directed by the Architect/Engineer, or his representative.
- G. "CONCEALED" means embedded in masonry or other construction, installed behind wall furring or within double partitions, or installed above hung ceilings.

1.08 COORDINATION OF THE WORK

- A. Certain materials will be provided by other trades. Examine the Contract Documents to ascertain these requirements.
- B. Carefully check space requirements with other trades and the physical confines of the area to insure that all material can be installed in the spaces allotted thereto including finished suspended ceilings and the spaces within the existing building. Make modifications thereto as required and approved.
- C. Transmit to other trades all information required for work to be provided under their respective Sections in ample time for installation.
- D. Wherever work interconnects with work of other trades, coordinate with other trades to insure that all trades have the information necessary so that they may properly install all the necessary connections and equipment. Identify all items of work that require access so that the ceiling trade will know where to install access doors and panels.

- E. Coordinate, project and schedule work with other trades in accordance with the construction sequence.
- F. The Drawings show only the general run of raceways and approximate location of outlets. Any significant changes in location of outlets, cabinets, etc., necessary in order to meet field conditions shall be brought to the immediate attention of the Architect/Engineer and receive his approval before such alterations are made. All such modifications shall be made without additional cost to the Owner.
- G. Obtain from the Architect/Engineer in the field the location of such outlets or equipment not definitely located on the Drawings.
- H. Circuit "tags" are used to show the circuit number and the panel designation for wiring devices and luminaires. Equipment circuits are indicated on equipment connection schedule. Show the actual circuits numbers on the finished record drawings and on panel directory card. Where circuiting is not indicated, Electrical Subcontractor must provide required circuiting in accordance with the loading indicated on the drawings and/or as directed.
- I. Adjust location of conduits, panels, equipment, pull boxes, fixtures, etc. to accommodate the work to prevent interferences, both anticipated and encountered. Determine the exact route and location of each raceway prior to fabrication.
 - 1. Right-of-Way
 - a. Lines that pitch have the right-of-way over those that do not pitch. For example: steam, condensate, and plumbing drains normally have right-of-way. Lines whose elevations cannot be changed to have right-of-way over lines whose elevations can be changed.
 - b. Make offsets, transitions and changes in direction in raceways as required to maintain proper headroom in pitch of sloping lines whether or not indicated on the Drawings.
- J. Wherever the work is of sufficient complexity, prepare additional Detail Drawings to scale similar to that of the bidding Drawings of the same size as the Contract Drawings. With these layouts, coordinate the work with the work of other trades. Such detailed work to be clearly identified on the Drawings as to the area to which it applies. Submit for review Drawings clearly showing the work and its relation to the work of other trades before commencing shop fabrication or erection in the field.
- K. Coordinate with the local Electric Utility Company and the local Telephone Company as to their requirements for service connections and provide all necessary materials, labor and testing.
- L. Coordinate with contractors for work under other Divisions of this specification for all work necessary to accomplish this contractor's work.

1.09 PROGRESS OF WORK

- A. The Contractor shall order the progress of his work to conform to the progress of the work of other trades and shall complete the entire installation as soon as the conditions of the building will permit. Any cost resulting from the defective or ill-timed work performed under this section shall be borne by the Contractor.

1.10 DELIVERY, STORAGE AND HANDLING

- A. Ship and store all products and materials in a manner that will protect them from damage, weather and entry of debris. If items are damaged, do not install, but take immediate steps to obtain replacement or repair. Any such repairs shall be subject to review and acceptance of the manufacturer and Architect/Engineer.
- B. Deliver materials in manufacturer's unopened container fully identified with manufacturer's name, trade name, type, class, grade, size and color.
- C. Store materials suitably sheltered from the elements, but readily accessibly for inspection by the Architect/Engineer until installed. Store all items subject to moisture damage in dry, heated spaces.

1.11 EQUIPMENT ACCESSORIES

- A. Provide supports, hangers and auxiliary structural members required for support of the work.
- B. Furnish and set all sleeves for passage of raceways through structural, masonry and concrete walls of floors and elsewhere as will be required for the proper protection of each raceway passing through building surfaces.
- C. Wall mounted equipment may be directly secured to wall by means of steel bolts. Maintain at least 1" air space between equipment and supporting wall. Groups or arrays of equipment may be mounted on adequately sized steel angles, channels, or bars. Prefabricated steel channels providing a high degree of mounting flexibility, such as those manufactured by Kindorf, Glob-Strutt and Unistrut, may be used for mounting arrays of equipment.

1.12 OPERATIONS AND MAINTENANCE MANUALS

- A. General: Provide operations & maintenance (O&M) manuals in accordance with the Contract Documents.
 - 1. Provide two (2) copies of each manual.
 - 2. Manuals shall be 8-1/2 inches X 11 inches in hard cover 3-ring loose-leaf binders.
 - 3. Manuals shall be complete and in Owner's hands prior to turning building over to Owner and at least 10 days prior to instruction to operating personnel.
- B. Provide manufacturer's literature as regularly published by the respective manufacturers for proper preventative and comprehensive maintenance.

- C. Provide O&M manuals including but not limited to the following:
1. Alphabetical list of all system components, with the name, address, and 24-hour phone number of the company responsible for servicing each item during the first year of operation.
 2. Operating instructions for complete system including:
 - a. Normal starting, operating, and shut-down.
 - b. Emergency procedures for fire or failure of major equipment.
 - c. Summer and winter special procedures, if any.
 - d. Day and night special procedures, if any.
 3. Maintenance instruction including:
 - a. Proper lubricants and lubricating instructions for each piece of equipment, and date when lubricated.
 - b. Necessary cleaning, replacement and/or adjustment schedule.
 4. Manufacturer's data for each piece of equipment including:
 - a. Installation instructions.
 - b. Drawings and specifications.
 - c. Parts list, including recommended items to be stocked.
 - d. Complete wiring diagrams.
 - e. Marked or changed prints locating all concealed parts and all variations from the original system design.
 - f. Test and inspection certificates.
- D. Refer to individual specification sections for additional O&M requirements.

1.13 RECORD DOCUMENTS

- A. Prepare record ("as-built") documents in accordance with the requirements in Division 1. In addition to the requirements specified in Division 1, indicate installed conditions for:
1. Major raceway systems, size, and location, for both exterior and interior; locations of control devices; distribution and branch electrical circuitry; and fuse and circuit breaker size and arrangements.
 2. Equipment locations (exposed and concealed), dimensioned from prominent building lines.
 3. Approved substitutions, contract modifications, and actual equipment and materials installed.

1.14 GUARANTEE

- A. Guarantee all material and workmanship for a period of one (1) year from date of final acceptance by the Owner, except that where guarantees or warranties for longer terms are specified elsewhere, such longer term to apply. Within 24 hours after notification, correct any deficiencies that occur during the guarantee period at no additional cost to the Owner, all to the satisfaction of the Owner and Architect/Engineer. Obtain similar guarantees from subcontractors, manufacturers, suppliers and subtrade specialists.
- B. See Division 1 – Closeout Procedures, for additional warranty requirements.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Applicable equipment and materials shall be listed by Underwriters' Laboratories and Manufactured in accordance with ASME, NEMA, ANSI or IEEE standards, and as approved by local authorities having jurisdiction as mentioned in Division 1.
- B. If products and materials are specified or indicated on the Drawings for a specific item or system, use those products or materials. If products and materials are not listed in either of the above, use first class products and materials, subject to approval of Shop Drawings where Shop Drawings are required or as approved in writing where Shop Drawings are not required.
- C. All equipment capacities, etc. are listed for job site operating conditions. All equipment sensitive to altitudes or ambient temperatures to be derated and method of derating shown on Shop Drawings. Where operating conditions shown differ from the laboratory test conditions, the equipment to be derated and the method of derating shown on Shop Drawings.

2.02 SUBSTITUTION OF MATERIALS OR EQUIPMENT

- A. All requests for substitution of materials or equipment shall be made in writing. The request for prior approval must be in the Engineers office not less than 10 days prior to the bid date. Samples of proposed substitute materials or equipment shall be submitted to the Engineer for review whenever they are requested. Bids shall be based only upon the specified materials and equipment, or substitutes that have received written acceptance from the Engineer prior to the bid.
- B. Wherever the words "for approval" or "approved" are used in regard to manufactured specialties, or wherever it is desired to substitute a different make or type of apparatus for that specified, submit all information pertinent to the adequacy and adaptability of the proposed apparatus, and secure Architect/Engineer's acceptance before apparatus is ordered.
- C. Wherever quantities or a definite make and size of apparatus are specified, the make and size of apparatus which is proposed must conform substantially (in regard to the operating results) to that specified or implied. Same shall apply to important dimensions relating to operation of apparatus in coordination with the rest of the system, or to properly fitting it into available space conditions. Any substitution of equipment or apparatus shall include all necessary revisions, as required to complete the installation.
- D. Acceptance of substitutions, for equipment specified herein, will not be given merely upon submission of manufacturer's names and will be given only after receipt of complete and satisfactory performance data covering the complete range of operating conditions in tabular and graphical form. Furnish complete and satisfactory information relative to equipment dimensions, weight, etc. Acceptance of all equipment specified or shown on the Drawings, or substitutions submitted for that specified or shown on the Drawings, will be granted if such equipment, in the opinion of the Architect/Engineer, conforms to the performance requirements, space conditions, weight requirements and quality requirements. Any additional construction and design costs incurred as a result of any accepted substitution shall be borne by the Contractor. The opinion and judgment of the Architect/Engineer shall be final, conclusive, and binding.

Pleasant Valley Town Hall, Generator Project
Eleva, WI

2.03 SUBMITTALS

- A. Submit through General or Prime Contractor. Refer to Division 1 – Section ‘Submittals’.
- B. Prepare and submit one (1) electronic copy of Shop Drawings for materials, systems, and equipment as listed herein, including locations and sizes of all openings in floor decks, walls, and floors.
- C. The Work described in any Shop Drawing submission shall be carefully checked for all clearances (including those required for maintenance and servicing), field conditions, maintenance of architectural conditions, and proper coordination with all trades on the job. Each submitted Shop Drawing shall include a certification that all related job conditions have been checked and that no conflict exists.
- D. All drawings shall be submitted sufficiently in advance of field requirements to allow ample time for checking and resubmitting as may be required. All submittals shall be complete and contain all required and detailed information.
- E. Acceptance of any submitted data or Shop Drawings for material, equipment apparatus, devices, arrangements, and layout shall not relieve Contractor from responsibility of furnishing same of proper dimensions and weight, capacities, sizes, quantity, quality and installation details, to efficiently perform the requirements and intent of the Contract. Such acceptance shall not relieve Contractor from responsibility for errors, omissions, or inadequacies of any sort on submitted data or Shop Drawings.
- F. Each Shop Drawing shall contain the following information.
 - 1. Provide general information on each copy of the submittal.
 - a. Project title.
 - b. Reference to the applicable drawing and specification article.
 - c. Identify each device per the schedules and drawings.
 - d. Contractor and supplier identification, addresses and telephone numbers.
 - e. Submittal Date.
 - f. Tab each submittal with its specification section. Do not supply a complete submittal without breaking out each specification section.
 - 2. Certification that the contractor has reviewed the submittal.
 - 3. Refer to individual specification sections for additional information requirements.
- G. Shop Drawing submittals shall be provided for each specific material, system, or equipment as identified herein.
 - 1. As a minimum, make submittals on the following items:
 - a. Raceways, conduit & wire
 - 2. Refer to individual specification sections for additional submittal requirements.

END OF SECTION

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SECTION 26 01 10

BASIC ELECTRICAL MATERIALS AND METHODS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
- B. Requirements specified in Division 26 Section "Basic Electrical Requirements" apply to this Section.
- C. This Section includes limited scope general construction materials and methods for application with electrical installations as follows:
 - 1. Joint sealers for sealing around electrical materials and equipment; and for sealing penetrations in fire and smoke barriers, floors, and foundation walls.
 - 2. Cutting, patching, and repairing.
 - 3. Excavation, trenching, and backfill.
 - 4. Waterproofing.
 - 5. Supports.
 - 6. Fastenings.
 - 7. Testing equipment and materials.
 - 8. Cleaning up.

1.02 DEFINITIONS

- A. The following definitions apply to excavation operations:
 - 1. Additional Excavation: Where excavation has reached required subgrade elevations, if unsuitable bearing materials are encountered, continue excavation until suitable bearing materials are reached. The Contract Sum may be adjusted by an appropriate Contract Modification.
 - 2. Subbase: As used in this Section refers to the compacted soil layer used in pavement systems between the subgrade and the pavement base course material.
 - 3. Subgrade: As used in this Section refers to the compacted soil immediately below the slab or pavement system.
 - 4. Unauthorized excavation: Consists of removal of materials beyond indicated subgrade elevations or dimensions without specific direction from the Engineer.

1.03 DELIVERY, STORAGE, AND HANDLING

- A. Deliver joint sealer materials in original unopened containers or bundles with labels informing about manufacturer, product name and designation, color, expiration period for use, pot life, curing time, and mixing instructions for multi-component materials.
- B. Store and handle joint sealer materials in compliance with the manufacturers' recommendations to prevent their deterioration and damage.

PART 2 PRODUCTS

2.01 JOINT SEALERS

- A. General: Joint sealers, joint fillers, and other related materials compatible with each other and with joint substrates under conditions of service and application.
- B. Colors: As selected by the Engineer from manufacturer's standard colors.
- C. Elastomeric Joint Sealers: Provide the following types:
 - 1. One-part, nonacid-curing, silicone sealant complying with ASTM C 920, Type S, Grade NS, Class 25, for uses in non-traffic areas for masonry, glass, aluminum, and other substrates recommended by the sealant manufacturer.
 - 2. Products: Subject to compliance with requirements, provide one of the following:
 - a. One-Part, Nonacid-Curing, Silicone Sealant
 - b. "Chem-Calk N-Cure 2000", Bostic Construction Products Division.
 - c. "Dow Corning 790", Dow Corning Corporation.
 - d. "Silglaze N SCS 2501", General Electric Company.
 - e. "Silpruf SCS 2000", General Electric Company.
 - f. "864", Pecora Corporation.
 - g. "Rhodorsil 5C", Rhone-Poulenc, Inc.
 - h. "Spectrum 1", Tremco, Inc.
 - i. "Spectrum 2", Tremco, Inc.
- D. Fire-Resistant Joint Sealers: Two-part, foamed-in-place, silicone sealant formulated for use in through-penetration fire-stopping around cables, conduit, pipes, and duct penetrations through fire-rated walls and floors. Sealants and accessories shall have fire-resistance ratings indicated, as established by testing identical assemblies in accordance with ASTM E 814, by Underwriters' Laboratories, Inc., or other testing and inspection agency acceptable to authorities having jurisdiction.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. "Dow Corning Fire Stop Foam", Dow Corning Corp.
 - b. "Pensil 851", General Electric Co.

2.02 INSTALLATION

- A. Examine substrates, area, and condition, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting installation and application of joint sealers and access panels. Do not proceed with installation until unsatisfactory conditions have been corrected.
- B. Preparation for Joint Sealers.
 - 1. Surface Cleaning for Joint Sealers: Clean surfaces of joints immediately before applying joint sealers to comply with recommendations of joint sealer manufacturer.
 - 2. Apply joint sealer primer to substrates as recommended by joint sealer manufacturer. Protect adjacent areas from spillage and migration of primers, using masking tape. Remove tape immediately after tooling without disturbing joint seal.
- C. Application of Joint Sealers
 - 1. General: Comply with joint sealer manufacturers' printed application instructions applicable to products and applications indicated, except where more stringent requirements apply.
 - a. Comply with recommendations of ASTM C 962 for use of elastomeric joint sealants.
 - b. Comply with recommendations of ASTM C 790 for use of acrylic emulsion joint sealants.
 - 2. Installation of Fire-Stopping Sealant: Install sealant, including forming, packing, and other accessory materials, to fill openings around electrical services penetrating floors and walls, to provide fire-stops with fire- resistance ratings indicated for floor or wall assembly in which penetration occurs. Comply with installation requirements established by testing and inspecting agency.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Follow manufacturer's instructions for installing, connecting, and adjusting all equipment. Provide a copy of such instructions at the equipment during any work on the equipment. Provide all special supports, connections, wiring, accessories, etc.
- B. Use mechanics skilled in their trade for all work.

- C. Rough-in:
1. Verify final locations for rough-ins with field measurements and with the requirements of the actual equipment to be connected.
 2. Refer to equipment specifications in Divisions 2 through 26 for rough-in requirements.
- D. Electrical Installations: Sequence, coordinate, and integrate the various elements of electrical systems, materials, and equipment. Comply with the following requirements:
1. Coordinate electrical systems, equipment, and materials installation with other building components.
 2. Verify all dimensions by field measurements.
 3. Arrange for chases, slots, and openings in other building components during progress of construction, to allow for electrical installations.
 4. Coordinate the installation of required supporting devices and sleeves to be set in poured-in-place concrete and other structural components, as they are constructed.
 5. Sequence, coordinate, and integrate installations of electrical materials and equipment for efficient flow of the work. Give particular attention to large equipment requiring positioning prior to closing in the building.
 6. Where mounting heights are not detailed or dimensioned, install systems, materials, and equipment to provide the maximum headroom possible.
 7. Coordinate connection of electrical systems with exterior underground utilities and services. Comply with requirements of governing regulations, franchised service companies, and controlling agencies.
 8. Install systems, materials, and equipment to conform with approved submittal data, including coordination drawings, to greatest extent possible. Conform to arrangements indicated by the Contract Documents, recognizing that portions of the Work are shown only in diagrammatic form. Where coordination requirements conflict with individual system requirements, refer conflict to the Architect/Engineer.
 9. Install systems, materials, and equipment level and plumb, parallel and perpendicular to other building systems and components, where installed exposed in finished spaces.
 10. Install electrical equipment to facilitate servicing, maintenance, and repair or replacement of equipment components. As much as practical, connect equipment for ease of disconnecting, with minimum of interference with other installations.
 11. Install systems, materials, and equipment giving right-of-way priority to systems required to be installed at a specified slope.

3.02 CUTTING, PATCHING, AND REPAIRING

- A. The work shall be carefully laid out in advance. Where cutting, channeling, chasing or drilling of floors, walls, partitions, ceilings or other surfaces is necessary for the proper installation, support or anchorage of raceway, outlets or other equipment, the work shall be carefully done. Any damage to the building, piping, equipment or defaced finish plaster, woodwork, metalwork, etc. shall be repaired by skilled mechanics of the trades involved at no additional cost to the Owner.
- B. Where conduits, mounting channels, outlet, junction, or pull boxes are mounted on a painted surface, or a surface to be painted, they shall be painted to match the surface. Whenever support channels are cut, the bare metal shall be cold galvanized.
- C. Perform cutting and patching in accordance with Division 01 Section "CUTTING AND PATCHING". In addition to the requirements specified in Division 01, the following requirements apply:
 - 1. Perform cutting, fitting, and patching of electrical equipment and materials required to:
 - a. Uncover work to provide for installation of ill-timed work.
 - b. Remove and replace defective work.
 - c. Remove and replace work not conforming to requirements of the Contract Documents.
 - 2. Protect the structure, furnishings, finishes, and adjacent materials not indicated or scheduled to be removed.
 - 3. Provide and maintain temporary partitions or dust barriers adequate to prevent the spread of dust and dirt to adjacent areas.
 - 4. Protection of Installed Work: During cutting and patching operations, protect adjacent installations.
 - 5. Patch finished surfaces and building components using new materials specified for the original installation and experienced installers. Installers' qualifications refer to the materials and methods required for the surface and building components being patched.

3.03 EXCAVATION, TRENCHING, AND BACKFILL

- A. Provide excavation for the Work. Excavate all material encountered, to the depths indicated on the drawings or required. Remove from the site, excavated materials not required or suitable for backfill. Provide grading, as may be necessary, to prevent surface water from flowing into trenches or other excavations. Remove any water accumulating therein. Provide sheeting and shoring as may be necessary for the protection of the Work and for the safety of personnel.
- B. Provide trenches of widths necessary for the proper execution of the Work. Grade bottom of the trenches accurately to provide uniform bearing and support the Work on undisturbed soil at every point along its entire length. Except where rock is encountered, do not excavate below the depths indicated. Where rock excavations are required.

Excavate rock to a minimum overdepth of four (4") inches below the trench depths indicated on the Drawings or required. Backfill overdepths in the rock excavation and unauthorized overdepths with loose granular, moist earth, thoroughly machine tamped, to a compaction level of at least 95 percent to standard protector density or 75 percent relative density or as specified by the Architect. Whenever unstable soil that is incapable of properly supporting the Work, as determined by Architect/Engineer, is encountered in the bottom of the trench, remove soil to a depth required and backfill the trench to the proper grade with coarse sand, fine gravel, or other suitable material.

- C. Excavate trenches for utilities to a depth that will provide the following minimum depths of cover from existing grade or from indicated finished grade, whichever is lower, unless otherwise specifically shown.
 - 1. Primary electric service: four (4) feet (minimum)
 - 2. Secondary electric service: two (2) feet (minimum)
 - 3. Telephone service: two (2) feet (minimum)
- D. Trenches shall not be placed within ten (10) feet of foundation or soil surfaces which must resist horizontal forces.
- E. Do not backfill trenches until all required tests have been preformed and the installation observed by the Engineer. Comply with the requirements of other sections of these specifications. Backfill shall consist of non-expansive soil with limited porosity. Deposit in six (6") inch layers and thoroughly and carefully tamp until the Work has a cover of not less than one (1) foot. Backfill and tamp remainder of trench at twelve (12") inch intervals until complete. Uniformly grade the finished surface. Backfill and tamp with compaction at least equal to the surrounding area.

3.04 WATERPROOFING

- A. Avoid, if possible, the penetration of any waterproof membranes such as roofs, machine room floors, basement walls, and the like. If such penetration is necessary, perform it prior to the waterproofing and furnish all sleeves or pitch-pockets required. Advise the Architect/Engineer and obtain written permission before penetrating any waterproof membrane, even where such penetration is shown on the Drawings.
- B. If Contractor penetrates any walls or surfaces after they have been waterproofed, he shall restore the waterproof integrity of that surface as directed by the Architect/Engineer at his own expense.

3.05 SUPPORTS

- A. Support work in accordance with the best industry practice and the following.
- B. Include supporting frames or racks extending from building structure for work indicated as being supported from walls where the walls are incapable of supporting the weight. In particular, provide such frames or racks in electric closets.
- C. Include supporting frames or racks for equipment, intended for vertical surface mounting, which is required in a free standing position.

- D. Supporting frames or racks shall be of standard angle, standard channel or specialty support system steel members. They shall be rigidly bolted or welded together and adequately braced to form a substantial structure. Racks shall be of ample size to assure a workmanlike arrangement of all equipment mounted on them.
- E. Nothing, (including outlet, pull and junction boxes and fittings) shall depend on electric conduits, raceways, or cables for support, except that threaded hub type fittings having a gross volume not in excess of 100 cubic inches may be supported from heavy wall conduit, where the conduit is securely supported from the structure within five inches of the fitting on two opposite sides.
- F. Nothing shall rest on, or depend for support on, suspended ceilings media (tiles, lath, plaster, as well as splines, runners, bars and the like in the plane of the ceiling).
- G. Provide required supports and hangers for conduit, equipment, etc., so that loading will not exceed allowable loadings of structure.

3.06 FASTENINGS

- A. Fasten electric work to building structure in accordance with the best industry practice and the following.
- B. Floor or pad mounted equipment shall not be held in place solely by its own dead weight. Include anchor fastening in all cases.
- C. For items which are shown as being ceiling mounted at locations where fastening to the building construction element above is not possible, provide suitable auxiliary channel or angle iron bridging, tying to the building structural elements.

3.07 TESTING EQUIPMENT AND MATERIALS

- A. The Contractor shall provide all testing instruments, equipment and all materials, connections, labor, etc., required to perform tests.
- B. Test all circuits, fixtures, equipment, and systems for proper operation and freedom from grounds, shorts and open circuits before acceptance is requested.
- C. Measure voltage at panelboards and outlets after the building is fully occupied. Make final transformer tap adjustments based on these measurements.
- D. Perform all tests required by local authorities, such as tests of life safety systems, in addition to tests specified herein.
- E. Perform tests required by other specification sections.

3.08 CLEANING UP

- A. Contractor shall take care to avoid accumulation of debris, boxes, crates, etc., resulting from the installation of his work. Contractor shall remove from the premises each day all debris, boxes, etc., and keep the premises clean.
- B. Contractor shall clean up all fixtures and equipment at the completion of the project.
- C. All switchboards, panelboards, wireways, trench ducts, cabinets and enclosures shall be thoroughly vacuumed clean prior to energizing equipment and at the completion of the project. Equipment shall be opened for observation by the Architect/Engineer as required.

END OF SECTION

SECTION 26 05 01

MINOR ELECTRICAL DEMOLITION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Electrical demolition.

1.02 RELATED REQUIREMENTS

- A. Division 1 - Execution and Closeout Requirements: Additional requirements for alterations work.

PART 2 PRODUCTS

2.01 MATERIALS AND EQUIPMENT

- A. Materials and equipment for patching and extending work: As specified in individual sections.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify field measurements and circuiting arrangements are as shown on Drawings.
- B. Verify that abandoned wiring and equipment serve only abandoned facilities.
- C. Demolition drawings are based on casual field observation and existing record documents.
- D. Report discrepancies to Engineer before disturbing existing installation.
- E. Beginning of demolition means installer accepts existing conditions.
- F. It shall be the contractor's responsibility to visit the existing project site, become acquainted with all existing conditions, and ascertain the extent of work involved in installing equipment, conduit, devices, controls and all other appurtenances pertaining to the above. The contractor shall provide all labor, materials, etc., required for the complete, new installation required for the completion of the project. By the act of submitting a price; or in the case of time and material project, begin work, the contractor shall be deemed to have performed such an examination, to have accepted such conditions, and to have made allowances therefore preparing his price and resolving questions regarding work required.

3.02 PREPARATION

- A. Coordinate utility service outages with utility company.
- B. 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.
- C. 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. Minimize outage duration.
 - 1. Obtain permission from Owner at least 24 hours before partially or completely disabling system.
 - 2. Make temporary connections to maintain service in areas adjacent to work area.

3.03 DEMOLITION AND EXTENSION OF EXISTING ELECTRICAL WORK

- A. Remove, relocate, and extend existing installations to accommodate new construction.
- B. Remove all abandoned wiring to source of supply. Verify with Owner.
- C. Remove exposed abandoned conduit, including abandoned conduit above accessible ceiling finishes. Cut conduit flush with walls and floors, and patch surfaces.
- D. Repair adjacent construction and finishes damaged during demolition and extension work.
- E. Maintain access to existing electrical installations that remain active. Modify installation or provide access panel as appropriate.
- F. Extend existing installations using materials and methods compatible with existing electrical installations, or as specified.

3.04 CLEANING AND REPAIR

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

END OF SECTION

SECTION 26 05 19

LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Wire and cable for 600 volts and less.
- B. Wiring connectors and connections.

1.02 RELATED REQUIREMENTS

- A. Division 31 - Earthwork.
- B. Section 26 05 53 - Identification for Electrical Systems.

1.03 REFERENCE STANDARDS

- A. NECA 1 - Standard for Good Workmanship in Electrical Contracting; National Electrical Contractors Association; 2015.
- B. NETA STD ATS - Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems; International Electrical Testing Association; 2017.
- C. NFPA 70 - National Electrical Code; National Fire Protection Association; 2017.

1.04 SUBMITTALS

- A. See Division 01 - Submittal Procedures.
- B. Test Reports: Indicate procedures and values obtained.
- C. Design Data: Indicate voltage drop and ampacity calculations for aluminum conductors substituted for copper conductors.
- D. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by product testing agency.
- E. Project Record Documents: Record actual locations of components and circuits.

1.05 QUALITY ASSURANCE

- A. Conform to requirements of NFPA 70.
- B. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum three years documented experience and with service facilities within 100 miles (160 km) of Project.
- C. Products: Furnish products listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

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PART 2 PRODUCTS

2.01 WIRING REQUIREMENTS

- A. Concealed Dry Interior Locations: Use only building wire in raceway, building wire with Type THHN, THWN, XHHW insulation in raceway, armored cable, or metal clad cable. See permitted use in 3.03 Installation for AC and MC cable.
- B. Exposed Dry Interior Locations: Use only building wire in raceway, building wire with Type THHN, THWN, XHHW insulation in raceway, armored cable, or metal clad cable. See permitted use in 3.03 Installation for AC and MC cable.
- C. Above Accessible Ceilings: Use only building wire in raceway, building wire with Type THHN, THWN, or XHHW insulation in raceway, armored cable, or metal clad cable. See permitted use in 3.03 Installation for AC and MC cable.
- D. Wet or Damp Interior Locations: Use only building wire with Type THWN or XHHW insulation in raceway.
- E. Exterior Locations: Use only building wire with Type THWN or XHHW insulation in raceway, direct burial cable, service-entrance cable.
- F. Underground Installations: Use only building wire with Type THWN or XHHW insulation in raceway.
- G. Use solid conductor for feeders and branch circuits 10 AWG and smaller.
- H. Use stranded conductors for control circuits.
- I. Use conductor not smaller than 12 AWG for power and lighting circuits.
- J. Use conductor not smaller than 16 AWG for control circuits.
- K. Use 10 AWG conductors for 20 ampere, 120 volt branch circuits longer than 75 feet (25 m).
- L. Conductor sizes are based on copper unless indicated as aluminum or "AL".

2.02 WIRE MANUFACTURERS

- A. Cerro Wire Inc.
- B. Industrial Wire & Cable, Inc.
- C. Southwire Company.
- D. Encore.
- E. Substitutions: See Division 01 - Product Requirements.

2.03 BUILDING WIRE

- A. Description: Single conductor insulated wire.
- B. Conductor: Copper.
 - 1. For Sizes Smaller Than 4 AWG: Copper.
 - 2. For Sizes 4 AWG and Larger: Copper.
- C. Insulation Voltage Rating: 600 volts.
- D. Insulation: NFPA 70, Type THW, THHN, THWN, XHHW.
- E. Insulation: Thermoplastic material rated 60 degrees C.

2.04 ARMORED CABLE (See Permitted Use in 3.03 Installation)

- A. Description: NFPA 70, Type AC.
- B. Conductor: Copper.
 - 1. For Sizes Smaller Than 4 AWG: Copper.
 - 2. For Sizes 4 AWG Through 1 AWG: Copper.
- C. Insulation Voltage Rating: 300 volts.
- D. Insulation Temperature Rating: 60 degrees C.
- E. Insulation Material: Thermoplastic.
- F. Conductor Assembly Covering: Lead.

2.05 METAL CLAD CABLE (See Permitted Use in 3.03 Installation)

- A. Description: NFPA 70, Type MC.
- B. Conductor: Copper.
 - 1. For Sizes Smaller Than 4 AWG: Copper.
 - 2. For Sizes 4 AWG and Larger: Copper.
- C. Insulation Voltage Rating: 600 volts.
- D. Insulation Temperature Rating: 60 degrees C.
- E. Insulation Material: Thermoplastic.
- F. Armor Material: Steel.
- G. Armor Design: Interlocked metal tape.
- H. Jacket: PVC; use in locations indicated.

2.06 WIRING CONNECTORS

- A. Split Bolt Connectors:
 - 1. Not acceptable.
- B. Solderless Pressure Connectors:
 - 1. High copper alloy terminal. May be used only for cable termination to equipment pads or terminals.
 - 2. Substitutions: See Division 01 - Product Requirements.
- C. Spring Wire Connectors:
 - 1. Solderless spring type pressure connector with insulating covers for copper wire splices and taps. Use for conductor sizes 10 AWG and smaller.
 - 2. Substitutions: See Division 01 - Product Requirements.
- D. Compression Connectors:
 - 1. Long barrel; seamless, tin-plated electrolytic copper tubing; internally beveled barrel ends. Connector shall be clearly marked with the wire size and type and proper number and location of crimps.
 - 2. Substitutions: See Division 01 - Product Requirements.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that interior of building has been protected from weather.
- B. Verify that mechanical work likely to damage wire and cable has been completed.
- C. Verify that raceway installation is complete and supported.
- D. Verify that field measurements are as indicated.

3.02 PREPARATION

- A. Completely and thoroughly swab raceway before installing wire.

3.03 INSTALLATION

- A. Install wire and cable securely, in a neat and workmanlike manner, as specified in NECA 1.
 - 1.
- B. Route wire and cable as required to meet project conditions.
 - 1. Wire and cable routing indicated is approximate unless dimensioned.
 - 2. Where wire and cable destination is indicated and routing is not shown, determine exact routing and lengths required.

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3. Include wire and cable of lengths required to install connected devices within 10 ft of location shown.
- C. Use wiring methods indicated.
- D. Pull all conductors into raceway at same time.
- E. Use suitable wire pulling lubricant for building wire 4 AWG and larger.
- F. Protect exposed cable from damage.
- G. Support cables above accessible ceiling, using spring metal clips or metal cable ties to support cables from structure or ceiling suspension system. Do not rest cable on ceiling panels.
- H. Use suitable cable fittings and connectors.
- I. Neatly train and lace wiring inside boxes, equipment, and panelboards.
- J. Clean conductor surfaces before installing lugs and connectors.
- K. Make splices, taps, and terminations to carry full ampacity of conductors with no perceptible temperature rise.
- L. Use solderless pressure connectors with insulating covers for copper conductor splices and taps, 8 AWG and larger.
- M. Use insulated spring wire connectors with plastic caps for copper conductor splices and taps, 10 AWG and smaller.
- N. Identify and color code wire and cable under provisions of Section 26 05 53. Identify each conductor with its circuit number or other designation indicated.
- O. AC and MC cable permitted uses:
 1. **Flexible connections less than 4'**.
 2. Light fixture connections above suspended ceiling. **Length shall be 6' or less.** Not approved for fixture to fixture wiring.
 3. Conductor to last device on branch circuits installed in walls.
 4. Control and signal circuits.

3.04 FIELD QUALITY CONTROL

- A. Perform field inspection and testing in accordance with Division 01.
- B. Inspect and test in accordance with NETA STD ATS, except Section 4.
- C. Perform inspections and tests listed in NETA STD ATS, Section 7.3.2.

END OF SECTION

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SECTION 26 05 23

CONTROL-VOLTAGE ELECTRICAL POWER CABLES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Furnishing and installing cabling for remote-control, signaling and power-limited circuits.

1.02 RELATED REQUIREMENTS

- A. Applicable provisions of Division 1 govern work under this Section.
- B. Section 26 05 33 – Raceway and Boxes for Electrical Systems.
- C. Section 26 05 53 – Identification for Electrical Systems.

1.03 REFERENCE STANDARDS

- A. NFPA 70 - National Electrical Code 2017.

1.04 SUBMITTALS

- A. Submit product data: Provide for each cable assembly type.
- B. Submit manufacturer's installation instructions. Indicate application conditions and limitations of use stipulated by product testing agency.

1.05 PROJECT CONDITIONS

- A. Verify that field measurements are as shown on Drawings.
- B. Wire and cable routing shown on Drawings is approximate unless dimensioned. Route wire and cable as required to meet Project Conditions.
- C. Where wire and cable routing is not shown, and destination only is indicated, determine exact routing and lengths required.

PART 2 PRODUCTS

2.01 GENERAL

- A. All wire shall be new, delivered to the site in unbroken cartons and shall be less than one year old out of manufacturer's stock.
- B. All conductors shall be copper.
- C. Insulation shall have a 600 volt rating.

- D. All conductors shall be suitable for the application intended. Conductors #12 and smaller may be solid or stranded with the following requirements or exceptions:
 - 1. All conductors terminated with crimp type devices shall be stranded.
 - 2. Stranded conductors shall be terminated with an approved ETL Listed type terminations or methods: e.g. stranded conductors shall not be wrapped around a terminal screw but shall be terminated with a crimp type device or in an approved back wired method.

2.02 REMOTE CONTROL AND SIGNALING CABLE

- A. All other systems cabling shall meet the requirements of NEC Article 725 and the following:
 - 1. Cable for Class 1 Remote-Control, Signaling and Power-Limited Circuits: 600 volt insulation, individual conductors twisted together, shielded, and covered with an overall PVC jacket. Cable shall be Listed, temperature rated, and suitable Type (general purpose, riser or plenum) for the application as required in the National Electrical Code.
 - 2. Cable for Class 2 or Class 3 Remote-Control, Signaling and Power-Limited Circuits shall be Listed, temperature rated, and suitable Type (general purpose, riser or plenum) for the application as required in the National Electrical Code.

2.03 WIRING CONNECTORS

- A. Split Bolt Connectors: Not acceptable.
- B. Spring Wire Connectors: Solderless spring type pressure connector with insulating covers for copper wire splices and taps. Use for conductor sizes 10 AWG and smaller.
- C. All wire connectors used in underground or exterior pull boxes shall be gel filled twist connectors or a connector designed for damp and wet locations.

PART 3 EXECUTION

3.01 GENERAL WIRING METHODS

- A. Control-voltage cables shall be installed in conduit.
- B. Do not use wire smaller than 14 AWG for control wiring greater than 60 volts, or 18 AWG for voltages less than 60 volts, all sizes subject to NEC 725 requirements.
- C. Splice only in junction boxes.
- D. Identify wire per section 26 05 53.
- E. Neatly train and lace wiring inside boxes, and equipment.

3.02 WIRING INSTALLATION

- A. Pull all conductors into a raceway at the same time. Use Listed wire pulling lubricant for pulling conditions when necessary.
- 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.

3.03 WIRING CONNECTIONS AND TERMINATIONS

- A. Splice only in accessible junction boxes.
- B. All splices shall be so made that they have an electrical resistance not in excess of two feet (600 mm) of the conductor.
- C. Use solderless spring type pressure connectors with insulating covers for wire splices and taps, 10 AWG and smaller.
- D. Thoroughly clean wires before installing lugs and connectors.
- E. At all splices and terminations, leave tails long enough to cut splice out and completely re-splice.

END OF SECTION

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SECTION 26 05 29

HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Conduit and equipment supports.
- B. Anchors and fasteners.

1.02 REFERENCE STANDARDS

- A. NECA 1 - Standard Practices for Good Workmanship in Electrical Contracting; National Electrical Contractors Association; 2015.
- B. NFPA 70 - National Electrical Code; National Fire Protection Association; 2017.

1.03 SUBMITTALS

- A. See Division 01 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide manufacturer's catalog data for fastening systems.
- C. Manufacturer's Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.

1.04 QUALITY ASSURANCE

- A. Conform to requirements of NFPA 70.
- B. Products: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Hangers, Supports, Anchors, and Fasteners - General: Corrosion-resistant materials of size and type adequate to carry the loads of equipment and conduit, including weight of wire in conduit.
- B. Supports: Fabricated of structural steel or formed steel members; galvanized.
- C. Anchors and Fasteners:
 - 1. Do not use powder-actuated anchors, spring clips, or beam clamps.
 - 2. Obtain permission from Architect before using powder-actuated anchors.

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3. Concrete Structural Elements: Use precast inserts, expansion anchors, powder-actuated anchors, or preset inserts.
4. Steel Structural Elements: Use beam clamps, steel spring clips, steel ramset fasteners, or welded fasteners.
5. Concrete Surfaces: Use self-drilling anchors or expansion anchors.
6. Hollow Masonry, Plaster, and Gypsum Board Partitions: Use toggle bolts or hollow wall fasteners.
7. Solid Masonry Walls: Use expansion anchors or preset inserts.
8. Sheet Metal: Use sheet metal screws.
9. Wood Elements: Use wood screws.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install hangers and supports as required to adequately and securely support electrical system components, in a neat and workmanlike manner, as specified in NECA 1.
 1. Do not fasten supports to pipes, ducts, mechanical equipment, or conduit.
 2. Do not drill or cut structural members.
 3. Obtain permission from Architect before drilling or cutting structural members.
- B. Rigidly weld support members or use hexagon-head bolts to present neat appearance with adequate strength and rigidity. Use spring lock washers under all nuts.
- C. Install surface-mounted cabinets and panelboards with minimum of four anchors.
- D. In wet and damp locations use steel channel supports to stand cabinets and panelboards 1 inch off wall.
- E. Use sheet metal channel to bridge studs above and below cabinets and panelboards recessed in hollow partitions.

END OF SECTION

SECTION 26 05 33

RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. This section describes the products and execution requirements relating to furnishing and installing raceways and boxes and related systems as part of a raceway system for electrical, communications, and other low-voltage systems for the project.

1.02 RELATED REQUIREMENTS

- A. Section 26 05 29 – Hangers and Supports for Electrical Systems.

1.03 REFERENCE STANDARDS

- A. NFPA 70 – National Electrical Code; National Fire Protection Association, 2017.
- B. ANSI/SCTE 77-2017 – Specifications for Underground Enclosure Integrity.

1.04 SUBMITTALS

- A. Surface Raceway System - submit product data and catalog sheets for all components.
- B. Boxes - provide product data showing configurations, finishes, dimensions, and manufacturer's instructions.
- C. Conduits in Concrete Slabs Above Grade - provide proposed conduit routing and sizing to Structural Engineer prior to approval of installation to verify structural integrity and fire rating of concrete slab.

PART 2 PRODUCTS

2.01 GENERAL

- A. All steel fittings and conduit bodies shall be galvanized.
- B. All conduit transitional fittings shall be listed for installed application.
- C. No cast metal or split-gland type fittings permitted.
- D. All conduit covers must be fastened to the conduit body with screws and be of the same manufacture.
- E. Mogul-type condulets 2 inch (50 mm) and larger, shall be permitted.

- F. C-condulets shall not be used in lieu of pull boxes.
- G. All boxes shall be of sufficient size to provide free space for all conductors enclosed in the box and shall comply with NEC requirements.

2.02 RIGID METAL CONDUIT (RMC) AND FITTINGS

- A. Conduit: Heavy wall threaded, galvanized steel.
- B. Fittings and Conduit Bodies: Use all steel threaded fittings and conduit bodies.
- C. Expansion Fittings/Expansion Joints: Expansion Fittings shall be Internal Grounding type and shall not rely on external bonding jumpers to maintain grounding continuity between raceway components.

2.03 PVC COATED RIGID METAL CONDUIT

- A. PVC Externally Coated Conduit: Rigid heavy wall, schedule 40, steel conduit with external 40 mil (0.1 mm) PVC coating. Conduit must be hot dipped galvanized inside and out including threads. The PVC coating bond to the galvanized steel conduit shall be stronger than the tensile strength of the coating itself.
- B. Fittings and Conduit Bodies: Threaded type, material to match conduit. PVC coated fittings and couplings shall have specially formed sleeves to tightly seal to conduit PVC coating. The sleeves shall extend beyond the fitting or coupling a distance equal to the pipe outside steel diameter or two inches (50 mm) whichever is greater.

2.04 INTERMEDIATE METAL CONDUIT (IMC) AND FITTINGS

- A. Conduit: Galvanized [Steel] [Aluminum], threaded.
- B. Fittings and Conduit Bodies: Use all [Steel] [Aluminum] threaded fittings and conduit bodies.
- C. Expansion Fittings/Expansion Joints: Expansion Fittings shall be Internal Grounding type and shall not rely on external bonding jumpers to maintain grounding continuity between raceway components.

2.05 ELECTRICAL METALLIC TUBING (EMT) AND FITTINGS

- A. Conduit: Steel, Unthreaded thin wall galvanized tubing.
- B. Fittings: All steel, compression or set screw type. No push-on or indenter types permitted.
- C. Transitional fitting: ½-1": All steel and malleable iron; 1 ¼" and above: All steel, Malleable iron and Die cast where not subjected to physical damage and with project specific DFDM electrical inspector approval.
- D. Conduit Bodies: All steel conduit bodies.

2.06 FLEXIBLE METAL CONDUIT (FMC) AND FITTINGS

- A. Conduit: steel, galvanized, spiral strip.
- B. Fittings and Conduit Bodies: All steel, galvanized or malleable iron (except as allowed in specification 26 51 13).

2.07 LIQUIDTIGHT FLEXIBLE METAL CONDUIT (LFMC) AND FITTINGS

- A. Conduit: flexible, steel, galvanized, spiral strip with an outer Liquidtight, nonmetallic, sunlight-resistant jacket.
- B. Fittings and Conduit Bodies: ANSI/NEMA FB 1, compression type. There shall be a metallic cover/insert on the end of the conduit inside the connector housing to seal the cut conduit end.

2.08 RIGID POLYVINYL CHLORIDE CONDUIT (PVC) AND FITTINGS

- A. Conduit: Rigid non-metallic conduit, Schedule 40 PVC minimum, Listed, sunlight resistant, rated for 90°C conductors. Schedule 80 for locations exposed to physical damage or as required.
- B. Fittings and Conduit Bodies: NEMA TC 2, Listed.

2.09 CONDUIT SUPPORTS

- A. See specification Section 26 05 29.

2.10 CONDUIT WATER SEALANT

- A. Description: Conduit sealant used to prevent water from entering buildings via conduits.
- B. Sealant shall seal conduits against water and gas intrusion, such as Polywater® FST™ 250 Foam Duct Sealant, Raychem RDSS Rayplate Duct Sealing System, or approved alternate. Sealant shall be re-enterable, shall be compatible with the conduit and conductor types being used, and shall comply with NEC 225.27, 230.8, and 300.5(G).
- C. Manufacturer names and catalog numbers are used to develop quality and performance requirements only. Products manufactured by others may be acceptable provided they meet or exceed the specifications.

2.11 PULL AND JUNCTION BOXES

- A. Interior Sheet Metal Boxes: code gauge galvanized steel, screw covers, flanged and spot-welded joints and corners.
- B. Interior Sheet Metal Boxes larger than 12 inches (300 mm) in any dimension shall have a hinged cover or a chain installed between box and cover. Boxes 9 square-feet or larger shall have hinged covers and a single cover shall not exceed 10 square-feet.
- C. Interior Sheet Metal Boxes connected to an exterior underground raceway, shall have a drain fitting located in the bottom.

- D. Exterior Boxes and Wet Location Installations: Type 4 and Type 6, flat-flanged, surface-mounted junction box, UL listed as rain-tight. [Galvanized cast iron][Aluminum][PVC] box and cover with ground flange, neoprene gasket, and stainless steel cover screws.
- E. Boxes installed in Parking Ramps shall be Type 4X, flat-flanged, surface-mounted junction box, ETL listed as rain-tight. [Stainless Steel] box and cover with ground flange, neoprene gasket, and stainless steel cover screws.
- F. Box extensions and adjacent boxes within 48 inches of each other are not allowed for the purpose of creating more wire capacity.
- G. Junction boxes 6 inch-by-6 inch or larger size shall be without stamped knock-outs.
- H. Wireways shall not be used in lieu of junction boxes.

2.12 IN GRADE HANDHOLES AND BOXES

- A. Handholes and Boxes: Polymer- Concrete.
- B. Handhole and Box Covers: Polymer- Concrete.
- C. Handhole and box bottoms: Integral Closed.
- D. Handholes and boxes for use in underground systems shall be designed and identified as defined in NFPA 70, for intended location and application.
- E. Handhole and cover Assembly Load Rating: ANSI/SCTE Tier 8 or better.
- F. Covers: Weatherproof, secured by tamper-resistant locking devices with non-skid finish.
- G. Cover Label: ELECTRIC.
- H. Units shall be designed – typically with a flared wall and footed base – to prevent frost heaving.

2.13 OUTLET BOXES

- A. Sheet Metal Outlet Boxes: galvanized steel, with stamped knockouts.
- B. Luminaire and Equipment Supporting Boxes: Rated for weight of equipment supported; include 3/8 inch male fixture studs where required.
- C. Concrete Ceiling Boxes: Concrete type.
- D. Cast Boxes: Cast ferroalloy or aluminum, deep type, gasketed cover, threaded hubs.

PART 3 EXECUTION

3.01 CONDUIT SIZING, ARRANGEMENT, AND SUPPORT

- A. EMT is permitted to be used in sizes 4 inch (100 mm) and smaller for power and low-voltage systems. See CONDUIT INSTALLATION SCHEDULE below for other limitations for EMT and other types of conduit.
- B. Size power conductor raceways for conductor type installed. Conduit size shall be 1/2 inch (16 mm) minimum except **all homerun conduits shall be 3/4 inch (21 mm)**, or as specified elsewhere. **Caution: Per the NEC, the allowable conductor ampacity is reduced when more than three current-carrying conductors are installed in a raceway. Contractor must take the NEC ampacity adjustment factors into account when sizing the raceway and wiring system.**
- C. Size communications and other low-voltage systems raceways as follows:
 - 1. Control, security, signal, and other low-voltage applications (not including AV): 3/4 inch minimum.
- D. Arrange conduit to maintain 6'-8" clear headroom and present a neat appearance.
- E. Route exposed conduit and conduit above accessible ceilings parallel and perpendicular to walls and adjacent piping.
- F. Maintain minimum 6 inch (150 mm) clearance between conduit and piping. Maintain 12 inch (300 mm) clearance between conduit and heat sources such as flues, steam pipes, and heating appliances.
- G. Arrange conduit supports to prevent distortion of alignment by wire pulling operations. Fasten conduit using galvanized pipe straps, conduit racks (lay-in adjustable hangers), clevis hangers, or bolted split stamped galvanized hangers.
- H. Group conduit in parallel runs where practical and use conduit rack (lay-in adjustable hangers) constructed of steel channel with conduit straps or clamps. Provide space for 25 percent additional conduit.
- I. Do not fasten conduit with wire or perforated pipe straps. Before conductors are pulled, remove all wire used for temporary conduit support during construction.
- J. Support and fasten metal conduit at a maximum of 8 feet (2.4 m) on center.
- K. Supports shall be independent of the installations of other trades, e.g. ceiling support wires, HVAC pipes, other conduits, etc., unless so approved or detailed.
- L. Conceal all conduits except where noted on the drawings or approved by the Architect/Engineer. Contractor shall verify with Architect/Engineer all surface conduit installations except in mechanical rooms.
- M. Changes in direction shall be made with symmetrical bends, cast steel boxes, stamped metal boxes or cast steel conduit bodies.

- N. For indoor and exposed exterior conduits, no continuous conduit run shall exceed 100 feet (30 meters) without a junction box.
- O. For exterior below grade conduits, no continuous conduit run shall exceed 250 feet (75 meters) without hand hole, manhole or pull box.
- P. All conduits installed in exposed areas shall be installed with a box offset before entering box.

3.02 CONDUIT INSTALLATION

- A. All conduit shall be run overhead unless indicated on the plans.
- B. All raceways shall be routed concealed in finished areas unless authorized by the Engineer.
- C. Cut conduit square; de-burr cut ends.
- D. Conduit shall not be fastened to the corrugated metal roof deck nor drywall or suspended ceiling grids.
- E. Bring conduit to the shoulder of fittings and couplings and fasten securely.
- F. Use conduit hubs for fastening conduit to cast boxes. Use sealing locknuts or conduit hubs for fastening conduit to sheet metal boxes in damp or wet locations.
- G. Threads cut in the field, and factory threads of conduit and nipples not coated with corrosion protection, shall be coated with an approved electrically conductive compound per NEC 300.6.
- H. Terminate all conduit (except for terminations into conduit bodies) using conduit hubs, or connectors with one locknut, or utilize double locknuts (one each side of box wall).
- I. Provide bushings for the ends of all conduit not terminated in box walls. Refer to Section 26 05 26 – Grounding and Bonding for Electrical Systems for grounding bushing requirements.
- J. Provide insulated bushings where raceways contain 4 AWG or larger conductors.
- K. Use pendants supported from swivel hangers in exposed ceiling/ structure locations where necessary to mount boxes supporting luminaires and wiring devices. Installation method shall comply with NEC 314.23 (H).
- L. Install no more than the equivalent of the following for building:
 - 1. Three 90 degree bends between boxes for electrical systems.
 - 2. Two 90 degree bends between boxes for communications and other low voltage systems. Note: Offsets shall be considered 90 degrees.
 - 3. No single bend may exceed 90 degrees.

- M. Use hydraulic one-shot conduit bender or factory elbows for bends in conduit larger than 2 inch (50 mm) size unless sweep elbows are required.
- N. Bend conduit according to manufacturer's recommendations. Torches or open flame shall not be used to aid in bending of PVC conduit.
- O. Use suitable conduit caps or other approved seals to protect installed conduit against entrance of dirt and moisture.
- P. Provide 1/8 inch (3 mm) nylon pull string in empty conduit, except sleeves and nipples.
- Q. Install listed expansion-deflection fitting or other approved means shall be used where a raceway crosses a structural joint for expansion, contraction or deflection, used in buildings, bridges, parking garages or other structures.
- R. **Install expansion joints where direct-buried conduit is subject to Earth Movement by settlement or frost per NEC 300.5(J), especially where conduit exits the ground exposed and enters a box, cabinet, or enclosure attached to a building or structure.**
- S. Install expansion fitting in exterior PVC conduit runs per NEC table 352.44 utilizing a minimum temperature change of 120 degree F.
- T. Avoid moisture traps where possible. Where moisture traps are unavoidable, provide junction boxes with drain fittings at conduit low points.
- U. Where conduit passes between areas of differing temperatures such as into or out of cool rooms, freezers, unheated and heated spaces, buildings, etc., provide conduit or box with duct seal or other means to prevent the passage of moisture and water vapor through the conduit.
- V. Route conduit through roof openings for piping and ductwork where possible.
- W. Use NRTL listed metallic grounding clamps when terminating conduit to cable tray.
- X. Conduit is not permitted in any slab topping of two inches (50 mm) or less.
- Y. Conduits in Concrete Slab Above Grade: Provide proposed conduit routing and sizing to Structural Engineer for approval prior to installation to verify structural integrity and fire rating of concrete slab.
- Z. Maximum Size Conduit in Concrete Slabs Above Grade: 1 inch (25 mm). Do not route conduits to cross each other in slabs above grade. Minimum conduit spacing shall be 6 inches on center.
- AA. PVC conduit in concrete pole bases shall transition to galvanized rigid metal conduit 12 inches before it enters a concrete pole base. Inside the pole base, the elbow shall be galvanized rigid metal conduit. From the elbow, the conduit shall transition back to PVC as it continues up and out the top of the concrete pole base.
- AB. PVC conduit shall transition to galvanized rigid metal conduit before it enters a foundation wall or up through a concrete floor.

- AC. PVC conduit shall be allowed without need of transition to galvanized rigid metal conduit up through concrete floor and concrete equipment pads for pad mounted transformers and switchgear. Provide a PVC connector and bushing, or bell-ends, on each conduit entry. Coordinate conduit installation with submittals and shop drawings for transformers and switchgear.
- AD. PVC conduits installed in exposed parking ramps shall have expansion fittings installed per NEC table 352.44, utilizing a minimum temperature change of 110 degrees F. Each conduit run shall be provided with a minimum of one expansion fitting. Proper PVC clamps shall be utilized to allow for conduit movement.
- AE. Identify conduit under provisions of Section 26 05 53.
- AF. All conduit installed underground (exterior to building) shall be buried a minimum of 24 inches below finished grade, whether or not the conduit is concrete encased. Install warning tape 12" below finish grade over all buried conduits. Underground warning tape shall be detectable, 2" wide minimum, 5 mil thickness, containing a foil core. Tape color shall be red and labeled with the words "CAUTION-BURIED ELECTRIC LINE BELOW" as manufactured by Presco or similar.
- AG. **Conduits penetrating underground foundation walls: Individual conduits or each conduit as part of a ductbank penetrating underground foundation walls (excluding manholes) shall be sealed against water intrusion into the building.**
- AH. Clean PVC conduit with solvent, and dry before application of glue. The temperature rating of glue/cement shall match weather conditions. Apply full even coat of cement/glue to entire area that will be inserted into fitting. The entire installation shall meet manufacturer's recommendations.

3.03 CONDUIT INSTALLATION SCHEDULE

- A. Conduit other than that specified below for specific applications shall not be used.
 - Underground Installations That Penetrate Foundation Walls: Rigid metal conduit within five feet (1.5 m) of the foundation wall. Conduit may transition to PVC conduit five feet (1.5 m) from the foundation walls.
 - Underground Installations That Do Not Penetrate Foundation Walls: Rigid metal conduit or PVC conduit.
 - Underground Installations Emerging from Grade: Buried conduit emerging from grade shall be Rigid metal conduit extending from the minimum cover distance of 24 inches below grade to the conduit termination point above grade.
 - Underground Installations Under Concrete Slab: Rigid metal conduit or Schedule 40 PVC conduit.
 - Underground Installations Emerging through Concrete Slab: Rigid metal conduit.
 - Concealed in Poured Concrete Walls: Rigid Metal Conduit or PVC conduit.
 - Concealed in Concrete Block Walls: Electrical metallic tubing or PVC conduit.

- Within Concrete Slab: Rigid Metal conduit or PVC conduit.
- Emerging from Within Concrete Slab: Rigid Metal conduit.
- Exposed Outdoor Locations: Rigid Metal conduit, Intermediate Metal conduit.
- Wet Interior Locations: Exposed: Rigid metal conduit.
- Concealed Dry Interior Locations: Rigid metal conduit, Intermediate metal conduit, Electrical metallic tubing, PVC conduit (Ground conductor).
- Interior Building Grounding Electrode Conductor: Schedule 80 PVC.
- Exposed Dry Interior Locations: Rigid metal conduit, Intermediate metal conduit, Electrical metallic tubing.
- Motor and equipment connections: Liquidtight flexible metal conduit (LFMC) in all locations except in Mechanical equipment plenum spaces where Flexible Metal Conduit (FMC) shall be utilized. Minimum length shall be one foot (300 mm); maximum length shall be three feet (900 mm). Conduit must be installed perpendicular to direction of equipment vibration to allow conduit to freely flex.
- Exposed Dry Interior Locations for HVAC control devices with Conduit Connections: Electrical metallic tubing, Flexible Metal Conduit (FMC). For FMC installations, Minimum length shall be one foot (300 mm), Maximum length shall be three feet (900 mm). Minimum size FMC of 3/8".
- Exposed Dry Interior Locations for HVAC control devices without Conduit Connections: Where HVAC equipment control panels or devices do not provide for the direct connection of conduits, exposed Class 2 wiring may be extended to complete the final connections in dry locations, provided it does not exceed 18 inches in length.
- Plenum Spaces: Installation shall comply with requirements of NEC 300.22.

3.04 PVC COATED RIGID METAL CONDUIT INSTALLATION

- A. Installers of PVC Coated Rigid Metal Conduit shall be factory trained and certified in the proper installation methods for this type of conduit. Proof of such certification shall be kept on the project site at all times and shall be produced upon request.

3.05 COORDINATION OF BOX LOCATIONS

- A. Provide electrical boxes as shown on Drawings, and as required for splices, taps, wire pulling, equipment connections, and code compliance.
- B. Electrical box locations shown on Contract Drawings are approximate unless dimensioned. Verify location of floor boxes and outlets in offices and work areas prior to rough-in.

- C. No outlet, junction, or pull boxes shall be located where it will be obstructed by other equipment, piping, lockers, benches, counters, etc.
- D. Conduit and boxes shall not be fastened to the metal roof deck. If conduit and boxes are required to be located and installed on roof decks, the conduit and boxes are required to be spaced minimum 1-5/8 inch off the lowest part of the metal roof decking material, per NEC 300.4 (E).
- E. It shall be the Contractor's responsibility to study drawings pertaining to other trades, to discuss location of outlets with workmen installing other piping and equipment and to fit all electrical outlets to job conditions.
- F. In case of any question or argument over the location of an outlet, the Contractor shall refer the matter to the Engineer and install outlet as instructed by the Engineer.
- G. The proper location of each outlet is considered a part of this contract and no additional compensation will be paid to the Contractor for moving outlets which were improperly located.
- H. Locate and install boxes to allow access to them. Where installation is inaccessible, coordinate locations and provide 18 inch (450 mm) by 24 inch (600 mm) access doors. Boxes must be installed within 12" from edge of the access door.
- I. Locate and install to maintain headroom and to present a neat appearance.
- J. Install boxes to preserve fire resistance rating of partitions and other elements, using approved materials and methods.
- K. Boxes installed in the building envelop shall be sealed with caulking materials or closed with gasketing systems compatible with the construction materials and locations per IEC 502.4.3.

3.06 PULL AND JUNCTION BOX INSTALLATION

- A. Pull boxes and junction boxes shall be minimum 4 inches square (100 mm) by 2 1/8 inches (54 mm) deep for use with 1 inch (25 mm) conduit and smaller. On conduit systems using 1 1/4 inch (31.75 mm) conduit, minimum junction box size shall be 4 11/16 inches square by 2 1/8 inches deep.
- B. Where used with raceway(s) containing conductors of 4 AWG or larger, pull box shall be sized as required unless otherwise noted on the drawings.
- C. Where used with raceway(s) containing conductors on systems over 600V, size pull box per NEC 314 Part IV unless otherwise noted as larger on the drawings.

Size pull boxes for communications per ANSI/TIA-568-C.
- D. Locate pull boxes and junction boxes above accessible ceilings, in unfinished areas or furnish and install approved access panels in non-accessible ceilings where boxes are installed. All boxes are to be readily-accessible.

- E. Provide Pull and Junction boxes for communications and other low voltage applications (a) in any section of conduit longer than 100 feet, (b) where there are bends totaling more than 180 degrees between pull points or pull boxes and (c) wherever there is a reverse bend in run. Locate boxes on straight section of raceway (e.g. do not use boxes in place of raceway bends).
- F. Support pull and junction boxes independent of conduit.

3.07 IN GRADE HANDHOLES AND BOXES

- A. Install handholes and boxes level and plumb and with orientation and depth coordinated with connecting conduits to minimize bends and deflections required for proper entrances.
- B. Unless otherwise indicated and detailed, support units on a level bed of crushed stone or gravel, graded from 1/2 inch (12.5 mm) sieve to No. 4 (4.25 mm) sieve and compacted to same density as adjacent undisturbed earth.
- C. Elevation: In finished areas, set so cover surface will be flush with finished grade.
- D. Handholes and boxes shall **NOT** be installed in paved or concrete drives or walks.
- E. Units shall be selected with depth sufficient to allow for conductor bending/ wire management and allow sufficient conduit elevation above compacted bed to prevent water infiltration in conduit.
- F. Provide conduit sealant to seal conduits against water and gas intrusion, such as Polywater® FST™-250 Foam Duct Sealant, Raychem RDSS Rayplate Duct Sealing System, or approved alternate. Sealant shall be re-enterable, shall be compatible with the conduit and conductor types being used, and shall comply with NEC 225.27, 230.8, and 300.5(G).

3.08 OUTLET BOX INSTALLATION

- A. Do not install boxes back-to-back in walls. Provide minimum 6 inch (150 mm) separation, except provide minimum 24 inch (600 mm) separation in acoustic-rated walls.
- B. Power:
 - a. Recessed (1/4 inch maximum) outlet boxes in masonry, concrete, tile construction, or drywall shall be minimum 4 inch square, with device rings. Device covers shall be square-cut except rounded corner plaster rings are allowed in drywall applications. Angle cut plaster rings are not permitted. Coordinate masonry cutting to achieve neat openings for boxes. A single gang box can be used in drywall and masonry, for a single device location, when a single conduit enters box.
 - b. Shallow 4 inch square by 1 1/2 inch deep boxes can be used as device boxes for power provided the box and plaster ring is sized for installed device and conductors.

- C. Low Voltage:
- a. Recessed (1/4 inch maximum) outlet boxes in masonry, concrete, tile construction or drywall shall be minimum 4 11/16 inch square by 2 1/8 inch deep with single gang device ring (unless noted otherwise on drawings or in companion specifications). Device covers shall be square-cut except rounded corner plaster rings are allowed in drywall applications. Angle cut plaster rings are not permitted. Coordinate masonry cutting to achieve neat openings for boxes.
- D. Provide knockout closures for unused openings.
- E. Support boxes independently of conduit except for cast boxes that are connected to two rigid metal conduits, both supported within 12 inches (300 mm) of box.
- F. Install boxes in walls without damaging wall insulation.
- G. Coordinate mounting heights and locations of outlets mounted above counters, benches, and backsplashes.
- H. Ceiling outlets shall be 4 inch square, minimum 2 1/8 inch (54 mm) deep except that concrete boxes and plates will be approved where applicable. Position outlets to locate luminaires as shown on reflected ceiling plans.
- I. In inaccessible ceiling areas, position outlets and junction boxes within 6 inches (150 mm) of recessed luminaire, to be accessible through luminaire ceiling opening.
- J. Provide recessed outlet boxes in finished areas; secure boxes to interior wall and partition studs, accurately positioning to allow for surface finish thickness. Use stamped steel stud bridges for flush outlets in hollow stud wall, and adjustable steel channel fasteners for flush ceiling outlet boxes.
- K. Align wall-mounted outlet boxes for switches, thermostats, and similar devices.
- L. Provide cast ferroalloy or aluminum outlet boxes in exterior and wet locations.
- M. Surface wall outlets shall be 4 inch (100 mm) square with raised covers for one and two gang requirements. For three gang or larger requirements, use gang boxes with non-overlapping covers.
- N. Outlet Box adjustable ring and depth device applications:
Provide box extenders for boxes that are set too far back in the wall due to unanticipated wall finishes. Place the box extender over the existing box face to make the box face flush with the wall finish.

END OF SECTION

SECTION 26 05 53

IDENTIFICATION FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Nameplates and labels.
- B. Wire and cable markers.
- C. Conduit markers.
- D. Field-painted identification of conduit.

1.02 RELATED REQUIREMENTS

- A. Division 01 - Painting and Coating.

1.03 REFERENCE STANDARDS

- A. NFPA 70 - National Electrical Code; National Fire Protection Association; 2017.

1.04 SUBMITTALS

- A. See Division 01 - Administrative Requirements for submittals procedures.
- B. Product Data: Provide catalog data for nameplates, labels, and markers.
- C. Manufacturer's Instructions: Indicate application conditions and limitations of use stipulated by product testing agency specified under Quality Assurance. Include instructions for storage, handling, protection, examination, preparation and installation of product.

1.05 QUALITY ASSURANCE

- A. Conform to requirements of NFPA 70.
- B. Products: Listed and classified by Underwriters Laboratories Inc. as suitable for purpose specified and shown.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Brady Corporation.
- B. Seton Identification Products.
- C. HellermannTyton.
- D. 3M.
- E. Substitutions: See Division 01 - Product Requirements.

2.02 NAMEPLATES AND LABELS

- A. Nameplates: Engraved three-layer laminated plastic, black letters on white background.
- B. Locations:
 - 1. Each electrical distribution and control equipment enclosure.
 - 2. Communication cabinets.
 - 3. Disconnects, starters, and relays.
- C. Letter Size:
 - 1. Use 1/8 inch letters for identifying individual equipment and loads.
 - 2. Use 1/4 inch letters for identifying grouped equipment and loads.
 - 3. Use 1 inch letters for identifying distribution and control equipment enclosures.
- D. Labels: Embossed adhesive tape, with 3/16 inch white letters on black background. Use only for identification of individual wall switches and receptacles, control device stations.

2.03 WIRE MARKERS

- A. Description: Cloth type wire markers.
- B. Locations: Each conductor at panelboard gutters, pull boxes, outlet boxes, and junction boxes each load connection.
- C. Legend:
 - 1. Power and Lighting Circuits: Branch circuit or feeder number indicated on drawings.
 - 2. Control Circuits: Control wire number indicated on schematic and interconnection diagrams on drawings.

2.04 CONDUIT MARKERS

- A. Description: Use tape or paint to mark conduit.
- B. Location: Furnish markers for each conduit longer than 6 feet.
- C. Spacing: 20 feet on center.
- D. Color:
 - 1. 120/208 Volt System: White.

2.05 UNDERGROUND WARNING TAPE

- A. Description: 4 inch wide plastic tape, detectable type colored red with suitable warning legend describing buried electrical lines.

2.06 WIRING DEVICE IDENTIFICATION

- A. Wall switches, receptacles, occupancy sensors, photocells, poke-through fittings, access floor boxes, and time clocks shall be identified with circuit numbers and panelboard source (ex. Panel ABC-3). In exposed areas, identifications should be made inside of device covers, unless directed otherwise. Use machine-generated adhesive labels, or neatly hand-written permanent marker.

PART 3 EXECUTION

3.01 PREPARATION

- A. Degrease and clean surfaces to receive nameplates and labels.

3.02 INSTALLATION

- A. Install nameplates and labels parallel to equipment lines.
- B. Secure nameplates to equipment front using screws.
- C. Secure nameplates to inside surface of door on panelboard that is recessed in finished locations.
- D. Identify conduit using field painting under provisions of Division 01.
 - 1. Paint colored band on each conduit longer than 6 feet.
 - 2. Paint bands 20 feet on center.
 - 3. Colors:
 - a. 120/208 Volt System: White.

- E. Identify underground conduits using underground warning tape. Install one tape per trench at a minimum of 12" above the underground installation.
- F. Label electrical service meters and disconnects per utilities and NEC specifications.

END OF SECTION

SECTION 26 32 13

ENGINE GENERATORS (PROPANE)

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

- A. This Section includes packaged engine-generator sets for Standby power supply with the following features:
 - 1. Propane Gas Engine
 - 2. Unit Mounted Cooling System
 - 3. DGC 2020 - Level 2 Fully Enhanced
 - 4. Level 2 - Basic Sound Attenuation (Steel) **(Equal to or less than 75.0dBa @ 23')**
 - 5. Performance Requirements for Sensitive Loads.
- B. Related Sections include the following:
 - 1. Division 1 for specifications covering demonstrations and training of the equipment.
 - 2. Section 26 05 53 "Identification for Electrical Systems" for specifications covering electrical systems.
 - 3. Section 26 36 00 "Transfer Switches" for transfer switches including sensors and relays to initiate automatic-starting and -stopping signals for engine-generator sets.
 - 4. Section 26 05 19 "Low-Voltage Electrical Power Conductors and Cables" for specifications covering wiring.

1.03 DEFINITIONS

- A. Operational Bandwidth: The total variation from the lowest to highest value of a parameter over a range of conditions indicated, expressed as a percentage of the nominal value of the parameter.
- B. Standby Rating: Power output rating equal to the power the generator set delivers continuously under normally varying load factors for the duration of the power outage.

1.04 SUBMITTALS

- A. Product Data: Include the following:
 - 1. Thermal Damage curve for generator.
 - 2. Time-current characteristic of curves for generator protective device.
- B. Shop Drawings: Detailed equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
 - 1. Dimensioned outline plan and elevation drawing of engine-generator set and other components specified.
 - 2. Design Calculations: Signed and sealed by a qualified engineer. Calculate requirements for selecting vibration isolators and seismic restraints and for designing vibration isolation bases.
 - 3. Vibration Isolation Base Details: Signed and sealed by a qualified engineer. Detail fabrication, including anchorages and attachments to structure and to supported equipment. Include base weights.
 - 4. Wiring Diagrams: Power, signal, and control wiring.

1.05 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For packaged engine-generator sets to include emergency, operation, and maintenance manuals. In addition to items specified in Division 1 Section "Closeout Submittals" include the following:
 - 1. List of tools and replacement items recommended to be stored at the Project for ready access. Including part and drawing numbers, current prices, and source of supply.

1.06 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Fuses: One for every ten of each type and rating, but no less than one of each.
 - 2. Indicator Lamps: Two for every six of each type used, but no fewer than two of each.
 - 3. Filters: One set each of lubricating oil, fuel, and combustion-air filters.
 - 4. Belts: One set of each alternator and fan belt.
 - 5. Load Bank for code required testing.

1.07 QUALITY ASSURANCE

- A. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for installation of units required for this Project.
 - 1. Maintenance Proximity: Not more than 2 hours normal travel time from Installer's place of business to Project site.
 - 2. Engineering Responsibility: Preparation of data for vibration isolators and seismic restraints of engine skid mounts, including Shop Drawings, based on the testing and engineering analysis of manufacturer's standard units in assemblies similar to those indicated for this Project.
- B. Testing Agency Qualifications: An independent agency, with the experience and capability to conduct the testing indicated, that is a member company of the InterNational Electrical Testing Association or is a nationally recognized testing laboratory (NRTL), and that is acceptable to authorities having jurisdiction.
 - 1. Testing Agency's Field Supervisor: Person currently certified by the InterNational Electrical Testing Association (NETA) or the National Institute for Certification in Engineering Technologies to supervise on-site testing specified in Part 3.
- C. Source Limitations: Obtain packaged engine-generator sets and auxiliary components through one source from a single manufacturer.
- D. Product Options: Drawings indicate size, profiles, and dimensional requirements of packaged generator sets and are based on the specific system indicated. Refer to Division 1 Section "Product Requirements."
- E. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- F. Comply with ASME B15.1.
- G. Comply with NFPA 37.
- H. Comply with NFPA 30.
- I. Comply with NFPA 70.
- J. Comply with NFPA 99.
- K. Comply with NFPA 110 requirements for Level 1 emergency power supply system.
- L. Comply with UL 2200.
- M. Engine Exhaust Emissions: Comply with applicable state and local government requirements.

1.08 PROJECT CONDITIONS

- A. Interruption of Existing Electrical Service: Do not interrupt electrical service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary electrical service according to requirements indicated:
 - 1. Notify Construction Manager and Owner no fewer than two days in advance of proposed interruption of electrical service.
 - 2. Do not proceed with interruption of electrical service without Construction Manager's and Owner's written permission.
- B. Environmental Conditions: Engine-generator system shall withstand the following environmental conditions without mechanical or electrical damage or degradation of performance capability:
 - 1. Minimum Temperature: 0 °F / -17.78 °C
 - 2. Maximum Temperature: 100 °F / 37.78 °C
 - 3. Relative Humidity: 0 - 95 percent
 - 4. Altitude: 1000 feet / 304.8 meters

1.09 COORDINATION

- A. Coordinate size and location of concrete bases for package engine-generator sets. Cast anchor-bolt inters into bases. Concrete, reinforcement, and formwork requirements are specified with concrete.

1.10 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of packaged engine-generator sets and associated auxiliary components that fail in materials or workmanship within specified warranty period.
 - 1. Warranty Period: 2 Yr - 3000 Hr Basic Stdbby Limited warranty from date of Substantial Completion.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Caterpillar Inc.
- B. Cummins Engine Company, I.
- C. Generac.
- D. Kohler.
- E. MTU.
- F. Substitutions: See Division 1 - Product Requirements.

2.02 ENGINE GENERATOR SET

- A. 70 kW / 208 Volt 3-Phase 60Hz packaged engine generator set shall be a coordinated assembly of compatible components.
- B. Factory-assembled and -tested, engine-generator set.
- C. Mounting Frame: Maintain alignment of mounted components without depending on concrete foundation; and have lifting attachments.
- D. Capacities and Characteristics:
 - 1. Power Output Ratings: Nominal ratings as indicated, with capacity as required to operate as a unit as evidence by records of prototype testing.
 - 2. Nameplates: For each major system component to identify manufacturer's name and address, and model and serial number of component.
- E. Generator-Set Performance with PMG excitation:
 - 1. Oversizing generator compared with the rated power output of the engine is permissible to meet specified performance.
 - a. Nameplate Data for Oversized Generator: Show rating required by the Contract Documents rather than ratings that would normally be applied to the generator size installed.
 - 2. Steady-State Voltage Operational Bandwidth: .25 percent of rated output voltage from no load to full load.
 - 3. Transient Voltage Performance: Not more than 20 percent variation for 50 percent step-load increase or decrease. Voltage shall recover and remain within the steady-state operating band within three to four seconds.
 - 4. Steady-State Frequency Operational Bandwidth: Plus or minus 0.25 percent of rated frequency from no load to full load.
 - 5. Steady-State Frequency Stability: When system is operating at any constant load within the rated load, there shall be no random speed variation outside the steady-state operational band and no hunting or surging of speed.
 - 6. Transient Frequency Performance: Less than 5 percent variation for 50 percent step-load increase or decrease. Frequency shall recover and remain within the steady-state operating band within five seconds.
 - 7. Sustained Short-Circuit Current: For a 3-phase, bolted short circuit at system output terminals, system shall supply minimum of 300 percent of rated full-load current for not less than 10 seconds without damage to winding insulation or other generator system components.

8. Excitation System: Performance shall be unaffected by voltage distortion caused by nonlinear load.
 - a. Provide permanent magnet excitation for power source to voltage regulator.
9. Start Time: Comply with NFPA 110, Type 10, system requirements.

2.03 ENGINE

- A. Basic Engine: Water cooled, four cycle, internal combustion engine.
- B. Rated Engine Speed: 1800 rpm.
- C. Starter: One electric starter 24v DC.
- D. Fuel System: Controlled by a microprocessor based engine control module (ECM) and a high speed electronic fuel pressure regulator (EPR). The ECM and EPR work with a three way catalyst and pre and post catalyst O2 sensors for feedback control. The system operates on the basis of a stoichiometric air fuel ratio.
- E. Alternator: Engine mounted belt drive.
- F. Lube Oil System: Forced feed lubrication, Lube oil filter, Lube oil heat exchanger, Filler neck and dip stick.
- G. Combustion Air System: Dry type air filter.
- H. Cooling System: Coolant circulation pump and Pusher fan.
- I. Governor: Electronic Control through ECU, with speed sensing.
- J. Engine Fuel System:
 1. Electronic Pressure Regulator: Regulates the fuel mixture based on Intake Air Temperature, Load, Etc.
 2. ECU: Coupled into the generator set control panel interface to allow direct control from the panel.
 3. System Control: Closed Loop fuel system using readings from O2 sensor(s) to maintain proper fuel mixture through control of the Electronic Pressure Regulator.
- K. Coolant Jacket Heater: An electric water heater with integral thermostatic control, properly sized to maintain engine jacket water at 90 degrees and suitable for operation in an ambient temperature of -20°F. Comply with NFPA 110 requirements for Level 1 equipment for heater capacity.

- L. Cooling system: Closed loop, liquid cooled, with radiator factory mounted on engine-generator set mounting frame and integral engine-driven coolant pump.
1. Solution of 50 percent ethylene-glycol-based antifreeze and 50 percent water, with anticorrosion additives as recommended by engine manufacturer.
 2. Size of radiator: Adequate to contain expansion of total system coolant from cold start to 110 percent of load condition.
 3. Expansion Tank: Constructed withstand maximum closed-loop coolant system pressure for engine used.
 4. Temperature Control: Self-contained, thermostatic-control valve modulates coolant flow automatically to maintain optimum constant coolant temperature as recommended by engine manufacturer.
 5. Coolant Hose: Flexible assembly with inside surface of nonporous rubber.
 - a. Rating: 50-psig (345-kPa) maximum working pressure with coolant at 180 deg F (82 deg C), and non-collapsible under vacuum.
 - b. End Fittings: Flanges or steel pipe nipples with clamps to suit piping and equipment connections.
- M. Critical Grade Silencer: The silencer shall attenuate exhaust noise to a Critical level.
1. An Exhaust silencer shall be furnished of industrial standard construction, all welded, for stationary engine application. Long radius, low restriction fittings will be used throughout, and pipe size will be sufficiently large to handle the engine exhaust flow at full load without causing back pressure in excess of that allowed by the engine manufacturer.
- N. Air-Intake Filter: Standard-duty, engine-mounted air cleaner with replaceable dry-filter element and "blocked filter" indicator.
- O. Starting System: 12 or 24 volt electric, with negative ground.
1. Components: Sized so they will not be damaged during a full engine-cranking cycle with ambient temperature at maximum specified in Part 1 "Project Conditions" Article.
 2. Cranking Motor: Heavy-duty unit that automatically engages and releases from engine flywheel without binding.
 3. Cranking Cycle: As required by NFPA 110 for system level specified.
 4. Battery: Adequate capacity within ambient temperature range specified in Part 1 "Project Conditions" Article to provide specified cranking cycle at least three times without recharging.
 5. Battery Cable: Sized as recommended by engine manufacturer for cable length indicated. Include required interconnecting conductors and connection accessories.

6. Battery Compartment: Battery rack floor mounted constructed of steel, gloss black finish. Include accessories required to support and fasten batteries in place.
7. Battery Charger: 12 or 24VDC, current-limiting, automatic-equalizing and float-charging type. Unit shall comply with UL 1236 and include the following features:
 - a. Operation: Minimum equalizing-charging rate of 10 amps shall be initiated automatically after battery has lost charge until and adjustable equalizing voltage is achieved at battery terminals. Unit shall then be automatically switched to a lower float-charging mode and shall continue to operate in that mode until battery is discharged again.
 - b. Automatic Temperature Compensation: Must be equipped with temperature compensation to assure correct charging in all conditions.
 - c. Automatic Voltage Regulation: Maintain constant output voltage regardless of input voltage variations up to plus or minus .5 percent.
 - d. Ammeter and Voltmeter: Digital display shall indicate charging rates.
 - e. Safety Functions: Sense abnormally low battery voltage and close contacts providing low battery voltage indication on control and monitoring panel. Sense high battery voltage and loss of AC input or DC output of battery charger. Either condition shall close contacts that provide a battery-charger malfunction indication at system control and monitoring panel.
 - f. Enclosure and Mounting: NEMA-1.
- P. Ignition: Coil on plug electronic ignition.

2.04 CONTROLS AND MONITORING

- A. Automatic Starting System Sequence of Operation: When mode-selector switch on the control and monitoring panel is in the automatic position, remote-control contacts in one or more separate automatic transfer switches initiate starting and stopping of generator set. When mode-selector switch is switched to the on position, the generator set starts. The off position of same switch initiates generator-set shutdown. When generator set is running, specified system or equipment failures or derangements automatically shut down generator set and initiate alarms. Operation of a remote emergency-stop switch also shuts down generator set.
- B. Manual Starting System Sequence of Operation: Switching on-off switch on the generator control panel to the on position starts the generator set. The off position of same switch initiates generator-set shutdown. When generator set is running, specified system or equipment failures or derangements automatically shut down generator set and initiate alarms. Operation of a remote emergency-stop switch also shuts down generator set.

- C. Configuration: Operating and safety indications, protective devices, basic system controls, engine gages, instrument transformers, generator disconnect switch or circuit breaker, and other indicated components shall be grouped in a combination control and power panel. Rigidly mounted to the generator set.
- D. Indicating and Protective Devices and Controls: As required by NFPA 110 for Level 1 system, and the following accessories:
- E. Supporting Items: Include sensors, transducers, terminals, relays, and other devices and include wiring required to support specified items. Locate sensors and other supporting items on engine or generator, unless otherwise indicated.
- F. Connection to Data Link: A separate terminal block, factor wired to Form C dry contacts, for each alarm and status indication is reserved for connections for data-link transmission of indications to remote data terminals. Data system connections to terminals are covered in Section 260913 "electrical Power Monitoring and Control."
- G. Common Remote Audible Alarm: Comply with NFPA 110 requirements for Level 1 systems. Include necessary contacts and terminals in control and monitoring panel.
 - 1. Overcrank Shutdown.
 - 2. Coolant Low-temperature Alarm.
 - 3. Control Switch Not in Auto Position.
 - 4. Battery-charger Malfunction Alarm.
 - 5. Battery Low-voltage Alarm.
- H. Common Remote Audible Alarm: Signal the occurrence of any even listed below without differentiating between event types. Connect so that after an alarm is silenced, clearing of initiating condition will reactivate alarm until silencing switch is reset.
 - 1. Engine High-temperature Shutdown.
 - 2. Lube-oil, Low-pressure Shutdown.
 - 3. Overspeed Shutdown.
 - 4. Remote Emergency-stop Shutdown.
 - 5. Engine High-temperature Pre-alarm.
 - 6. Lube-oil, Low-pressure Pre-alarm.
 - 7. Low Coolant Level.
- I. Remote Alarm Annunciator: Designed for compliance with NFPA 110. LEDs labeled with proper alarm conditions identify each alarm as well as an audible signal for each alarm condition. Silencing switch in face of panel silences signal without altering visual indication. Cabinet and faceplate are surface- or flush-mounting type to suit mounting conditions indicated.

LED indications are provided for the following:

- 1. Alarms:
 - a. Low Coolant Level
 - b. High Coolant Temperature
 - c. Low Oil Pressure
 - d. Overcrank
 - e. Overspeed

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- f. Emergency Stop Activated
- g. Fuel Leak
- h. Sender Failure

2. Pre-alarms:

- a. High Coolant Temperature
- b. Low Coolant Temperature
- c. Low Oil Pressure
- d. Battery Overvoltage
- e. Weak Battery
- f. Battery charger Failure

3. Operational status:

- a. Switch Not in Auto
- b. Display Panel On
- c. EPS Supplying Load

- J. Remote Emergency-Stop Switch: Flush; wall mounted, unless otherwise indicated; and labeled. Push button is protected from accidental operation.

2.05 GENERATOR OVERCURRENT AND FAULT PROTECTION

- A. Generator Circuit Breaker: Thermal-magnetic type; 80 percent rated; complying with NEMA AB 1 and UL 489.

- 1. Tripping Characteristic: Designed specifically for generator protection.
- 2. Trip Rating: Matched to generator rating.
- 3. Mounting: On generator set in an enclosure.
- 4. Bell Alarm: None
- 5. Shunt Trip: Provides remote control capability to open circuit breaker.

- B. Generator Protector: Microprocessor-based unit shall continuously monitor current level in each phase of generator output, integrate generator heating effect over time, and predict when thermal damage of alternator will occur. When signaled by generator protector or other generator-set protective devices, a shut-trip device in the generator disconnect switch shall open the switch to disconnect the generator from load circuits. Protector shall perform the following functions:

- 1. Initiates a generator overload alarm when generator has operated at an overload equivalent to 110 percent of full-rated load for 60 seconds. Indication for this alarm is integrated with other generator-set malfunction alarms.
- 2. Under single or three-phase fault conditions, regulates generator to 300 percent of rated full-load current for up to 10 seconds.
- 3. As overcurrent heating effects on the generator approaches the thermal damage point of the unit, protector switches the excitation system off, opens the generator disconnect device, and shuts down the generator set.
- 4. Senses clearing of a fault by other overcurrent devices and controls recovery of rated voltage to avoid overshoot.

- C. Ground-Fault Indication: Comply with NFPA 70, "Emergency System" signals for ground-fault. Integrate ground-fault alarm indication with other generator-set alarm indications.

2.06 GENERATOR, EXCITER, AND VOLTAGE REGULATOR

- A. Comply with NEMA MG 1.
- B. Drive: Generator shaft shall be directly connected to the engine shaft. Exciter shall be rotated integrally with generator rotor.
- C. Electrical Insulation: Class H or Class F.
- D. Stator-Winding Leads: Brought out to terminal box to permit future reconnection for other voltages if required.
- E. Construction shall prevent mechanical, electrical, and thermal damage due to vibration, overspeed up to 125 percent of rating, and heat during operation at 110 percent of rated capacity.
- F. Enclosure: Drip proof.
- G. Instrument Transformers: Mounted within generator enclosure.
- H. Voltage Regulator: PM300 voltage regulator is an encapsulated electronic voltage regulator that controls the output of a brushless AC generator by regulating the current into the exciter field.
- I. Strip Heater: A small heater element mounted permanently in the generators winding or outlet box to provide a warm, moisture free environment.
- J. Bearing RTD: None
- K. Stator RTD: None

2.07 OUTDOOR GENERATOR-SET ENCLOSURE

- A. Description: Enclosure is designed to be wind resistant up to 100 mph. ASCE 7-05 Exposure C, 3-second wind gusts.
- B. Description: Steel enclosure with the following features:
 - 1. Vandal resistant.
 - 2. Construction: Formed and/or welded steel.
 - 3. Hinged doors for access with lockable latches.
 - 4. Motorized Louveres and/or baffled air inlet. Grated air outlet.
 - 5. Interior lined with acoustical foam for sound attenuation.
 - 6. Choice of standard colors. Custom colors available upon request.
 - 7. Integral heater.

2.08 VIBRATION ISOLATION DEVICES

- A. Neoprene Pad
 - 1. ¼ inch thick elastomeric pad in square shape to be placed under the base frame at each of the pre-drilled isolator mounting holes.
 - 2. Helps to prevent sliding of the unit as well as reducing the transmission of sound and vibration into the floor.

2.09 FINISHES

- A. Indoor and Outdoor Enclosures and Components: Manufacturer's standard finish over corrosion-resistant pretreatment and compatible primer.

2.10 SOURCE QUALITY CONTROL

- A. Project-Specific Equipment Tests: Before shipment, factory test engine-generator set and other system components and accessories manufactured specifically for this Project. Perform tests at rated load and power factor. Include the following tests:
 - 1. Test components and accessories furnished with installed unit that are not identical to those on tested prototype to demonstrate compatibility and reliability.
 - 2. Full Load Run.
 - 3. Maximum Power.
 - 4. Voltage Regulation.
 - 5. Transient and Steady-State Governing.
 - 6. Single-Step Load Pickup.
 - 7. Safety Shutdown.
 - 8. Provide 14 days' advance notice of tests and opportunity for observation of tests by Owner's representative.
 - 9. Report factory test results within 10 days of completion of test.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine areas, equipment bases, and conditions, with Installer present, for compliance with requirements for installation and other conditions affecting packaged engine-generator set performance.
- B. Examine roughing-in of piping systems and electrical connections. Verify actual locations of connections before packaged engine-generator installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION

- A. Comply with packaged engine-generator manufacturers' written installation and alignment instructions and with NFPA 110.
- B. Install packaged engine generator to provide access, without removing connections or accessories, for periodic maintenance.
- C. Electrical Wiring: Install electrical devices furnished by equipment manufacturers but not specified to be factory mounted.

3.03 CONNECTIONS

- A. Coordinate piping installations and specialty arrangements with schematics on Drawings and with requirements specified in piping systems. If Drawings are explicit enough, these requirements may be reduced or omitted.
- B. Piping installation requirements are specified in Division 23 Sections. Drawings indicate general arrangement of piping and specialties.
- C. Connect fuel, cooling-system, and exhaust-system piping adjacent to packaged engine generator to allow service and maintenance.
- D. Connect wiring according to Division 26 Section "Low-Voltage Electrical Power Conductors and Cables."

3.04 IDENTIFICATION

- A. Identify system components according to Division 23 Section "Identification for HVAC Piping and Equipment" and Division 26 Section "Identification for Electrical Systems."

3.05 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to perform tests and inspections and prepare test reports.
- B. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust components, assemblies, and equipment installations, including connections. Report results in writing.
- C. Perform tests and inspections and prepare test reports.
 - 1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.

- D. Tests and Inspections:
1. Perform tests recommended by manufacturer and each electrical test and visual and mechanical inspection except those indicated to be optional for "AC Generators and for Emergency Systems" specified by NETA Acceptance Testing Specification. Certify compliance with test parameters.
 2. NFPA 110 Acceptance Tests: Perform tests required by NFPA 110 that are additional to those specified here including, but not limited to, single-step full-load pickup test.
 3. Battery Tests: Equalize charging of battery cells according to manufacturer's written instructions. Record individual cell voltages.
 - a. Measure charging voltage and voltages between available battery terminals for full-charging and float-charging conditions. Check electrolyte level and specific gravity under both conditions.
 - b. Test for contact integrity of all connectors. Perform an integrity load test and a capacity load test for the battery.
 - c. Verify acceptance of charge for each element of the battery after discharge.
 - d. Verify that measurements are within manufacturer's specifications.
 4. Battery-Charger Tests: Verify specified rates of charge for both equalizing and float-charging conditions.
- E. Coordinate tests for transfer switches and run them concurrently.
- F. Test instruments shall have been calibrated within the last 12 months, traceable to standards of NIST, and adequate for making positive observation of test results. Make calibration records available for examination on request.
- G. Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.
- H. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation.
- I. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- J. Remove and replace malfunctioning units and retest as specified above.
- K. Retest: Correct deficiencies identified by tests and observations and retest until specified requirements are met.

3.06 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain packaged engine generators. Refer to Section 017900 "Demonstration and Training."

END OF SECTION

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SECTION 26 36 00
TRANSFER SWITCHES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Automatic Transfer Switch.

1.02 RELATED REQUIREMENTS

- A. Section 26 05 53 - Identification for Electrical Systems: Engraved nameplates.
- B. Section 26 32 13 - Engine Generators: Testing requirements.

1.03 REFERENCE STANDARDS

- A. NEMA ICS 10 - Industrial Control and Systems: AC Transfer Switch Equipment; National Electrical Manufacturers Association; 2005.
- B. NETA STD ATS - Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems; International Electrical Testing Association; 2007.
- C. NFPA 70 - National Electrical Code; National Fire Protection Association; 2008.
- D. UL 1008 – Standard for Automatic Transfer Switches.
- E. NFPA 110 – Emergency and Standby Power Systems.
- F. International Standard Organization ISO 9001: 2000.

1.04 SUBMITTALS

- A. See Division 1 - Administrative Requirements for submittal procedures.
- B. Product Data: Provide catalog sheets showing voltage, switch size, ratings and size of switching and overcurrent protective devices, operating logic, short circuit ratings, dimensions, and enclosure details.
- C. Manufacturer's Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.
- D. Operation Data: Instructions for operating equipment under emergency conditions when engine generator is running.
- E. Maintenance Data: Routine preventative maintenance and lubrication schedule. List special tools, maintenance materials, and replacement parts.

1.05 QUALITY ASSURANCE

- A. Conform to requirements of NFPA 70.
- B. Supplier Qualifications: Authorized distributor of specified manufacturer with minimum three years documented experience.
- C. Products: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

1.06 MAINTENANCE SERVICE

- A. Provide service and maintenance of transfer switches for one year from Date of Substantial Completion.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. ASCO Power Technologies, LP.
- B. Eaton Electrical/Cutler-Hammer.
- C. Russelectric.
- D. Kohler.
- D. Substitutions: See Division 1 - Product Requirements.

2.02 AUTOMATIC TRANSFER SWITCH (Mechanically Held)

- A. The transfer switch unit shall be electrically operated and mechanically held. The electrical operator shall be a single-solenoid mechanism, momentarily energized. Main operators which include overcurrent disconnect devices will not be accepted. The switch shall be mechanically interlocked to ensure only one of two possible positions, normal or emergency.
- B. The switch shall be positively locked and unaffected by momentary outages so that contact pressure is maintained at a constant value and temperature rise at the contacts is minimized for maximum reliability and operating life.
- C. All main contacts shall be silver composition. Switches rated 600 amperes and above shall have segmented, blow-on construction for high withstand current capability and be protected by separate arcing contacts.
- D. Inspection of all contacts shall be possible from the front of the switch without disassembly of operating linkages and without disconnection of power conductors. A manual operating handle shall be provided for maintenance purposes. The handle shall permit the operator to manually stop the contacts at any point throughout their entire travel to inspect and service the contacts when required.

- E. Designs utilizing components of molded-case circuit breakers, contactors, or parts thereof which are not intended for continuous duty, repetitive switching or transfer between two active power sources are not acceptable.
- F. Where neutral conductors are to be solidly connected, a neutral terminal plate with fully-rated AL-CU pressure connectors shall be provided.

2.03 MICROPROCESSOR CONTROLLER WITH MEMBRANE INTERFACE PANEL

- A. The controller shall direct the operation of the transfer switch. The controller's sensing and logic shall be controlled by a built-in microprocessor for maximum reliability, minimum maintenance, and inherent serial communications capability. The controller shall be connected to the transfer switch by an interconnecting wiring harness. The harness shall include a keyed disconnect plug to enable the controller to be disconnected from the transfer switch for routine maintenance.
- B. The controller shall be enclosed with a protective cover and be mounted separate from the transfer switch unit for safety and ease of maintenance. Sensing and control logic shall be provided on printed circuit boards. Interfacing relays shall be industrial grade plug-in type with dust covers.
- C. The controller shall meet or exceed the requirements for Electromagnetic Compatibility (EMC) as follows:
 - 1. ANSI C37.90A/IEEE 472 Voltage Surge Test
 - 2. NEMA ICS - 109.21 Impulse Withstand Test
 - 3. IEC801-2 Electrostatic discharge (ESD) immunity
 - 4. ENV50140 and IEC 801 - 3 Radiated electromagnetic field immunity
 - 5. IEC 801 - 4 Electrical fast transient (EFT) immunity
 - 6. ENV50142 Surge transient immunity
 - 7. ENV50141: Conducted radio-frequency field immunity
 - 8. EN55011: Group 1, Class A conducted and radiated emissions
 - 9. EN61000 -4 - 11 Voltage dips and interruptions immunity

2.04 ENCLOSURE

- A. The ATS shall be furnished in a NEMA type 1 enclosure unless otherwise shown on the plans.
- B. Controller shall be flush-mounted display with LED indicators for switch position and source acceptability. It shall also include test and time delay bypass switches.

2.05 OPERATION

A. Voltage and Frequency Sensing

1. The voltage of each phase of the normal source shall be monitored, with pickup adjustable to 95% of nominal and dropout adjustable from 70% to 90% of pickup setting.
2. Single-phase voltage and frequency sensing of the emergency source shall be provided.

B. Time Delays

1. An adjustable time delay shall be provided to override momentary normal source outages and delay all transfer and engine starting signals.
2. An adjustable time delay shall be provided on transfer to emergency, adjustable from 0 to 5 minutes for controlled timing of transfer of loads to emergency.
3. A generator stabilization time delay shall be provided after transfer to emergency.
4. An adjustable time delay shall be provided on retransfer to normal, adjustable to 30 minutes. Time delay shall be automatically bypassed if emergency source fails and normal source is acceptable.
5. A 5-minute cool down time delay shall be provided on shutdown of engine generator.
6. All adjustable time delays shall be field adjustable without the use of special tools.

C. Additional Features

1. A set of contacts rated 5 amps, 32 VDC shall be provided for a low-voltage engine start signal. The start signal shall prevent dry cranking of the engine by requiring the generator set to reach proper output, and run for the duration of the cool down setting, regardless of whether the normal source restores before the load is transferred.
2. A push-button type test switch shall be provided to simulate a normal source failure.
3. A push-button type switch to bypass the time delay on transfer to emergency, the engine exerciser period on the retransfer to normal time delay whichever delay is active at the time the push-button is activated.
4. Terminals shall be provided for a remote contact which opens to signal the ATS to transfer to emergency and for remote contacts which open to inhibit transfer to emergency and/or retransfer to normal.
5. Auxiliary contacts, rated 10 amps, 250 VAC shall be provided consisting of one contact, closed when the ATS is connected to the normal source and one contact, closed, when the ATS is connected to the emergency source.

6. Indicating lights shall be provided, one to indicate when the ATS is connected to the normal source (green) and one to indicate when the ATS is connected to the emergency source (red). Also provide indicating lights for both normal and emergency source availability.
7. Terminals shall be provided to indicate actual availability of the normal and emergency sources, as determined by the voltage sensing pickup and dropout settings for each source.
8. Engine Exerciser - An engine generator exercising timer shall be provided, including a selector switch to select exercise with or without load transfer.
9. Inphase Monitor - An Inphase monitor shall be inherently built into the controls. The monitor shall control transfer so that motor load inrush currents do not exceed normal starting currents, and shall not require external control of power sources. The inphase monitor shall be specifically designed for and be the product of the ATS manufacturer.
10. Communications Interface - Connectivity Module to allow several different serial devices that communicate at different baud rates and with different protocols to a common Ethernet media. The module shall be used to connect Annunciators to the standard Ethernet TCP/IP network with standard 10 base-T (RJ-45) connector. The module shall be designed to communicate with up to 4 clients such as Web applications (web pages) communication products simultaneously over an Ethernet connection.
11. Programmable Engine Exerciser - A seven or fourteen day programmable engine exerciser with digital readout display. Shall include one form C contact for availability of normal and emergency sources. Include "with or without" load control switch for exerciser period. The exerciser shall be backed up by a permanent battery. (Accessory11BG).

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that surface is suitable for transfer switch installation.

3.02 PREPARATION

- A. Provide housekeeping pads under the provisions of Division 3.

3.03 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Provide engraved plastic nameplates under the provisions of Section 26 05 53.

3.04 FIELD QUALITY CONTROL

- A. Perform field inspection and testing in accordance with Division 1.
- B. Inspect and test in accordance with NETA STD ATS, except Section 4.
- C. Perform inspections and tests listed in NETA STD ATS, Section 7.22.3.

3.05 MANUFACTURER'S FIELD SERVICES

- A. Provide the services of the manufacturer's technical representative to check transfer switch connections and operations and place in service.

3.06 CLOSEOUT ACTIVITIES

- A. Demonstrate operation of transfer switch in normal and emergency modes.

PART 4 ADDITIONAL REQUIREMENTS

4.01 WITHSTAND AND CLOSING RATINGS

- A. The ATS shall be rated to close on and withstand the available rms symmetrical short circuit current at the ATS terminals with the type of overcurrent protection shown on the plans. WCR ATS ratings as be as follows when used with specific circuit breakers:

ATS Size	Withstand & Closing Rating MCCB	W/CLF
30	22,000A	100,000
70 - 200	22,000A	200,000
230	22,000A	100,000
260 - 400	42,000A	200,000
600 - 1200	65,000A	200,000
1600 - 2000	85,000A	200,000
2600 - 3000	100,000A	200,000

4.02 TESTS AND CERTIFICATION

- A. The complete ATS shall be factory tested to ensure proper operation of the individual components and correct overall sequence of operation and to ensure that the operating transfer time, voltage, frequency and time delay settings are in compliance with the specification requirements.
- B. Upon request, the manufacturer shall provide a notarized letter certifying compliance with all of the requirements of this specification including compliance with the above codes and standards, and withstand and closing ratings. The certification shall identify, by serial number(s), the equipment involved. No exceptions to the specifications, other than those stipulated at the time of the submittal, shall be included in the certification.
- C. The ATS manufacturer shall be certified to ISO 9001: 2000 International Quality Standard and the manufacturer shall have third party certification verifying quality assurance in design/development, production, installation and servicing in accordance with ISO 9001: 2000.

4.03 SERVICE REPRESENTATION

- A. The complete ATS shall be factory tested to ensure proper operation of the individual components and correct overall sequence of operation and to ensure that the operating transfer time, voltage, frequency and time delay settings are in compliance with the specification requirements.
- B. The manufacturer shall maintain records of each switch, by serial number, for a minimum of 20 years. For ease of maintenance, the transfer switch nameplate shall include drawing numbers and serviceable part numbers.

END OF SECTION

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