

DIVISION 16 - ELECTRICAL

A. General Instructions:

1. Codes, Permits and Inspections:
 - a. Wiring shall be in accordance with latest edition National Electrical Code (NEC), NFPA, and/or applicable local, state, and Utility Company rules, laws, codes, and ordinances.
 - b. Secure all permits and inspections required for the installation of the electrical work.
 - c. All work shall comply with the latest edition of the Americans With Disabilities Act (ADA).
 - d. Pay all fees associated with temporary utility services.
2. Verifications:
 - a. Verify mounting heights and locations of electrical equipment before installation or rough-in.
 - b. Verify exact location of electrical service entrance including point of service and system characteristics.
3. Wiring Methods:
 - a. The Electrical Contractor shall cooperate with other Contractors and install equipment in proper sequence so as not to interfere with the progress of other Contractors.
 - b. All materials shall be new and carry the Underwriter's Label or be "listed" by that group, and be fully equal to makes specified.
 - c. Use only insulated copper conductors in conduit. Use flexible conduit for connections to motors and similar equipment.
 - d. All wiring shall be concealed and all outlets shall be flush mounted in finished spaces except as noted otherwise.
 - e. All systems wiring shall be in conduit.
4. Tests:
 - a. This Contractor shall be responsible for performing all tests necessary to prevent concealment of defective or improper work.
 - b. Upon completion of work, test the installation thoroughly and render it free from shorts, grounds or improper connections.
5. Guarantee:
 - a. This Contractor shall guarantee that all defective items of workmanship, material, labor or mechanical operation developing within one (1) year from the date of final acceptance of completed installation shall be replaced to the complete satisfaction of the Owner.
6. Workmanship:
 - a. Electrical equipment shall be installed in a neat and workmanlike manner. Unightly installations shall be removed or reworked at no additional expense to the Owner.
7. Identification of Disconnecting Means:
 - a. Provide a permanent nameplate for each disconnect switch indicating its purpose. The marking shall be of sufficient durability to withstand the environment it is installed in as required by N.E.C. Section 110.22 and 230.72(A).

B. Electrical Equipment:

1. Conduits:
 - a. All conduit installed in earth, concrete, below concrete on earth, or exposed to weather shall be rigid steel or intermediate metal conduit. Aluminum conduit tubing for all dry interior runs. Fittings shall be fully approved in accordance with N.E.C. PVC may be used under ground.
 - b. Flexible or P.V.C. conduit may be used where not exposed to damage and approved by N.E.C. and local codes.
 - c. Provide a ground wire sized per N.E.C. Art. 250.122 in all conduits, both metallic and nonmetallic.
 - d. Conduit shall be installed and sized according to code requirements and protected from damage during construction.
 - e. Conduit may be re-routed where such action does not adversely affect the intended design or circuiting.
 - f. Final connections to all mechanical equipment shall be with U. L. approved liquidtight conduit. Liquidtight and fittings shall be U.L. listed for grounding.
2. Conductors:
 - a. Conductors shall be copper, generally with 600 volt rated insulation. Branch circuit wiring min. size #12 Type "THW" or "THWN/THHN" as required. Service entrance, feeder conductors Type "THWN/THHN" or "XHHW". Low voltage wire shall be Type "TF" or "TFF" minimum #18 gauge unless noted otherwise. All other types shall be as required by N.E.C.
 - b. All conductors shall be color coded with type and size marking. Connections to service equipment, feeder panels shall be made with solderless lugs. All splices, taps, connections to service entrance conductors shall be made by bronze solderless lugs. All other splices, connections shall be pressure type connectors.
 - c. Insulate joints, splices with Scotch #33 plastic tape or plastic moulded jackets.
3. Outlet Boxes and Plaster Rings:
 - a. Outlet boxes shall be aluminum of type and size approved for particular installation requirements.
4. Wall Receptacles:
 - a. Duplex receptacles shall be "Specification Grade", back or side wired, grounding type. Manufacturer shall be Hubbell or equal.
 - b. Weatherproof receptacles (indicated WP) shall be WEATHER RESISTANT GFCI duplex receptacles with stainless steel in-use weatherproof cover plate.
5. Wall Switches:
 - a. Wall switches shall be "Specification Grade", 20A.
 - b. Provide mechanically operated single pole, double pole, three way, four way or other types as indicated on the drawings. Manufacturer shall be Hubbell or equal. Maximum load shall be less than 80% of rated capacities.
6. Wall Plates and Covers
 - a. Flush wiring devices shall be provided with stainless steel wall plates as made by the PS/Sierra Electrical and Mfg. Co. or equal.
 - b. Flush junction boxes shall be equipped with blank plates.
 - c. Surface wiring devices shall be provided with suitable heavy steel coverplates with rounded edges and corners.

7. Safety Switches:
 - a. Furnish safety switches of size and type indicated on drawings.
 - b. Heavy duty switches shall be fusible unless indicated otherwise. Provide Class "J" fuse clips.
 - c. All exterior switches shall be raintight.
8. Lighting Fixtures and Lamps:
 - a. Install lighting fixtures. Provide lamps as indicated on the drawings.
 - b. No substitutions on lighting fixtures except as approved by Engineer prior to bidding.
 - c. Verify exact locations of fixture outlets so as to cause no interference with piping, equipment and architectural treatment.
 - d. Ballasts by "Advance" or equal, internally or externally fused, high power factor, V.L.H., fully compatible with lamps and shall carry UL label, ETL and CBM certifications of compliance, even though indicated fixture number may indicate otherwise.
 - e. Furnish all fixtures with lamps as scheduled and/or required by final fixture selection. Lamps equal to G.E.
10. Grounding:
 - a. Provide system ground as required by N.E.C. and utility company.
 - b. Bond mechanical equipment frames.
 - c. Bond all service entrance equipment and conduit system.
 - d. An equipment grounding conductor sized per N.E.C. Art. 250.122 shall be provided in all conduits. The ground wire is required for both metallic and nonmetallic conduit installations.
11. Branch Circuit Panels
 - a. Branch circuit lighting panels shall be Square D with thermal magnetic breakers and ground buses. Lead center construction is not permitted. Electrical Contractor shall obtain available short circuit current from local Utility co. Panelboards shall be U.L. listed for available fault current. Breakers and panels shall be fully rated or U.L. series rated with specified fuses (22,000 AIC minimum).
 - b. Breakers shall have individual plastic cases sized as scheduled. Two pole breakers shall be common trip (single pole units with tie bars are not acceptable).
 - c. Panel shall be mounted as noted on the drawings. Provide with a hinged door and a neatly typed circuit directory card.
 - d. Re-assign circuits to properly balance the loads on the phases if final connections and tests show it to be advisable.
12. Equipment Supplied By Others, Contractors, And/Or The Owner
 - a. The Electrical Contractor shall furnish, install and connect all wiring, conduit, boxes, toggle switches, thermal switches, disconnect switches, remote pushbutton stations, etc., for all equipment requiring electrical power that is either furnished or specified by other contractors and/or the Owner, shown on drawings or listed below. The E.C. shall receive, install and connect all magnetic starters and controllers, capacitors, power factor correction devices, transformers, alarms, bells, horns, relays, remote switches for equipment supplied by others (i.e. starters or capacitors or power factor correction devices for Mechanical Equip., etc.). In general, all major equipment will be specified to be factory prewired with only service and interconnecting required at the site by the Electrical Contractor; however, the E.C. shall check all Divisions of the specification to verify whether the equipment is specified to be factory prewired. If not, then it shall be the responsibility of the Electrical Contractor to provide the complete wiring of the equipment in accordance with wiring diagrams provided by other Contractors and/or Owner to the Electrical Contractor. All interconnecting of equipment shall be by the Electrical Contractor.
 - b. All line and low voltage wiring and connections required to control the equipment are a part of this section. All wiring shall be in conduit.
 - c. It shall be assumed the Contractor is familiar with the equipment to be furnished by the other Contractors and/or the Owner in connection with this work and that provisions for such connections and work have been included in the Contractor's price. In no case will extra remuneration be allowed for such work.
 - d. Connections to all equipment have been designed from units as specified on the drawings or in the specifications. In the event equipment or control differs on approved mechanical shop drawings it shall be the responsibility of the supplying contractor to coordinate the electrical connections to the units and reimburse electrical contractor for any changes in the electrical system design. These changes shall not involve additional cost to the Owner.
 - e. Electrical Contractor shall coordinate installation through City of Sand Springs inspectors, code department, Water Production Department and Technical Services Department throughout the extents of the project.

C. SCADA:

1. Owner will be contracting directly with the Systems Integrator (SI).
2. Contractor will be responsible for the following
 - a. Installation of all conduit and conductors.
 - b. All conduit supports.
 - c. All tower penetrations.
 - d. 120V power to equipment where required.
3. SI will be responsible for providing all SCADA equipment and termination of all controls conductors.

GENERAL NOTES

1. ALL ELECTRICAL WORK SHALL COMPLY WITH THE LATEST EDITION OF THE NATIONAL ELECTRICAL CODE (NEC) & THE AMERICANS WITH DISABILITIES ACT (ADA).
2. REFER TO RELATED CIVIL, MECHANICAL, AND STRUCTURAL DRAWINGS FOR RELATED INFORMATION.
3. REFER TO THE SPECIFICATIONS FOR DATA NOT ON THE DRAWINGS.
4. E.C. SHALL REFER TO MECHANICAL DRAWINGS AND SPECIFICATIONS FOR THE REQUIREMENTS ASSOCIATED WITH WIRING AND CONNECTION OF INTERLOCKING AND CONTROLS OF MECHANICAL UNITS AND THERMOSTAT LOCATIONS.
5. ALL MOUNTING HEIGHTS TO CENTERLINE OF ITEM UNLESS OTHERWISE NOTED. VERIFY ALL OUTLET LOCATIONS ON THE JOB PRIOR TO ROUGH-IN.
6. CONDUIT RUN W/CONDUCTORS AS INDICATED & GROUND WIRE SIZED PER N.E.C. 250.122. CONDUIT SIZE AS REQUIRED.
7. WHEN INCREASED CONDUCTOR SIZES ARE SHOWN ON THE PLANS, THE LARGER CONDUCTOR SIZE SHALL BE USED THROUGHOUT THE LENGTH OF THE CIRCUIT, INCLUDING NEUTRAL AND GROUND.

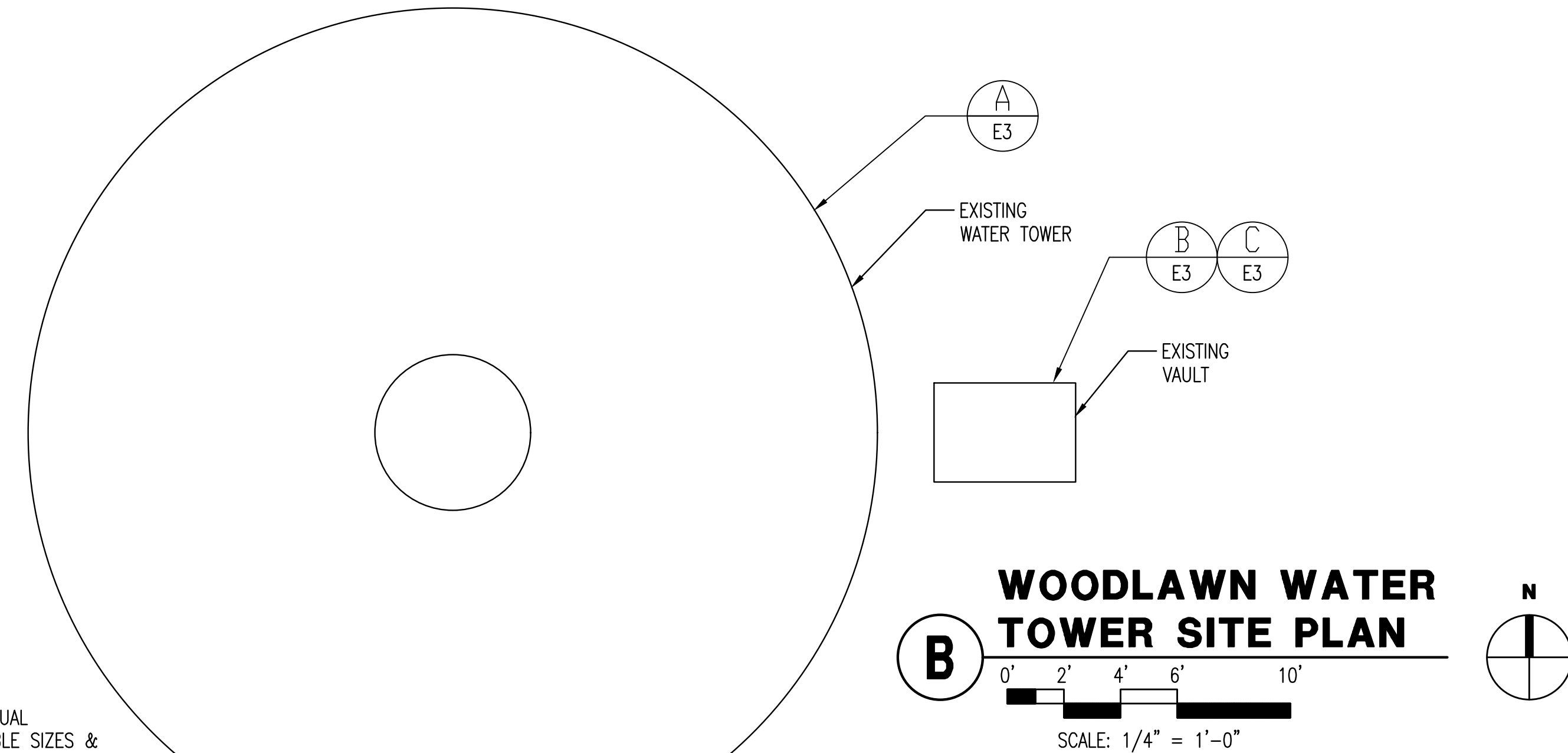
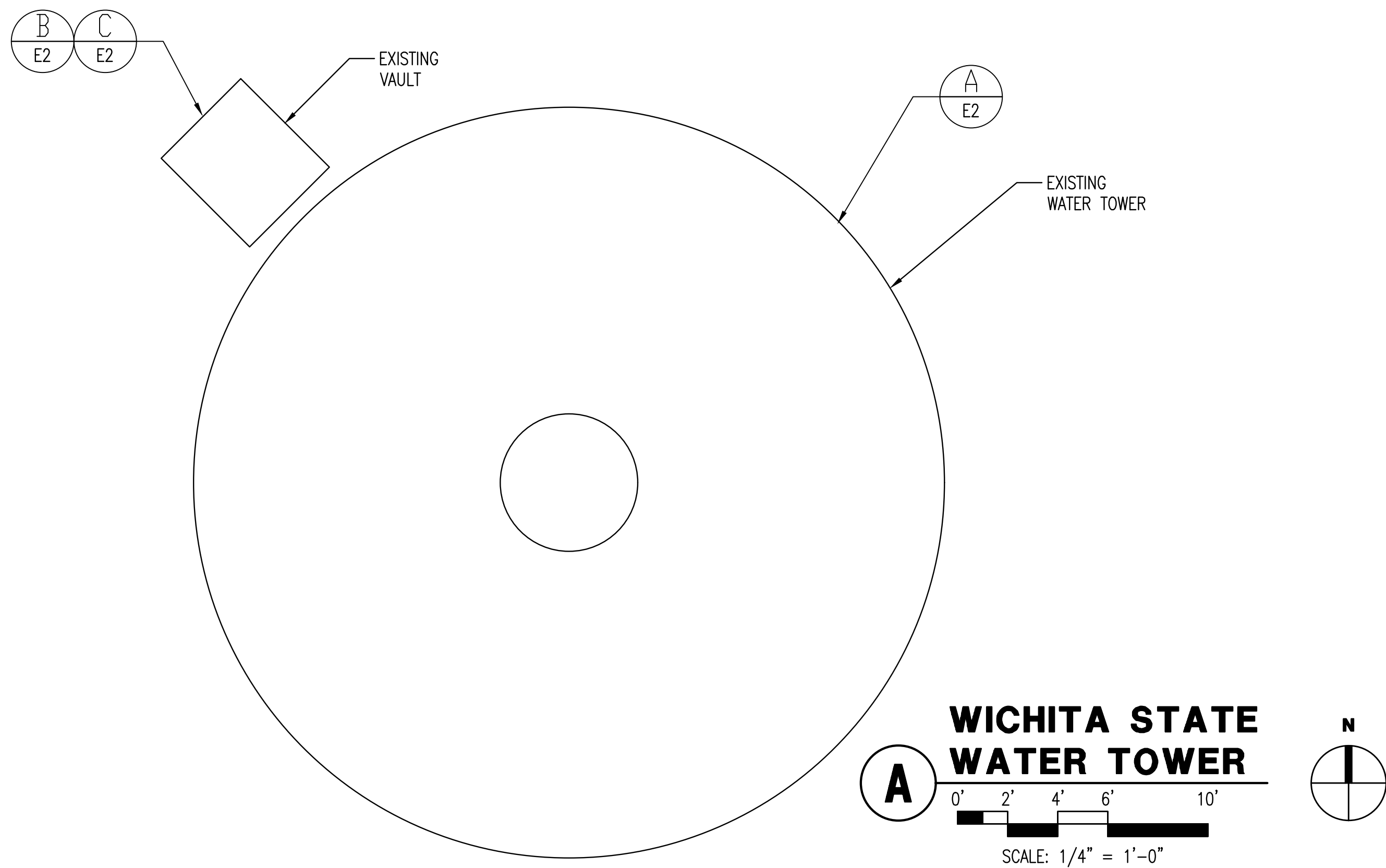
SYMBOL LIST

SYMBOL	DESCRIPTION	MOUNTING
	LIGHT FIXTURE & FIXTURE LETTER	WALL
	SWITCHES (1-POLE, 2-POLE, 3-WAY, 4-WAY)	46" AFF
	WEATHERPROOF	
	FUSTAT BUSS #SSY	
	MISC. EQUIPMENT CONNECTION	
	BRANCH CIRCUIT PANEL & PANEL DESIG. 72" TO TOP	
	CONDUIT RUN 2#12 & 1#12 GRD.-	CEIL./WALL
	CONDUIT RUN 2#12 & 1#12 GRD.-	EARTH/FLOOR
	SEE GENERAL NOTE 6 & 7	
	CONDUIT RUN TWO (2) CIRCUITS	CEIL./WALL
	PHASE CONDUCTORS (#12 UON)	
	NEUTRAL CONDUCTOR (#12 UON)	
	SWITCH LEGS (#12 UON)	
	GROUND CONDUCTOR (#12 UON)	
	ABOVE FINISHED FLOOR	
	UNLESS OTHERWISE NOTED	
	CONTROL CABLES IN CONDUIT TO CONTROL PANEL	
	DISCRETE CONTROL CABLE (# OF PAIRS) IN CONDUIT	
	ANALOG CONTROL CABLE (# OF SHIELDED PAIRS) IN CONDUIT	
	OBSTRUCTION LIGHTING CONTROLLER	
	MOTORIZED VALVE	
	SOLENOID VALVE	
	MOTOR	

CONTROL CABLES CONDUIT SCHEDULE

# OF CABLES	ESTIMATED CONDUIT SIZE
2	1"
3	1"
5	1 1/4"
7	1 1/2"
13	2"
18	2 1/2"
29	3"
38	3 1/2"

NOTE: CONDUIT SIZES DEPEND ON ACTUAL CABLES INSTALLED. VERIFY CABLE SIZES & ADJUST CONDUIT AS REQUIRED. RUN ALL CONTROL CABLES IN SEPARATE CONDUIT FROM POWER CIRCUITS. ALSO RUN SHIELDED & LAN LAN CABLES IN SEPARATE CONDUIT FROM OTHER CONTROLS. CONTRACTOR CAN SIZE CONDUIT FOR ACTUAL CABLE SIZE, PER N.E.C. FILL TABLE WITH 25% SPARE CAPACITY. SUBMIT CALCULATIONS.



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 U:\wchita-civil\2014\14420\001\Elec\Drawings\ET ELECTRICAL SCHEDULES

Revision _____ By _____ Date _____

CITY OF WICHITA, KANSAS

ELECTRICAL SCHEDULES & SITE PLANS

WATER TOWER REHABILITATION

PEC PROFESSIONAL ENGINEERING CONSULTANTS, P.A.
 303 SOUTH TOPEKA WICHITA, KS 67202
 316-262-2691 www.pec1.com

Designed by ABP

Drawn by RWW

Job No. 34-14420-001

Date APRIL 2016

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