

DIVISION 33 UTILITIES

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Unless stated otherwise, the standards in this Facilities Design Manual (FDM) are directed to the Design Professional to incorporate into the Project.

Although the Owner encourages improved concept, method and product recommendations by the Design Professional, deviation from these standards, including product requests for “approved equivalent” status, requires written justification from the Design Professional and written approval from the Owner’s Representative before completion of Design Development Documents.

33 00 00 UTILITIES

A. GENERAL

1. Specify the following underground utilities are inspected by the Owner's Representative before backfill.
 - a. New utilities
 - b. Existing exposed utilities
2. For a mechanical utilities narrative, see FDM Part 2/Support Docs for Div 33/Mech Util Narrative And Util Specs/[Mechanical Utilities Narrative.doc](#).
3. For utility mechanical details, see FDM Part 2/Support Docs for Div 33/[Utility Mechanical Details](#).
4. For the following specification sections, see FDM Part 2/Support Docs for Div 33/ Mech Util Narrative And Util Specs/[Utilities Specifications.doc](#).
 - a. Section 33 05 26 Locate Wire For All Non-Electric Systems
 - b. Section 33 10 00 Domestic Water Distribution System
 - c. Sections 33 30 00 Sanitary Sewer And 33 40 00 Storm Drainage
 - d. Section 33 51 00 Natural Gas
 - e. Section 33 61 00 Chilled Water
 - f. Section 33 63 00 Steam Distribution
 - g. Section 33 63 19 Electrical Services For Steam Distribution
 - h. Section 33 63 43 Utility Insulation

33 70 00 ELECTRICAL UTILITIES

A. GENERAL

1. The content of this section is specifically applicable to Iowa State University at Ames, Iowa.
2. Provide the Owner's Representative with building service power requirements to review at the beginning of the Design Development Phase.
3. For major building addition projects where the additional electrical requirements exceed the capacity of the existing transformers, specify a new service to support the total building load and replace the existing service.
4. For remodeling projects in existing buildings, verify that additional loads will not exceed existing transformers and/or main switchboards capacities.
 - a. If existing capacities are exceeded, include new transformers and/or switchboards in the design and coordinate the Work with the Owner's Representative.

B. ELECTRICAL UNDERGROUND VAULTS

1. Design and locate high voltage distribution service vaults following program requirements and discussion with the Owner's Representative.
2. Vault Requirements
 - a. Cast-in-place concrete
 - b. Interior standard size 9 feet wide by 12 feet long by 8 feet high
 - c. Portion of top removable for equipment installation
 - d. Personnel access through 3 foot diameter pipe size cast iron frame with lid, Neenah R-5900-H.
 - e. Housekeeping pads for high voltage equipment located in vault
 - f. Sump pit 1.5 feet in diameter by 3 feet deep

g. Lighting, receptacles, cable tray, grounding, ladders, etc. as detailed in "Standard Cast in Place Electric Vault"

1) See FDM Part 2/Support Docs for Div33/[Utility Electrical Details](#).

3. Sump pump and associated piping required if high voltage equipment located in vault or if directed by Owner.

C. POWER DISTRIBUTION

1. Power is available from the Owner's underground electrical distribution system.
2. Normally, 4160 volt 3 phase 4 wire 60 hertz power is available for buildings on central campus and 13,800 volt 3 phase 4 wire 60 hertz power is available to areas outside of central campus.
3. Specify the Owner will furnish and install high-voltage switchgear and transformers.
4. Specify the Owner will furnish and install high voltage cables to the buildings and those between transformers and high voltage switchgear.
5. Specify the Contractor to furnish and install the following Work coordinated with the Owner's Representative.
 - a. Equipment foundations
 - b. Raceway and underground vaults for cables and switchgear
 - c. All accessories for underground vaults which includes, but is not limited to, lighting, receptacles, grounding, cable tray and sump pumps.
6. For information on low voltage distribution within buildings, see paragraphs under Section 26 20 00 A in FDM Part 2/[Div 26 Electrical.pdf](#).
7. For the available fault level on the primary side, contact the Owner's Representative.
8. Protect transformers in all locations with high voltage switchgear and coordinate with the Owner's Representative.
9. For high voltage systems on central campus, specify rigid galvanized steel raceway that is direct buried, and for areas outside of central campus, specify schedule 40 PVC raceway that is either direct buried or encased in concrete as directed by the Owner's Representative.
 - a. Specify minimum 48 inch conduit bending radius for any change in direction.
 - b. Specify factory offsets wherever possible.
 - c. Specify minimum depth of 36 inches to top of raceways.
10. For exposed high voltage conduit, specify labels at minimum 50 foot intervals that read "DANGER HIGH VOLTAGE – CABLE VOLTAGE" and show the cable voltage rating.

D. TRANSFORMERS

1. If the project is located on central campus, design using one of the following transformers.
 - a. 4160 Delta 120/208 WYE with a 750 KVA maximum size secondary
 - b. 4160 Delta 277/480 WYE with a 1500 KVA maximum size secondary
2. If the project is located in areas outside of central campus, design using a primary voltage of 13,800 volts.
3. For standard design, specify pad mount transformers for outdoor use, 3 phase, oil filled, with a 55/65° C rise to permit 100% loading with a 55 °C rise and 112% loading at the 65° C rise based on an average ambient of 30° C and impedance equal to 4.5% or more.
 - a. Locate transformer at grade and be accessible
 - b. Design screening around the outdoor pad to shield the equipment from view.
 - c. Measured from equipment to edge of pad, maintain minimum clearances of 10 feet in front of doors and 3 feet on all other sides.
 - d. For an outdoor pad detail, see FDM Part 2/Support Docs for Div 33/Utility Electrical Details/[EU-Padmouted XFMR Foundation.pdf](#).

4. Where an outdoor pad mount is not possible, design using a dry type transformer only for indoor use, 3 phase, AA/FA rated, low loss, high efficiency with 80° C rise based on an average ambient of 30° C, 33% overload capability and impedance equal to 4.5% or more.

E. BUILDING HIGH VOLTAGE SWITCHGEAR

1. Specify nominal voltage rating of 15,000 volts for all locations.
2. Base standard design on S&C Electric Company PMH or VISTA style of equipment.
3. Locate equipment adjacent to building transformer.
 - a. Maintain minimum clearances around equipment from edge of foundation of 10 feet in front of doors and 3 feet on all other sides.
 - b. For an outdoor pad detail, see FDM Part 2/Support Docs for Div 33/[Utility Electrical Details](#).

F. SYSTEM HIGH VOLTAGE SWITCHGEAR

1. Specify nominal voltage rating of 15,000 volts for all locations.
2. Base standard design on S&C Electric Company VISTA or G&W Electric Company RAC style of equipment.
3. Typically locate S&C equipment at grade on a concrete precast pull pit, and typically locate G&W equipment in an underground vault.
 - a. For an installation detail, see FDM Part 2/Support Docs for Div33/[Utility Electrical Details](#).

END OF DIVISION 33 UTILITIES