



A Con Edison, Inc. Company

Consolidated Edison Company  
of New York, Inc.  
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## **265/460V Transformer Vaults and Network Compartments Structure Design Guideline**

For the 265/460V transformer vaults and network protector (NWP) compartments, the customer should provide structural calculations, rebar details and etc. The package should include following information:

### **For the Structure:**

- Design concrete structures in accordance with ACI 318-08 or newer version.
- Use LRFD design method for steel design.
- Use HS-25 wheel load (20,000 lbs.) as per AASHTO, and the impact distribution as per ASTM C857 latest version.
- Consider blast load (600psf) as Live Load in transformer vaults.
- Consider transformer and NWP weights as Live Loads:
  - Transformer:
    - Weight of the 2500kVA Transformer: 40K transformer live loads applied over 3.5'X 4.5' area (design for the worst Case position).
    - Maximum additional live load will be rain water accumulated in case of pump failure. Water weight in a 10'X12'foot print X1' deep will be about 7.2kips.
    - Floor/wall/roof slab self-weight – Concrete -150 psf as dead load
    - 37.5 psf dead load for 3" concrete topping
  - NWP:
    - 3K NWP live load
    - NWP roof – 30 psf live load
    - NWP roof/wall/floor- self-weight – Concrete -150 psf as dead load
    - 37.5 psf dead load for 3" concrete topping
- Structural drawings showing any reinforcement requirements for the transformer vaults and NWP locations.
- Reinforcing bars shall be billet steel, intermediate grade, deformed, and shall conform to A.S.T.M spec. Des. A – 615 grade 60.
- Reinforcing bars shall be epoxy – coated in accordance with A.S.T.M. spec. A – 775
- Reinforcement supported material conforming to A.S.T.M. spec. A – 775.
- Concrete mixture shall be 5,000 psi
- Concrete with 6.5 minimum sacks of cement per cubic yard according to NYC BLDG. Code, 2008, Chapter 19 or local bldg code outside NYC.
- All concrete material for construction and protection for reinforcing bars shall conform to NYC BLDG. Code, 2008, Chapter 19 or local bldg code outside NYC.
- Concrete inspection will conform to NYC BLDG. Code, 2008, Chapter 17 or local bldg code outside NYC.
- The calculations should provide information regarding the structure that is to be supported, including the verification of the capacity of structure support –e.g. greater than 50 tons. The calculations needs to show the formulas used to obtain the results.
- Provide the latest calculations and structural plans signed and sealed by a licensed Professional Engineering (PE).
- The design should be compliant with Con Edison Engineering specifications E0-1121



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For the Ventilation, Drainage and Feeder routing:

- Architectural drawings showing the transformer vault and NWP compartment. Drawings will show the new transformer high voltage feeders' conduct route and the new transformer and network protector rigging route.
- Plumbing drawings showing vault floor drains.
- Architectural drawings show the location of the customer's splicing chambers, need to identify number of spare ducts in each chamber. A separate duct bank is required for each two primary feeders. Each duct bank must be a minimum of 20 feet apart.
- An installation and replacement route plan through the building (for the installation and replacement of equipment) with a 4'-0" minimum clear passage way to the freight elevator (if applicable) access and hallways. Any freight elevator door need be minimum 3'-0" and the hallway must be minimum 4'-0" clear in the entire path.
- Electrical drawings showing the new mechanical vault/compartment lighting, receptacles, ventilation fan power supply, ventilation system control and alarm monitoring system and fire alarm system

For the Ventilation and Louver:

- The Ventilation design should be compliant with Con Edison Engineering specifications E0-2032 (Ventilation):
  - Natural ventilation to the outside air is required for transformer vaults.
  - The customer needs to secure the air rights for air ventilation, and ensure the air ventilation would not be obstructed.
  - NWP compartments, mechanical means such as forced exhaust ventilation is permitted. When natural ventilation is available, louvers shall be provided in the high and low positions at opposite ends of each network bus compartment. These louvers shall be adequately sized for allowing a natural air flow to attempt to maintain an ambient temperature of 35 degrees C or less.
  - Forced air ventilation: When natural ventilation is not available, a forced air ventilation system shall be installed and maintained by the customer. The system shall include a power supply, ventilation and alarm controls. The intake exhaust must be separate from the HVAC for the network protector room. Each network protector must be ventilated individually.
  - Mechanical drawings showing the new vault/compartment mechanical ventilation system.
- The Louver design should be compliant with Con Edison Engineering specifications EO-4552-A
  - There are two vendors that Con Edison approved for the louver design. Please feel free to work with them or any other contractor.
    - Ross technology inc-1-800-345-8170 x 640 Duane Sanders or [dsanders@rosstechnologyinc.com](mailto:dsanders@rosstechnologyinc.com)
    - Michaelman 1-610-837-9914 Sammy or [samye@micronworks.com](mailto:samye@micronworks.com)

For the Concrete Mixture:

- Concrete mixture shall be min. 28 day strength at 5,000 psi
- Concrete mixture shall have No Fly Ash
- Concrete mixture shall have No slag
- Slump shall be between 4"-6" (exception may be allowed if a super plasticizer is used). This would be labeled as such in the mixture
- Air content shall be 6 % ( with +/- 1.5%)
- Coarse aggregates shall conform to size # 67



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- The concrete mixture report must be signed and sealed by a licensed Professional Engineering (PE).
- The admixtures should be compliant with Con Edison Engineering specifications EO-100285 to ensure using approved admixtures from the approved list. If the admixtures are not on the approved list, it required Con Edison addition time for review and approval.