**SECTION 260500-COMMON WORK RESULTS FOR ELECTRICAL**

PART 1 - GENERAL

1.1 GENERAL AND EXECUTION

A. Related Documents:

1. Drawings and general provisions of contract, including general and supplementary conditions, Division 0 and Division 1 specification sections, apply to the entire Division 26 documents.

B. The intent of these specifications are for the contractor to provide all labor, material, supervision, and equipment necessary for a complete electrical installation as described in the drawings and specifications for a fully operative electrical system.

C. The electrical installation of equipment and other work shall comply with or exceed all requirements of the latest edition of the National Electrical Code and all state and local codes and ordinates applicable to this project including the Ohio Building Code, latest edition.

1.2 SHOP DRAWINGS

A. Contractor shall submit shop drawings and catalog cuts to architect.

B. Shop drawings and catalog cuts that shall be submitted under this section include, but are not limited to the following:

1. Motor starters and disconnects and motor control centers
2. Distribution panelboards and switchboards
3. Fuses
4. Wiring devices
5. Lighting Fixtures
6. Fire Alarm System
7. Transformers

C. No portion of the work requiring submission of shop drawings, product data or samples shall be commenced until the submittals have been accepted by the owner. All such portions of the work shall be in accordance with accepted submittals.

D. Acceptance of any material or product shall not relieve the contractor of his responsibility for meeting all the requirements of the specifications and shall not prevent subsequent rejections if such material or product is later found to be inferior.

E. Electrical material and equipment furnished by the contractor shall be new, listed by Underwriters Laboratories and bear the "UL" label. Similar items shall be of the same manufacturer.

1.3 DISCREPANCIES, COORDINATION, GUARANTEES

A. The contractor shall contact, prior to bid, the owner and architect in writing immediately if he notices any discrepancies or omissions in either the drawings or the specifications or if there are any questions regarding the meaning or intent thereof. No allowances shall be given to contractor after the work has begun.

B. The contractor is required to visit the site and fully inform himself concerning dimensions, existing conditions and all other conditions affecting the scope of work. Failure to visit the site shall not relieve the contractor from any responsibility in the performance of his work.

C. The contractor is responsible for coordinating the electrical installation. Costs generated due to poor coordination of work shall be paid by the contractor without cost to owner.

D. The contractor shall guarantee all work installed under this contract to be free from defective workmanship and material, usual wear excepted. Should any defects develop within a period of one year after final acceptance by owner, the contractor shall replace the defective material and repair all defective workmanship and all resultant damage without cost to the owner.

E. Before installing any of his work, this contractor shall see that it does not interfere with clearances required for finish on beams, columns, walls or other structural members shown on the drawings. The contractor shall make sure switches, controls, dimmers, and similar devices are installed on the lock side of door.

1.4 GENERAL INSTALLATION

A. All scratches or chipped paint on electrical equipment are to be touched-up with matching paint. All dents in all electrical equipment are to be taken out and the prime or finish costs touched up. If damage is excessive, replacement will be required.

B. After all equipment has been inspected and approved, thoroughly clean all equipment.

C. Equipment mounted on either side of exterior block walls shall be mounted allowing a 3/4" (typical) space between wall and equipment.

D. It is the responsibility of contractor to obtain detailed shop drawings of all equipment prior to rough in and making final connections.

E. It is the contractor's responsibility to see that all equipment and apparatus that may require maintenance is made easily accessible. Although the location of the equipment may be shown on the drawings, the construction of the structure and the location of other equipment may not make its position easily accessible. Contractor is to call the attention of the owner to the condition before advancing the construction to a point where a change in the location would reflect additional cost.

F. The contractor shall perform his own cutting and patching, trenching and backfill, excavation, core drilling, etc to install his work.

1.5 CODES

A. The entire electrical installation shall be in compliance with or exceed the requirements of the latest edition of:

1. The National Electrical Code, NFPA 70
2. The National Fire Alarm Code, NFPA 72
3. The National Electrical Safety Code
4. OBC, and other State, county or local codes and ordinances having jurisdiction.
5. The Institute of Electrical and Electronics Engineers, Inc., Publications.
6. Underwriters Laboratories
7. OSHA

B. Conflicts between the above codes and the electrical drawings or specification shall be resolved as follows:

1. Codes shall be considered as establishing minimum standards for methods, material and equipment.
2. Where the electrical drawings or specifications exceed the requirements of the codes, then the electrical drawings or specification shall prevail.

1.6 CLEARANCES

A. The contractor shall maintain minimum clearances for all electrical equipment such as panelboards, switchboards, starters, mcc's etc. as required by the National electrical Code, latest edition, regardless of where equipment is shown on drawing.

1.7 WATERPROOF SEALING OF CONDUITS

A. Moisture sealant. Provide moisture seals for the exterior of conduits penetrating exterior or water bearing walls consisting of a cast-in-place water stop wall sleeve with a compressible rubber gasket between the conduit and the sleeve.
Provide seals for the interior of conduits which penetrate exterior or water bearing walls, consisting of gland type sealing bushings or closed cell silicone foam.

1.8 DEFINITIONS AND ABBREVIATIONS

A. Definitions

1. "Furnish" shall mean supply and deliver to project site, ready for unloading, unpacking, assembly, installation, etc., as applicable in each instance.

2. "Install" shall be used to describe operations at project site including unloading, packing, assembly, erection, placing, anchoring, applying, working to dimension, finishing, curing, protection, cleaning, and similar operations, as applicable in each instance.

3. "Provide" shall mean furnish and install, complete and ready for intended use, as applicable in each instance.

4. "Directed" shall mean as directed by Owner prior to installation of equipment.

5. "Indicated" shall mean "indicated on Contract Drawings".

6. "Shown" shall mean "shown on Contract Drawings".

7. "Section" shall mean one of the Specification Sections.

8. "Division" shall mean one of the Specification Divisions.

9. "Article" shall mean one of the numbered paragraphs of the Specification Section.

10. "Work" or "Electrical Work" herein includes products, labor, equipment, tools, appliances, transportation and related items, directly or indirectly required to complete the specified and/or indicated electrical installation.

11. "Code" shall mean any regulations and requirements of regulatory bodies, public or private, having jurisdiction over the work involved.

12. "Product" used in Division 16 means material, equipment, machinery, and/or appliances directly or indirectly required to complete the specified and/or indicated Electrical Work.

13. "Standard Product" shall mean a manufactured product, illustrated and/or described in catalogs or brochures, which are in general distribution prior to the date of issue of construction documents for bidding. Products shall generally be identified by means of a specific catalog number and manufacturer's name.

14. "Wiring" shall mean fittings, conduits, wires, junction boxes, connections to equipment, splices, and other accessories required to complete the work.

15. Abbreviations and Symbols: See lists for both on drawings.

16. "Contractor" shall mean the contractor responsible for Division 16 work.

17. "Contract Documents" shall mean drawings, specifications, bid forms, addendum, and change orders.

18. Whenever the phrases "approved by the Professional or Owner," "approved equal," or "equal to" appear in these specifications, they shall be interpreted as meaning "as recommended by the Professional and approved by the Authority."

19. The word "Architect" or "Engineer" shall be interpreted as meaning "Project Professional."

20. The "Owner" shall mean the owner and operator of the Facility.

B. Reference to the following codes and standards shall mean:

| Reference | Definition |
|---|---|
| NEC | National Electrical Code Current Edition |

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| ASTM | American Society for Testing Materials |
| NEMA | National Electrical Manufacturers Association |
| ANSI | American National Standards Institute |
| FS | Federal Specification, U. S. Government |
| CS | Commercial Standards issued by U. S. Dept. of Commerce |
| NESC | National Electrical Safety Code |
| NETA | National Electrical Testing Association |
| ADA | Americans with Disabilities Act |
| EIA | Electronics Industries Association |

1.9 SINGULAR NUMBER

A. References made to any item in the singular number shall apply equally to as many identical items that the work may require.

1.10 ACCESSIBILITY

A. Verify the adequacy of the size of shafts and chases, and the adequacy of clearances in hung ceilings and other areas required for the proper installation of this work. Pay particular attention to the ladder tray located above the dropped ceiling.

B. Locate equipment which must be serviced, operated or maintained in fully accessible positions.

C. Locations of access doors in finished construction shall be submitted in sufficient time to be installed in the normal course of the work.

1.11 SLEEVES

A. Provide and install sleeves where required to protect equipment or facilities in the installation. Each sleeve shall extend through its respective floor, wall or partition and shall be cut flush with each surface unless otherwise required.

B. Sleeves in bearing and masonry walls, floors and partitions shall be standard weight steel pipe finished with smooth edges. For other than masonry partitions, through suspended ceilings, and for concealed vertical piping, sleeves shall be No. 22 U.S.G. galvanized iron.

C. Sleeves shall be properly installed and securely cemented in place.

D. Floor sleeves shall extend 1" above the finished floor, unless otherwise noted. Space between floor sleeves and passing conduit shall be caulked with graphite packing and waterproof caulking compound as approved.

E. Where conduits pass through waterproofed floor or walls, design of sleeves shall be such that waterproofing can be flashed into and around the sleeves.

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F. Where conduits pass through roofs, sleeves shall be installed and flashed and made watertight by the contractor unless otherwise specified or shown on the drawings.

G. Sleeves through exterior walls below grade shall have the space between conduit and sleeve caulked watertight, using an approved method.

1.12 ACCESS PANELS

A. Furnish access panels not smaller than 12 " by 16" for access to concealed pull boxes, junction boxes or similar items where no other means of access is provided. The contractor shall install access panels.

B. Access panels shall be all-steel construction with a No. 16 gauge wall or ceiling frame and a No. 14 gauge panel door with not less than 1/8" fireproofing secured to the inside of the door. Doors shall be provided with concealed hinges and cylinder lock except doors for wall panels which may be secured with suitable clips ad countersunk screws. Outside of access panels shall finish flush with finished wall or ceiling surfaces. Covers shall be factory primed with two (2) coats of primer.

1.13 WIRE GAUGE

A. The sizes of conductors and thickness of metals shown on the drawings or mentioned herein shall be understood to be American Wire Gauge.

1.14 ANCHOR BOLTS

A. Provide and set in place, at the time of pouring of concrete foundations, necessary anchor bolts as required for the equipment called for under these specifications. Anchor bolts shall be of the hook type, of proper size and length to suit the equipment. Anchor bolts shall be set in pipe sleeves of approximately twice the

bolt diameter and one-half the embedded length of the bolt. Assume full responsibility for proper emplacement of the bolts.

1.15 GENERAL - EXECUTION

A. Provide any chases or openings required under this Division. No cutting shall be done which may affect the building structurally or architecturally without the prior approval of the Professional. Damaged construction shall be restored to its original conditions and finished to match the surrounding work. Refer to Division 1, for additional cutting and patching requirements.

B. Grades, elevations, and dimensions shown on the drawings are approximately correct; however, field check and otherwise verify such data at the site before proceeding with the work. Make necessary survey equipment available at all times and shall make use of such equipment wherever necessary to properly install his equipment.

C. The contractor shall be entirely responsible for apparatus, equipment, and appurtenances furnished by him or his sub-contractors in connection with the work and special care shall be taken to protect all parts thereof in such manner as may be necessary or as may be directed. Protection shall include covers, crating, sheds or other means to prevent dirt,

grit, plaster or other foreign substances from entering the working parts of machinery or equipment. Special care shall be taken to keep open ends of pipes closed while in storage and during installation. Where equipment must be stored outside the building, it shall be totally covered and secured with heavy weatherproofing tarps and kept dry at all times. Where equipment has been subjected to moisture, it shall be removed from the site and replaced with new equipment. Protect open excavating until covered over.

D. Due to the schematic nature and small scale of the Electrical drawings, it is not possible to indicate exact locations, offsets, fittings, access panels, pull boxes, and miscellaneous parts which may be required to form a complete system. The drawings are generally indicative of the work to be installed. Arrange work accordingly, furnishing necessary parts and equipment as may be required to meet the various conditions and to provide a complete circuit from end use device to circuit protective device in panel. The contractor shall adjust the exact location of each drop within 5 feet of the area shown. The final location of the drop to be coordinated with the Owner.

E. Within ten (10) days after notice to proceed, submit to the OWNER for approval, a complete list of equipment and materials to be furnished under this contract, giving names and addresses of manufacturers and material they intend to furnish. This source of supply shall be listed on forms available from the Professional.

F. Take caution of routing conduit and location of equipment. In many cases, clearances in ceiling plenums is limited due to ductwork and other mechanical lines and systems and steel. This contractor is responsible for routing around mechanical equipment and ducts in order that everything can remain concealed in finished areas.

G. Apply for detailed and specific information regarding the location of equipment as the final location may differ from that indicated on the drawings. Outlets, equipment or wiring improperly placed because of failure to obtain this information shall be relocated and re-installed without additional expense to the Institution.

H. The design shall be subject to such revisions as may be necessary to overcome building obstructions. No changes shall be made in location of outlets or equipment without written consent of the Professional and Owner.

I. Unless otherwise mentioned or indicated, mounting heights of outlets are shown on the drawings or in the specification. Dimensions given shall be considered to be from center of outlet to finished floor.

J. Properly rough for the electrical conduit and equipment under this Division and modify as required for coordination during the construction period.

K. The location of electrical drops are shown on the drawings. The contractor shall assume that the drops may be moved, within 10 feet of the location shown. Coordinate exact location of each drop with the Owner.

L. Do not mount outlets back to back with through-the-wall boxes.

A. Furnish all concrete work for all equipment bases, such as, panels, switchboards, transformers, switchgear, etc.

B. All floor mounted electrical equipment shall receive a concrete base.

C. The bases shall be 4" high and at least 4" larger around perimeter of the equipment or as shown. Increase pad sizes as required. All concrete pads and pole bases shall have 45 deg. 1" bevel at edges and shall be rubbed out.

D. All concrete to be reinforced, 4000 PSI.

1.17 EXCAVATION

A. Lay out all ditches and trenches to be excavated prior to digging. Review all other drawings for sewers, telephone, power, CATV, water, and gas. It is the responsibility of the electrical contractor to exercise caution whenever excavating for placement of conduit etc. The architect and engineer have tried to avoid any conflicts with other work but if electrical contractor damages any piping or equipment while he or his subcontractors are performing this work, he shall pay all costs to replace same and do it promptly, within 48 hours.

B. Slope sides of excavation to comply with local codes and ordinances. Shore and brace as required for stability of excavation.

C. Prevent surface water and subsurface or ground water from flowing into excavations and from flooding project site and surrounding area.

D. Do not allow water to accumulate in excavations. Remove water to prevent softening of bearing materials. Provide and maintain dewatering system components necessary to convey water away from excavations.

E. Establish and maintain temporary drainage ditches and other diversions outside excavation limits to convey surface water to collecting or run-off areas. Do not use trench excavations as temporary drainage ditches.

F. Stockpile satisfactory excavated materials where directed, until required for backfill or fill. Place, grade, and shape stockpiles for proper drainage.

G. Locate and retain soil materials away from edge of excavations.

H. Remove and legally dispose of excess excavated materials and materials not acceptable for use as backfill or fill.

I. Excavate trenches for electrical installations as follows:
   1. Excavate trenches to the uniform width, sufficiently wide to provide ample working room and a minimum of 6 to 9 inches clearance on both sides of raceways and equipment.

   2. Excavate trenches to depth indicated or required.

3. Limit the length of open trench to that in which installations can be made and the trench backfilled within the same day.

4. Where rock is encountered, carry excavating below required elevation and backfill with a layer of crushed stone or gravel prior to installation of raceways and equipment. Provide a minimum of 6 inches of stone or gravel cushion between rock bearing surface and electrical installations.

5. Protect excavation bottoms against freezing when atmospheric temperature is less than 35 deg. F.

6. Place soil materials in layers to required subgrade elevations for each area.

7. Under walks and pavements, use a combination of subbase materials and excavated or borrowed materials.

8. For raceways under roadways, provide 4-inch thick concrete base slab support. After installation of raceways, provide a concrete encasement (sides and top) prior to backfilling and placement of roadway subbase.

9. Backfill excavations as promptly as work permits, but not until completion of the following:
   a. Inspection, testing, approval, and locations of underground utilities have been recorded.
   b. Removal of concrete form work
   c. Removal of shoring and bracing, and backfilling of voids.
   d. Removal of trash and debris.

10. Provide a yellow caution tape 18" above conduits when backfilling.

J. Place backfill and fill materials in layers of not more than 8 inches in loose depth for material compacted by heavy equipment, and not more than 4 inches in loose depth for material compacted by hand-operated tampers. All ditches or cuts in work area to have 12 inches of premium fill along with all other requirements of the contract documents.

K. Before compaction, moisten or aerate each layer as necessary to provide optimum moisture content. Compact each layer to required percentage of maximum dry density of relative dry density for each area as required. Do not place backfill or fill material on surfaces that are muddy, frozen, or contain frost or ice.

L. Repair all underground excavation to original condition including walks, grass, drives, roadways, patios, etc.. Place backfill and fill materials evenly adjacent to structures, piping, and equipment to required elevations. Prevent displacement of raceways and equipment by carrying material uniformly around them to approximately same elevation in each lift.

## 1.18 TEMPORARY ELECTRIC

A. The contractor shall be responsible for providing, maintaining and paying for the

following temporary electrical requirements, except as otherwise noted.

B. The contractor shall provide all labor and materials to provide temporary service for the construction areas.

C. Furnish and install a temporary electric service for general use. Install service(s) large enough to serve the loads required during the construction phase.

D. Electrical contractor is responsible for proper grounding installation.

F. Electrical Service: comply with NEMA, NECA and UL standards and regulations for temporary electric service. Install service in compliance with National Electric Code (NFPA 70) and OSHA requirements. Include all equipment at service.

G. Installation of temporary power and lighting system is to begin upon notification by the engineer and shall be installed and routed in a manner acceptable to the architect, local inspector and the utility company and the owner so as not to interfere with construction of the project.

H. The main distribution panel shall have proper overcurrent protection in each panel and the enclosure if exposed to moisture shall be NEMA 3R. Provide GFI protection on all overcurrent devices.

I. For power tools provide receptacles equipped with ground fault interrupters, reset button and pilot light for connections to power tools and equipment. Provide flexible power cords as required.

J. Provide metal conduit, tubing or armored cable for protection of wiring where exposed to possible damage. No exposed wiring on floors, decks, etc.

K. One electrician will be designated to maintain the temporary service. He shall be on site at all times when temporary electricity is required.

L. Any trade requiring special electrical requirements beyond the capacity of the electrical service, shall provide and pay for such services.

M. Exercise measures to conserve energy.

N. Temporary lighting requirements are contained in OSHA safety and health standards, and expressed in terms of minimum intensities in foot candles.

O. Furnish and install guard cages of tempered glass enclosure. Provide and install exterior type fixtures where exposed to moisture.

P. Furnish and install at least one 20 ampere, 120 volt 1 phase grounding type receptacle (GFI) outlet for every 800 square feet of floor space. The maximum length of 20 ampere branch circuit shall not be over 200 feet from panelboard. Each outlet shall be on one overcurrent device.

Q. The electrical contractor shall be responsible with all costs associated with the temporary electrical service.

R. Installation Requirements:

1. Completed portions of work shall not be used for temporary power.
2. Provide solid grounding of the temporary service
3. Ground the temporary branch circuits for power and lighting.

1.19 COMMISIONING OF ELECTRICAL SYSTEMS

A. The electrical contractor is responsible for all work outlined in specification section 'COMMISSIONING OF HVAC AND ELECTRICAL SYSTEMS' as defined in that section that relate to the Electrical Contractor.

END OF SECTION 260500

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