MAQUOKETA CAVES STATE PARK
ROADWAY RECONSTRUCTION, MAINTENANCE & CAMPGROUND ELECTRICAL
JACKSON COUNTY, IOWA
PROJECT NO. 17-06-49-02

November 9, 2017

This Addendum is issued to modify, explain or correct the original Drawings and Specifications, and is hereby made a part of the Contract Documents. Please attach this Addendum to the Project Manual in your possession. Insert the number and issue date of this Addendum in the blank space provided on the Proposal Form.

SPECIFICATIONS

A. 02220 Trenching, Backfilling And Compacting
   a. Added specification
B. 16000 Electrical Power Transmission
   a. Updated specification

PART 1 - GENERAL

1.01 SUMMARY:

A. Section Includes: The work covered by this Section consists of furnishing all material, labor and equipment necessary or required to do the trenching, backfilling and compacting needed for the proper and complete installation of underground utilities as shown on the Drawings.

B. Related Sections: Drawings and General Provisions of the contract, including the General Covenants and Provisions, Supplementary Covenants and Provisions and General Requirements.

Section 02785 - Electric Power Transmission

1.02 QUALITY ASSURANCE:

A. Qualifications: Use adequate numbers of skilled workers who are thoroughly trained and experienced in the necessary crafts, and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.

B. Use equipment adequate in size, capacity, and numbers to accomplish the work in a timely manner.

C. Codes and Standards: Perform all work of this Section in compliance with applicable requirements of governing authorities having jurisdiction.

1. In addition to complying with the pertinent codes and regulations of other governing agencies, comply with applicable requirements of Iowa Department of Natural Resources Authorized Technical Specifications for Water and Sewer Projects, latest edition.

D. Safety: All trenching, excavating and methods of construction shall conform to the state of Iowa Bureau of Labor and all OSHA standards.

E. Where conflicts arise between Contract Documents and Referenced Codes and Standards, the latter shall prevail, unless Contract Documents are more stringent.

1. Bring all conflicts to the attention of the DNR Construction Inspector.

1.03 PROJECT/SITE CONDITIONS:

A. Environmental Requirements:

1. Protect existing trees and other vegetation indicated or as directed by DNR Construction Inspector to remain in place, against unnecessary cutting, breaking or skinning of roots, skinning and bruising of bark, smothering of trees by stockpiling

construction materials or excavated materials within drip line, excess foot traffic or vehicular traffic, or parking of vehicles within drip line.

2. Provide temporary guards to protect trees and vegetation to be left standing.

3. Repair or replace trees and vegetation indicated to remain which are damaged by construction operations, in a manner acceptable to the DNR Construction Inspector.

B. Existing Conditions:

1. Site information indicated on the Drawings regarding existing conditions, is of a general nature.

a. Visit the site and become familiar with existing conditions.

2. Observe weather conditions.

a. Attempt no work in frozen conditions without the approval of the DNR Construction Inspector.

PART 2 - PRODUCTS

2.01 MATERIALS:

A. Fill and Backfill Materials:

1. Provide soil materials free from organic matter and deleterious substances, containing no rocks or lumps over 6" in greatest dimension, and with not more than 15 percent of the rocks or lumps larger than 2-3/8" in their greatest dimension.

2. Fill material is subject to the approval of the DNR Construction Inspector, and is that material removed from excavations or imported from off-site borrow areas, predominantly granular, nonexpansive soil free from roots and other deleterious matter.

3. Do not permit rocks having a dimension greater than 1" in the upper 12" of fill.

4. Cohesionless Material Used for Backfill: Provide sand free from organic material and other foreign matter, and approved by the DNR Construction Inspector.

B. Provide other materials, not specifically described but required for a complete and proper installation, selected by the Contractor subject to the approval of the Project Engineer.

PART 3 - EXECUTION

3.01 PREPARATION:

A. Protection of Persons and Property:

1. Barricade open holes and depressions occurring as part of the work, and post warning lights on property adjacent to or with public access.

2. Operate warning lights during hours from dusk to dawn each day and as otherwise required.

3. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, washout, and other hazards created by operations under this Section.

B. Protection of Utilities:

1. Unless shown to be removed, protect active utility lines shown on the Drawings or otherwise made known to the Contractor prior to trenching.

a. If damaged, repair or replace at no additional cost to the Owner.

2. If active utility lines are encountered, and are not shown on the Drawings or otherwise made known to the Contractor, promptly take necessary steps to assure that service is not interrupted.

3. If service is interrupted as a result of work under this Section, immediately restore service by repairing the damaged utility at no additional cost to the Owner.

4. If existing utilities are found to interfere with the permanent facilities being constructed under this Section, immediately notify the Project Engineer and secure instructions.

5. Do not proceed with permanent relocation of utilities until written instructions are received from the Project Engineer.

C. Dewatering:

1. Remove all water, including rain water, encountered during trench and sub-structure work to an approved location by pumps, drains, and other approved methods.

2. Keep trenches and site construction area free from water.

D. Dust Control: Use means necessary to prevent dust becoming a nuisance to the public, at neighbors, and to other work being performed on or near the site.

E. Maintain access to adjacent areas at all times.

3.02 TRENCHING:

A. Provide sheeting and shoring necessary for protection of the work and for the safety of personnel.

1. Prior to backfilling, remove all sheeting.

2. Do not permit sheeting to remain in the trenches except when, in the opinion of the DNR Construction Inspector, field conditions or the type of sheeting or methods of

construction such as use of concrete bedding are such as to make removal of sheeting impracticable.

a. In such cases, the Project Engineer, upon recommendation from the DNR Construction Inspector, may permit portions of sheeting to be cut off and remain in the trench.

B. Open Cut:

1. Excavate for utilities by open cut.

2. If conditions at the site prevent such open cut, and if approved by the Project Engineer, trenching may be used.

3. Short sections of a trench may be tunneled if, in the opinion of the Project Engineer, the conductor can be installed safely and backfill can be compacted properly into such tunnel.

4. Where it becomes necessary to excavate beyond the limits of normal excavation lines in order to remove boulders or other interfering objects, backfill the voids remaining after removal of the objects as directed by the DNR Construction Inspector.

5. When the void is below the subgrade for the utility bedding, use suitable earth materials and compact to the relative density directed by the DNR Construction Inspector, but in no case less than 90 percent.

6. When the void is in the side of the utility trench or open cut, use suitable earth or sand compacted or consolidated as approved by the DNR Construction Inspector, but in no case to a relative density less than 80 percent.

7. Remove boulders and other interfering objects, and backfill voids left by such removals, at no additional cost to the Owner.

8. Excavating for appurtenances:

a. Excavate for manholes and similar structures to a distance sufficient to leave at least 12" clear between outer surfaces and the embankment or shoring that may be used to hold and protect the banks.

b. Overdepth excavation below such appurtenances, unless directed, will be considered unauthorized.

c. Fill unauthorized overdepth excavation with sand, gravel, or lean concrete as directed by the DNR Construction Inspector, and at no additional cost to the Owner.

C. Trench to the minimum width allowed for proper installation of the utility, with sides as nearly vertical as possible.

1. Accurately grade the bottom to provide uniform bearing for the utility.

D. Depressions:

1. Dig bell holes and depressions for joints after the trench has been graded.

a. Provide uniform bearing for the pipe on prepared bottom of the trench.

2. Except where rock is encountered, do not excavate below the depth indicated or specified.

3. Where rock is encountered, excavate rock to a minimum overdepth of 4" below the trench depth indicated.

E. Where utility runs traverse public property or are subject to governmental or utility company jurisdiction, provide depth, bedding, cover, and other requirements as set forth by legally constituted authority having jurisdiction, but in no case less than the depth shown in the Contract Documents.

F. Where trenching occurs in existing lawns, remove turf in sections, keep damp and replace turf upon completion of the backfilling.

G. Cover:

1. Provide minimum trench depth indicated below to maintain a minimum cover over the top of the installed item below the finish grade or subgrade:

a. Areas subject to vehicular traffic:

(1) Sanitary sewers: 48"

(2) Storm drains: 36"

b. Areas not subject to vehicular traffic:

(1) Sanitary sewers: 30"

(2) Storm drains: 18"

c. All areas:

(1) Water lines: 60"

(2) Natural gas lines: 24"

(3) Primary electrical cables: 42"

(4) Secondary electrical ducts: 36"

d. Concrete encased:

(1) Pipe sleeves for water and gas lines: 24"

(2) Sanitary sewers and storm drains: 12"

(3) Electrical ducts: 24”

2. Where utilities are under a concrete structure slab or pavement, the minimum depth need only be sufficient to completely encase the conduit or pipe sleeve, and electrical long-radius rigid metal conduit riser, provided it will not interfere with the structural integrity of the slab or pavement.

3. Where the minimum cover is not provided, encase the pipes in concrete as indicated.

a. Provide concrete with a minimum 28-day compressive strength of 3,000 psi.

3.03 BEDDING:

A. Provide bedding as indicated on the Drawings and as specified herein.

3.04 BACKFILLING:

A. General:

1. Do not completely backfill trenches until required pressure and leakage tests have been performed, and until the utilities systems as installed conform to the requirements specified in the pertinent Section of these Specifications.

2. Except as otherwise specified, or directed for special conditions, backfill trenches to the ground surface with selected material approved by the DNR Construction Inspector.

3. Re-open trenches which have been improperly backfilled, to a depth as required for proper compaction.

4. Refill and compact as specified, or otherwise correct to the approval of the DNR Construction Inspector.

5. Do not allow or cause any of the work performed or installed to be covered up or enclosed by work of this Section prior to required inspections, test, and approvals.

6. Should any of the work be so enclosed or covered up before it has been approved, uncover all such work and, after approvals have been made, refill and compact as specified, all at no additional cost to the Owner.

B. Lower Portion of Trench:

1. Deposit approved backfill and bedding material in layers of 6" maximum thickness, and compact with suitable tampers of the density of the adjacent soil, or grade as specified herein, until there is a cover of not less than 14: over sewers and 12" over other utility lines.

2. Take special care in backfilling and bedding operations not to damage pipe and pipe coatings.

C. Remainder of Trench:

1. Except for special materials for pavements, backfill the remainder of the trench with material free from stones larger than 6" or 1/2 the layered thickness, whichever is smaller, in any dimension.

2. Deposit backfill material in layers not exceeding the thickness specified, and compact each layer to the minimum density directed by the DNR Construction Inspector.

D. Adjacent to Buildings: Mechanically compact backfill within ten feet of buildings.

E. Consolidation of backfill by jetting with water may be permitted, when specifically approved by the DNR Construction Inspector, in areas other than building and pavement areas.

3.05 PIPE JACKING:

A. Unless so or otherwise required, the Contractor may, at his option, install steel pipe casings, tongue-and-groove reinforced concrete pipes, and steel pipes under existing roads or pavements by jacking into place using procedures approved by the governmental agencies having jurisdiction and approved by the DNR Construction Inspector.

3.06 TUNNELING OPERATIONS:

A. Unless so or otherwise required, the Contractor is allowed the option to tunnel pipes into position using procedures approved by the Project Engineer/DNR Construction Inspector and the governmental agencies having jurisdiction.

3.07 FIELD QUALITY CONTROL:

A. Tests: Test for displacement of sewer and storm drains.

1. Check sewers and storm drains to determine whether displacement has occurred after the trench has been backfilled to above the pipe and has been compacted as specified.

2. Flash a light between manholes or, if the manholes have not yet been constructed, between the locations of the manholes, by means of a flashlight or by reflecting sunlight with a mirror.

3. If the illuminated interior of the pipeline shows poor alignment, displaced pipes, or other defects, correct the defects to the specified conditions and at no additional cost to the Owner.

B. Inspection: The DNR Construction Inspector will inspect and approve open cuts and trenches before installation of utilities, and the following:

1. Assure that trenches are not backfilled until all tests have been completed.

2. Check backfilling for proper layer thickness and compaction.

3. Verify that test results conform to the specified requirements, and that sufficient tests are performed.

4. Assure that defective work is removed and properly replaced.

END OF SECTION 02220

PART 1 - GENERAL

1.01 SUMMARY:

A. Section Includes: Providing all material, tools, equipment, and labor necessary to complete the following:

1. Provide complete and functioning electrical power transmission, services and systems as shown on the Drawings, as specified herein, and as required for a complete and proper installation of a campground electrical system including, but not limited to:

a. Electrical service, complete, of size, voltage and type indicated or required to point of connection with utility company's equipment; all conductors shall be copper.

b. Service entrance with metering equipment and feed switches or breakers.

c. Main distribution panels and distribution panels or boards as needed.

d. Complete feeder system, underground, from the main distribution panels to individual campsite power outlets and branch panels.

e. Complete branch circuit wiring for receptacles, junction boxes, area lighting, and similar uses.

f. Exterior lighting fixtures, lamps and poles, terminal and splice boxes, campsite power outlets, switches, receptacles, controls, and motors, motor starters, detectable tape, and similar items.

g. Hangers, anchors, sleeves, bushings, conduits, conduit risers and elbows, supports for fixtures, equipment mounting structures, transformer pads and other electrical materials and equipment in association therewith.

h. Trenching and backfilling for underground electrical installation not specified elsewhere.

i. Connections to distribution panels in Buildings or existing utility company equipment, as shown on the Drawings.

2. The omission of direct reference to an essential part, the necessity or use of which is reasonably implied shall not release the Contractor from providing the same.

3. Inspect the site as necessary to become familiar with all existing conditions affecting the performance of the work under this Contract. Extras will not be allowed for failure to do so.

B. Related Sections: Drawings and General Provisions of the contract, including the General Covenants and Provisions, Supplementary Covenants and Provisions and General Requirements as well as, but not necessarily limited to, the following:

Section 02220 Trenching, Backfilling and Compacting

C. Certain material may be provided by others to be installed under this contract. Coordinate with DNR Construction Inspector, utility company and other slated to provide material to be installed as part of this contract.

1.02 REFERENCES:

A. Codes, Ordinances, and Standards: Comply with all applicable codes and regulations of the following:

1. National Electric Code, latest edition;

2. Local Utility Company Regulations;

3. Underwriter's Laboratories.

1.03 SYSTEM DESCRIPTION:

A. Power system shall be a 120/240 volt, 60 cycle, single phase 3-wire solid neutral, underground system.

1. Ground circuits at the transformer/main distribution panel with a No.6 AWG continuous copper grounding conductor type THW routed with the circuit conductors.

B. Verify the exact location of primary service, secondary service, and transformers at the job site.

C. Underground Service Entrance: Unless otherwise specified elsewhere conductors will be continuous direct burial cable, USE or UF neoprene jacket insulated and moisture resistant non-metallic outer covering.

1. Minimum burial depth 24 inches.

2. Furnish and install number and size of conductors shown or as required by N.E.C.

a. All conductors shall be copper.

1.04 SUBMITTALS:

A. Submit shop drawings, diagrams, and product information, material lists and manufacturer's specifications to Project Engineer before obtaining material, including but not necessarily limited to the following:

1. Panelboards, power outlets, and equipment.

2. Each specialized installation or system, including assembly or coordination Drawings.

C. Product Data, Submit:

1. Materials list of items proposed to be provided under this section;

2. Manufacturers' specifications and other data needed to prove compliance with the specified requirements;

3. Manufacturers' recommended installation procedures which, when approved by the Project Engineer, will become the basis for accepting or rejecting actual installation procedures used on the work.

D. Manual: Upon completion of this portion of the work, and as a condition of its acceptance, deliver to the Project Engineer two copies of an operation and maintenance manual, which shall include:

1. Copy of the approved Record Documents for this portion of the work;

a. Shop drawings, diagrams, material lists, and product information.

b. As-built drawings showing any changes in construction, additions and/or deletions from the Project Engineer's Drawings.

2. Copies of all circuit directories;

3. Copies of all warranties and guarantees.

1.05 QUALITY ASSURANCE:

A. Qualification of Installers: For the actual fabrication, installation, and testing of the work in this section, use only thoroughly trained, licensed, experienced workers completely familiar with the items required and with the manufacturer recommended methods of installation.

1. In acceptance or rejection of installed work, no allowance will be made for lack of skill on part of workers.

B. Provide only new materials of grade and quality specified. Unless otherwise approved or specified, provide only materials, equipment, devices, fittings, etc., of U.S. manufacture.

C. Except as otherwise indicated, comply with the provisions of NEC and the standards by NEMA for electrical components.

1. Provide UL listed and labeled products where applicable.

1.06 DELIVERY, STORAGE, AND HANDLING:

A. Protection: Use all means necessary to protect the materials of this section before, during, and after installation and to protect the work and materials of all other trades.

B. Replacements: In the event of damage, immediately make all repairs and replacements necessary to the approval of the Project Engineer/DNR Construction Inspector and at no additional cost to the Owner.

1.07 SEQUENCING AND SCHEDULING:

A. Coordination of Work: Plan all work so that it proceeds with a minimum of interference with the work of other trades.

1. Coordinate all openings, special frames and sleeves required in the building construction for electrical work with the construction work of others both within and outside of this Contract.

B. Cooperation with Other Trades: Coordinate the work to be performed in compliance with the requirements of other trades and afford other trades reasonable opportunity for the execution of their work.

1. Coordinate this work shall with the work of other trades at such time and in such a manner as not to delay or interfere with their work.

2. Examine the Contract Documents to determine the requirements of other similar trades.

1.08 WARRANTY:

A. Guarantee the entire installation, including every part and every specialized system, to the exception of lamps, from the standpoint of workmanship and material for one year after formal acceptance by the Project Engineer.

B. Correct any defects becoming apparent during the guarantee period at no cost to the Owner.

C. Do not construe this guarantee requirements as obligating the Contractor to make repair or replacements for equipment failure as a result of improper operation or maintenance by the Owner.

1.09 MAINTENANCE STOCKS:

A. Provide 5 percent excess over the required amount of spring-loaded nuts, washers, conduit clamps, and other specialized fasteners for mounting electrical equipment.

1. Store where directed by the DNR Construction Inspector.

B. Prior to the acceptance of the equipment with plug-in receptacles and ground fault interrupters, provide two GFI testers to be used by the DNR for testing and remain the property of the DNR thereafter.

PART 2 - PRODUCTS

2.01 MANUFACTURERS:

A. Subject to compliance with requirements, manufacturer offering electrical material and components which may be incorporated in the work include, but are not limited to, the following:

1. Square D
2. General Electric

3. ITE
4. Westinghouse
5. Hubbell
6. Bryant
7. Arrow-Hart

2.02 MATERIALS:

A. Provide only materials that are new, of the type and quality specified.

1. Where Underwriter's Laboratories, Inc. have established standards for such materials, provide only materials bearing the UL label.

B. Provide only copper conductors as part of permanent installation within this project, from connection with the power company's equipment to connection to fixtures, receptacles or other devices or appliance as specified herein.

1. The Project Engineer will not approve others for use anywhere within this project at any location.

2. Remove any wire or cable used on this project which does not meet this requirement and replace at no cost to the Owner.

C. Temporary Power:

1. In addition to providing temporary power, provide and pay the costs for installing permanent electrical meter or meters as required;

2. When permanent metering is in place and connected, the Owner will pay the costs for electrical power charged against the meter or meters.

2.03 COMPONENTS:

A. Distribution Panels:

1. Circuit breaker type with single main disconnect, solid neutral with voltage and main bus rating equal to or exceeding rating on panel schedule.

2. Boxes: Code gauge steel, galvanized, with surface cover.

3. Trim: Code gauge steel with grey enamel finish and door, complete with directory of circuits and key locked.

4. Branch circuit breakers: Plug-in or bolt-in, of rating and poles indicated, with thermal-magnetic tripping mechanism at each pole, with quick-make and quick-break action, toggle type operating mechanism.

a. Provide multiple pole breakers with a common trip.

b. Provide breakers with ground fault protection for outlets as required by Code, except for outlets requiring ground fault interruption as indicated on the

Drawings for which separate and individual ground fault protection and reset features will be provided integral to the outlet.

5. Provide panels, for 200-Amp or less and 120/240 volt service, with amperage indicated, as manufactured by, but not limited to, one of the following:

   a. Square D
   b. General Electric
   c. ITE
   d. Westinghouse

6. Provide main distribution panels: For 225-Amp, 400-Amp, or 600-Amp, and 120/240 volt service, as shown on the Drawings, provide main distribution panels with solid neutral and equipment ground bar installed, dead-front enclosed board assembly, NEMA type 3R rain-proof cabinet with concealed door hinge, gasketed door, 3-point vault-type locking mechanism with chrome finish padlock handle, with rust inhibiting primer and a finish coat of standard grey baked enamel, as manufactured by, but not limited to one of the following:

   a. Square D
   b. General Electric
   c. Others as approved by the Project Engineer

7. U.L. approved and N.E.C. rated.

B. Wiring Devices:

1. Receptacles: Specification grade, duplex, 3-pole grounding type, amperage as shown, 125 V AC as manufactured by, but not limited to, one of the following:

   a. Hubbell
   b. Bryant
   c. Leviton

C. Fittings, Boxes, Etc.:

1. All outlet boxes, junction boxes, and switch boxes shall be code gauge galvanized steel.

2. Boxes shall be square, rectangular, or octagonal of a suitable and ample size.

D. Raceways and Fittings:

1. Conduit shall be rigid galvanized steel conduit with compression or tap-on type fittings.

2. Conduit installed in concrete slab or underground shall be rigid galvanized coated with asphaltum paint.

3. All conduit and fittings shall be U.L. approved and N.E.C. rated.

4. No conduit smaller than 3/4" shall be used.

5. Roadway conduit: Unless otherwise noted on the Drawings or elsewhere in the specifications, provide 2-1/2" diameter, schedule 80 PVC, Ul listed at 90 degrees, UV resistant electrical conduit for the installation of conductors beneath roadways.

6. Provide rigid galvanized steel electrical conduits, threaded at the top to accept rain-tight cap, for mounting of distribution of panels and equipment.

    a. Rain-tight cap: galvanized steel, threaded fitting suitable for capping open end of rigid steel electrical conduit.

7. Corrugated flexible PVC Conduit: Where direct burial cable is not used provide unspliced, high tensile pvc corrugated flexible conduit to IPS dimensions, suitable for underground secondary distribution and under roadway application for protection of type TW, THW, RHW, or XHHW conductors used underground.

    a. Provide IPS dimensions, schedule 430 PVC accessories including, but not necessarily limited to, couplings, adaptors, end bells and plugs, and PVC solvent cement suited for watertight joints.

    b. Provide Corrugate flexible PVC conduit and accessories manufactured by Carlon, Cleveland, Oh., or approved equals.

E. Interior Conductors and Conductors Installed in Watertight Underground Conduits:

1. Wire and cable shall be 600 V insulated N.E.C. standard type TW, THW, RHW, or XHHW, and color coded.

2. All wiring shall be copper and No.12 AWG or larger, wires No.8 and larger shall be stranded.

F. Direct Burial Conductors:

1. Wire and Cable: 600 V insulated, NEC standard, type USE or UF, as shown on the Drawings

2. All wiring shall be copper and No.12 AWG or larger, wires No.8 and larger shall be stranded.

G. Grounding devices:

1. Grounding Electrodes: 5/8" diameter, minimum 10 feet long unless otherwise shown, "Copperweld" ground rods.

2. Electrode Conductor: Copper, no.6 AWG or larger, and type THW. Use clamp suitable for burial to fasten grounding conductor to rod.

H. Safety Switches:

1. Provide heavy duty, horsepower rated, quick-make and quick-break design, externally operated with provision for padlocking, fusible or non-fusible as shown on the Drawings.

a. Equip with field or factory installed solid neutral assembly and service grounding kit.

2. Provide enclosure clearly marked for maximum voltage and horsepower rating, and:

a. Indoor: NEMA type 1.

b. Outdoor: NEMA type 3R, rain tight.

3. For dual rated switches, provide rating indicated on a metal plate riveted or otherwise permanently fastened to the enclosure.

4. Provide safety switches for 120/240 volt service, amperage as indicated as manufactured by, but not limited to one of the following:

a. Square D
b. General Electric
c. ITE
d. Westinghouse

5. Safety switches shall be UL approved and NEC rated.

I. Campsite Power Outlets:

1. The following are the only approved receptacle to be provided for recreational vehicle use on campsites:

a. 5-20R GFI, 20 AMP duplex, 125 volts, in accordance with ANSI/NEMA WD 6-1989, for recreational vehicles.

b. R-32-U, 30 AMP duplex, 125 volts, in accordance with ANSI/NEMA WD 6-1989, for recreational vehicles.

c. 14-50R, 50 AMP duplex, 125/250 volts in accordance with ANSI/NEMA WD 6-1989, for recreational vehicles.

2. Provide individual recreational vehicle site service entrance equipment, as shown on the Drawings,Ul listed and labeled "Suitable for Recreational Vehicle Service Equipment", as manufactured by Midwest Electrical Products, Inc. P.O. Box 910, Mankato, Minnesota, Tel No. 507/625-4414, or approved equal.

3. Metallic R.V. Equipment: Unless otherwise noted on the Drawings, power outlets shall contain the circuit breaker and receptacles as specified herein.

a. Single unit Midwest Model No. U075CP6010, single unit Millbank Model No. U5200-XL-75 or approved equal for 50 Amp sites.

b. Double unit Midwest Model No. U075CB6010, double unit Millbank Model No. U5220-XL-75 or approved equal for 50 Amp sites.

c. Provide NEMA 3R, light grey baked enamel, uni-post mounted power outlets, completely factory wired and assembled, with loop-feed lugs to accept specified wire size. Power outlet box to be 14-gauge galvanized steel. Post to be 12-Gauge galvanized steel.

d. Install stabilizer foot and post extension on pedestal as a footing base unless otherwise shown on the Drawings, or an alternate stabilization method is approved.

4. Nonmetallic R.V. Equipment: Injection Molded, thermoplastic enclosure with Corrosion resistant internal components, factory wired power receptacles in 20 and 30 AMP configuration, protected by a 30 AMP ground fault interrupter main breaker, a hinged cover to protect R.V. plugs. Midwest model No. U71 "Parkmate" or approved equal.

a. Terminal lugs will accept 1/0 copper cables.

b. The power center will be rated 100 AMP maximum, 120/240 volts, single phase, 3 wire with ground.

c. Power to be factory mounted on 12 gauge galvanized steel, grey baked on enamel, vented post for underground services, with loop-feed twin 2-300 MCM terminal per phase lugs.

d. Install stabilizer foot and post extension on pedestal as a footing base unless otherwise shown on the Drawings, or an alternate stabilization method is approved.

e. Provide a seven watt fluorescent light protected by an in-line fuse circuit protection and molded polycarbonate light cover.

f. Provide additional options as shown on the Drawings. Other options may include a light with manual switch or photo electric sensor, single service cable TV jack for type RG-59 coax cable, single service telephone jack type PH6596.

J. Detectable Warning Tape: 3-inch wide electronically detectable tape with markings: "Caution - Electrical Power Lines Below" provided by, but not necessarily limited to, one of the following:

1. Terra Tape D, Reef Industries, Inc., Houston, Texas

2. Dectatape, Allen Systems, Houston, Texas

3. Detectable Marking Tape III, Lineguard, Inc., Weaton, Illinois

K. GFCI Testers: Provide GFCI testers capable of indicating wiring errors and faulty GFI equipment.

1. Unitest GFI model No. 5708 manufactured by Beha Corporation, Clearwater, Fl. or approved equals.

L. Mounting Channels and accessories: Provide 1-5/8" series, galvanized steel channels and accessories for mounting distribution panels, meters, and safety switches, including conduit clamps and spring-loaded nuts, provided by, but not necessarily limited to, one of the following:

1. Unistrut, GTE Products Corp., Wayne, MI.

2. Power-Strut, Elcen Metal Product Co., Franklin Park, IL.

M. Terminal and Splice Boxes: NEMA type 3R rain proof code approved cabinets, with removable door with stay-open position, provision for padlocking, concentric knockouts, and heavy zinc-coated finish, of sufficient voltages.

1. Include field or factory installed grounding kit.

2. Provide boxes for 120/240 service, Ul approved and NEC rated, of amperage indicated, as manufactured by, but not limited to, one of the following:

a. Square D
b. Midwest Electric Products, Inc.

N. Provide other materials, not specifically described but required for a complete and proper installation, as selected by the Contractor subject to the approval of the Project Engineer.

PART 3 - EXECUTION

3.01 EXAMINATION:

A. Examine the areas and conditions under which the work of this section will be installed. Correct conditions detrimental to the proper and timely completion of the work. Do not proceed until unsatisfactory conditions have been corrected.

B. Verify location and configuration of existing facilities in relation to the work of this section before preparing bid.

C. Verify depths and location so all existing underground utilities

3.02 PREPARATION:

A. Coordination: Coordinate installation of electrical items with the schedules for other work, to prevent unnecessary delays in the total work.

B. Where electrical items are shown in conflict with locations of structural members and mechanical or other equipment, provide all required supports and wiring to clear the encroachment.

C. Accuracy of Data: The data indicated on the Drawings and in these Specifications are as exact as could be secured, but their absolute accuracy is not guaranteed.

1. Exact locations, distances, levels, and other conditions will be governed by actual construction.

2. Use the Drawings and these Specifications for guidance, and secure the DNR Construction Inspector's approval of all changes in locations.

D. Measurements: Verify all measurements at the site.

1. No extra compensation will be made because of differences between locations shown on the Drawings and measurements at the site, except as provided In the General Covenants and Provisions.

E. Circuiting: The branch circuits have been designed for maximum economy consistent with sizes for voltage drop and other considerations.

1. Circuits and wire sizes shall be in accordance with the N.E.C. Install circuits as shown on the Drawings unless otherwise approved by The Project Engineer.

F. Electrical circuit drawings are diagrammatic in nature but are to be followed as closely as made possible by the actual construction and interface with the work of other trade in this or other contracts.

1. Where deviations are approved to comform with actual construction and the work of other trades, make such deviation without additional costs to the Owner, except as provided elsewhere in the Contract Documents.

G. Trenching and backfilling is required for installation of the work of this section. Perform all such trenching and backfilling in strict accordance with the provisions of Section 02200 of these Specifications.

3.03 INSTALLATION:

A. Conduits:

1. Where conduit is installed in concrete slabs, on the ground, underground, or exposed to the weather, make all joints liquidtight and gastight.

a. Bury all underground conduit to a depth of 2'0" below finished grade unless otherwise shown on the Drawings.

b. Install necessary sleeves, chases, bushings, and approved sealants where conduits pass through slabs, floors, walls and other structures.

c. Make necessary openings and spaces while keeping cutting and patching of work by other to an acceptable minimum.

2. Install bushing at conduit ends, to protect wires from abrasions, where conduit enters box or other fittings.

3. No conduit smaller than 3/4" shall be used for a branch circuit in this project.

a. Unless otherwise specified, provide code-size conduit for number and size of wire required by Code.

4. Where conduit is exposed, run parallel to or at right angle with lines of the building.

a. Make bends free from dents and flattening with standard conduit elbows or conduit bent to not less than the same radius.

B. Roadway Crossing Electrical conduit:

1. Install specified conduit at location indicated on the Drawings by boring, jacking into place, or trenching, when permitted by the DNR Construction Inspector, into unpaved roadways.

2. Indentify roadway crossing location by placing two 2" P-K nails, one inch apart, six inches from each side of pavement.

a. In addition install a 12-inch long reinforcing rod or a 24-inch long treated wood stake at each end of conduit.

3. Plug and cap each end of conduit placed beneath roadway for future circuit installation.

a. Sand fill around each end to aid future location and installation.

4. Install conduit for primary circuits below the location of conduit for primary circuit where they are indicated on the Drawings to cross at the same location.

C. Installation of Conductors:

1. All conductors used for branch circuits will be minimum number 12 protected by 20 ampere circuit breakers.

a. Install larger wires where necessary to limit voltage drop or as required by NEC.

2. Conductors will be installed continuous from outlet to outlet and no splices shall be made except within outlet or junction boxes.

3. No underground splice will be permitted.

a. Conductors will run continuously from the main distribution panel to the terminal bar located in the first R.V. site service entrance equipment post on the circuit and continuously thereafter from terminal bar to terminal bar.

4. Balance the campsite loads between the two phase conductors by connecting the loads to alternate sides of each 120/240 volt, three wire circuit.

a. Follow NEC requirements to provide for coding convention to consistently identify conductors throughout the project.

3. No more than three circuits will be permitted in one raceway.

a. A common neutral may be used as permitted by the National Electric Code.

4. Terminals and Splices: Stranded conductors shall be terminated with approved copper connecting lugs, accommodating the full diameter of the bare conductor.

a. Mains and feeders shall run their entire lengths in continuous sections without joints or splices.

5. Splices will be permitted only at outlet or junction boxes.

a. Splices shall be thoroughly cleaned, mechanically and electrically secured without solder, then soldered.

b. After soldering, wrap rubber and friction tape.

c. Vinyl plastic tape will be acceptable subject to the approval of local inspection authorities.

d. Scotch lock type S, M, L, and D connectors will be approved as equal to soldering.

D. Installation of main distribution panels:

1. Mount main distribution panels using specified conduit support posts and mounting channels, clamps and accessories as shown on the Drawings.

a. Install the rain-tight cap on top of support posts.

2. Unless otherwise specified, install copper studs and spade type bushings in utility company transformer, and install secondary connections between transformer and the main distribution panel.

a. Seek approval of utility company representative prior, during and after installation.

3. Install meter where indicated on The Drawings or as instructed by the utility company.

a. Installation subject to approval of utility company.

b. Provide utility company approved meter if so instructed by utility company.

4. Directories: Mount a typewritten directory behind glass or plastic on the inside of each panel door.

a. Show circuit numbers and circuit description for all outlets in each circuit.

5. Mounting Heights: To center of box above finished floor for the below-named items, shall be as follows, unless otherwise shown or indicated.

a. Flush toggle switches: 48".

b. Convenience outlets and similar: 12" - finished areas (unless noted otherwise).

c. Convenience outlets and power outlets: 48".

d. Safety switches: 54" to operator.

e. Motor controllers: 54" or top even with safety switch.

f. Panelboards: 72" to top.

g. Other mounting heights are indicated on the Drawings by detail or by a plus dimension shown adjacent to the symbol.

E. Grounding System: Ground all equipment including panelboards, transformers, conduits systems, junction and splice boxes, RV site service equipment, motors and other apparatus, by conduit or conductor to grounding electrode as shown on the Drawings, using grounding clams suitable to direct burial.

1. Locate grounding electrode in area which will receive ground water regularly, and drive rod to depth of at least 8 feet.

2. Test to measure ground resistance, and provide not more than 5 ohms resistance, adding ground rods as required to achieve that level.

3.04 FIELD QUALITY CONTROL:

A. Testing: At the conclusion of the work, test each and every circuit to establish the proper operation of electric equipment and freedom from improper ground and to ascertain the insulation values which shall not be lower than those required by the National Electrical Code.

1. Test of equipment grounding conductors will show a resistance of no more than 25 ohms at any point on the circuit, except for grounding electrode which will show a resistance of no more than 5 ohms.

B. Carry out final test in the presence of the Project Engineer/DNR Construction Inspector.

C. Correct all work not meeting code requirements, and all circuits which fail testing, at no additional cost to the Owner.

3.05 CLEANING:

A. Exposed conduits, panel boards, fixtures, switches, hangers, and equipment exposed shall be thoroughly cleaned.

B. Fixture glass and shields shall be cleaned and washed.

C. Keep premises free from unnecessary accumulation of rubbish and debris resulting from the work of this section.

D. Dispose of all debris resulting from the work of this contract at no additional cost to the Owner.

END OF SECTION 02785