

265/460 Volt

Transformer Vault
Placement & Installation
Recommendation
(Sidewalk)



Prepared By
Energy Services
Planning and Project Management

For Reference Only

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Introduction

Whether you (the Customer) are constructing a new building or adding electric load to an existing one, Consolidated Edison (we, Con Edison, the Company) strongly encourages for you and your design team to contact us early in the design process to discuss the transformer vault placement requirements. Typical transformer vault space requirements depend on the number of transformers required to supply electricity to your building. In addition, there may be an incremental customer cost to supply service at your requested point of entry. Your final service design will be developed after we receive you and your team's service request and load letter with details of your entire building's new or additional electrical requirements. The following information will assist you in planning for your building's electric service configuration, placement, and installation of transformer vaults.

This Installation Recommendation has been prepared for customers, like you, who need new transformer vaults to fulfill their electrical service's load requirements. It provides a high-level introduction to the sequence of events involved in the design, construction, installation, and energization of the transformer vaults and your services. Provided in this recommendation is a schedule showing how the Customer's and Con Edison's activities are sequenced and key points of information to assist you in the development of your design strategy and construction timeline. It will help you to avoid unnecessary and costly design changes or delays that may result if these requirements are not incorporated into your final building design.

This recommendation is a companion to Con Edison's engineering design specifications and New York City Department of Transportation (NYCDOT, DOT) transformer vault requirements. This document is not intended as a design specification or an instruction manual for final building designs without discussing or consulting with a Con Edison engineering/design team. Consolidated Edison Company of New York shall not be held liable for indirect, special, incidental, punitive, or consequential damages of any kind including loss of profits, arising under or in connection with the use of this recommendation.

Description of Transformer Vault Installation

According to New York State Public Service Commission (PSC) Rates and Tariffs No. 10-Electricity, Leaf #56: 5.6.1, paragraph 1, it is the Customer's "Ultimate Responsibility to provide the suitable space and reasonable access for transformer vault installations, without rental charge." With a 265/460 volt installation, we will supply electric service to buildings at a non-standard voltage of 3-phase, 4-wire 265/460 volts. When transformer vaults are required to serve the building's load, it is essential that you consider the vault requirements before you proceed with the design of your building. Part of the installation will also include the construction of 460V network protector rooms. It is also important to consider the 460V network protector room requirements, such as space and access issues, before you proceed with the design of your building.

When transformer vaults are installed within the sidewalk area, many aspects of the operation must be taken into consideration in order to ensure that adequate space and clearance are provided to meet all jurisdiction requirements of local authority, such as NYCDOT, Department of Buildings (DOB), Department of Environmental Protection (NYCDEP, DEP), Parks Department, the MTA, etc.

All Con Edison transformer vaults require natural ventilation. Sidewalk transformer gratings provide ventilation for the transformer installed outside the building, as well as a means of entry for Con Edison personnel to operate, maintain, install, and remove equipment. To facilitate access and ventilation, the space for vaults should be adjacent to the building line and immediately below street grade without obstruction.

Con Edison strives to install all transformer vaults in the sidewalk because it is the optimum location for installation, maintenance and operation of the equipment. If such space is not available, there is the option to have an Interior Distribution Design. With an interior design, you will need to provide enough space within your building that meets the clearance and design requirements of Con Edison for transformer vaults and network protector rooms as well as space for a demarcation point, which will be splicing chambers or customer owned manholes, at the property line to accept the service. More details for the Interior Distribution Design will not be covered in this document. If you intend to have an interior design, please discuss with our design team as soon as possible.

NYCDOT Requirements

We strongly recommend that you review the NYCDOT's requirements prior to setting up a meeting with the DOT in order to obtain their concurrence on the vault location.

Here are some DOT requirements:

- Doors and gratings (such as transformer gratings) in sidewalks are not permitted in front of any entrances, including building, store, and delivery.
- Typically, the DOT requires a clear, unobstructed path (no gratings) between the building and the curb line and a continuous passage along the sidewalk that has a five-foot solid concrete walking surface.
- If the Customer proposes to place transformer vaults in conflict with these DOT requirements, a waiver must be granted by the DOT.

For more information refer to chapter 3.7 of the Street Works Manual at the NYCDOT web site.

http://www.nyc.gov/html/dot/streetworks/html/chapter_3/3_7.shtml

Minimum Clearance Requirements for Transformer Vaults (New or Alterations):

| Item | Obstruction Type | Clearance ** |
|------|------------------------------------|---|
| 1 | Bench | 5 ft |
| 2 | Bicycle Rack | 5 ft |
| 3 | Bus Stop Sign | 5 ft |
| 4 | Bus Zone | Not Permitted |
| 5 | Canopy Support | 3 ft |
| 6 | Cellar Door/Hatch Door | Prefer 3 ft along the same line |
| 7 | Corner Quadrant | 5 ft |
| 8 | Curb Cut | 3 ft |
| 9 | Curb Offset | 18 inches (maximum 24 inches) from the grating edge perpendicular to face of curb |
| 10 | Driveways | 3ft out of driveway cut |
| 11 | All Entrances | 3 ft from each side of the entrance to the grating edge |
| 12 | Fire Hydrant | 5 ft |
| 13 | Areaway, Grating, Sidewalk Opening | * Maintain minimum Clear Path requirement (Below) |
| 14 | Mailbox | 3 ft |
| 15 | Newsstands | 5 ft offset along the curb line (Not Permitted in front) |
| 16 | Parking Meter | 3 ft |
| 17 | Sign Posts | 3 ft |
| 18 | Standpipe | 3 ft |

| | | |
|----|-----------------------------------|---------------------|
| 19 | Street Light/Traffic Signal | 3 ft |
| 20 | Telephone Booth | 5 ft |
| 21 | Tree Pit | 7 ft (prefer 10 ft) |
| 22 | Utility Access Cover | 3 ft |
| 23 | Utility Pole | 3 ft |
| 24 | Water Line/ Sewer Line / Gas Line | 3 ft |
| 25 | Landscaped Grass Strip | Not Permitted |

Note:

*Clear Path (pedestrian walkway): this directive is intended to provide pedestrians with the maximum amount of safety and space to traverse the sidewalk. This requires a minimum distance on narrow sidewalks (10-12 feet) of five (5) feet. Or a minimum distance on wide sidewalks (larger than 12 feet) of eight (8) feet. DOT's preference is for no split in pedestrian flow.

**All distances indicate measurements from nearest edge of any object to closest edge of vault unless specified.

DOT Initial Approval:

Initial DOT approval is required for any design work to begin as it ensures that the new transformer vault installation will provide a safer, clear and direct pathway for pedestrian movement on the sidewalks. If the initial DOT approval is not granted, Con Edison's design work cannot progress.

In order to obtain DOT initial approval, you will need to present a package of design drawings, Sidewalk, Curb & Roadway Application (SCARA) filing, and a Con Edison approved grating sketch.

DOT Final Approval:

DOT final approval ensures that the final design is compliant with the restrictions of the DOT. Once DOT final approval has been granted, the Con Edison construction layout can be finalized and the process can be transferred over to the Con Edison Major Services department for the construction portion of the project.

In order to obtain DOT final approval, you need to provide finalized and approved design drawings, SCARA filing, and Con Edison's submitted grating sketch.

Con Edison Design Requirements

We recommend that you review Con Edison's design requirements prior to setting up a meeting with our Customer Project Manager (CPM) in order to obtain our concurrence on the vault location. All new sidewalk 265/460V transformer vault installation can either be a single (1) transformer installation or require a minimum of three (3) transformers and up to a maximum of six (6) per installation. Each transformer vault will require a corresponding network protector as well. The required separate network protector rooms shall be installed in a controlled environment within the building. The face of all rooms (vault and network protector) shall be straight with no protrusions.

Point of Service Termination:

According to the New York State PSC Rates and Tariffs No. 10- Electricity, Leaf #35 and Leaf #46: 5.5.1, we, as Con Edison, "reserve the right to determine the location of the point of service termination to the service line." The point of service termination will typically be the property line of the building. This is a requirement of the National Electrical Code (NEC). According to NEC Article 225.32, the connection point to the services will be installed "inside or outside of the building or structure served or where the conductors pass through the building or structure. The disconnecting means shall be at a readily accessible location nearest the point of entrance of the conductors."

You will be responsible for furnishing, installing, and maintaining all service line and equipment beyond the point of service termination, in accordance with our specifications and all jurisdiction requirements of local authority.

To avoid misunderstanding, we recommend you consult with Con Edison before starting design work to determine the exact location of the point of service termination, especially the electrical switchgear room to accept the 460V service. We recommend the location of the switchgear room shall be on the same floor, immediately adjacent to the network protector room. From the service take off to the switchgear room, the cable length should be limited to a maximum length of 25 ft. and be in the line of sight of the service take off. If you plan to have any deviation from this, please discuss with our Customer Project Manager.

Transformer Vaults:

The transformer vaults required for a 460V installation are not submersible structures. These transformer vaults used to house the transformers are field cast structures constructed by the customer. Con Edison will reimburse you for the cost of constructing the vaults. For details of the reimbursement please discuss with our CPM or see the “Customer Agreement (AKA 50-51 Agreement)” section below.

There are two different designs for transformer vaults: a four wall design and a three wall design. The four wall design is the standard design and is a completely separate structure from the building foundation. The three wall design is only used for adding additional service to existing structures. The transformer vault will use the building’s foundation wall as part of the structure. The design that is used in your installation will be dependent on the space clearance and DOT clearance requirements. For additional details, please discuss with our CPM.

Network Protectors and Rooms:

460V Network protectors are currently not submersible designs and shall be installed in waterproof structures, which are network protector rooms, within buildings above, below or at grade. The location of the network protector cannot be the lowest point of the building and cannot be directly below a plaza area. Network protector rooms require two independent access entrances on each side of the structure, which are there in case of emergencies, with at least 4 feet of “Clear Access” for installation and one side door open to the public. The network protector room design shall include enough clearance for delivering equipment to the room. Network protectors may also be installed in separate enclosures from the building, which references a block house design. These structures are usually above grade within the customer's premises. No customer piping can be installed in the network protector rooms and the rooms cannot have a metal deck.

If your installation is within the flood plain, the network protectors cannot be installed on any floor of your building that is within the flood plain.

A typical 460V installation has the network protector room and transformer vaults at the same elevation (refer to “Case 1” in the “Transformer and Network Protector Compartment Arrangements” drawing under Attachments). If you plan to have a design with an elevation difference greater than 3 feet (“Case 3”), please discuss with our Customer Project Manager.

Space Allocation Drawing:

Space allocation is the space you agree to provide to Con Edison without any cost/charge. The space allocation drawing shows the design and location of the transformer vaults and network protector rooms with reference to the building. The drawing should also show the locations for the point of entry. For sidewalk installations, you need to show the transformer vaults are aligned with the network protector room. Con Edison prefers to have no separation between adjacent vaults. You will need to submit a space allocation drawing to Con Edison for the approval of the location and design of the network protector rooms and transformer vaults. Once the design is completed, you, as the owner, will need to sign off on the drawing as part of the agreement.

We recommend you review a sample space allocation drawing provided by Con Edison in order to avoid any misunderstandings in our design requirements.

Structural Design and Calculations:

With a 265/460V transformer installation, you will be required to design the structures to house the transformers and network protectors. The structural design to be submitted will include the physical design of the structures as well as calculations showing the support and the capacity for the structures related to your building

These structures will be field poured concrete structures. You will also be required to submit a concrete mix design for approval.

For further details please refer to the “Space Allocation Drawing Review” section under the Design and Planning Phase or the “265/460V Transformer Vaults and Network Compartments Structure Design Guideline” under attachments.

Ventilation Design:

Con Edison prefers to have natural ventilation for all transformers. You will be required to submit ventilation designs to Con Edison for approval. It will be your responsibility to secure air rights for air ventilation and ensure the ventilation will not be obstructed.

Natural ventilation or mechanical ventilation is required for network protector rooms. Natural ventilation for network protector rooms will consist of louvers installed on opposite ends of the compartment. The only acceptable mechanical ventilation for the network protector room is

forced exhaust. If you plan to have a forced exhaust ventilation system for the network protectors, you will need to provide mechanical drawings showing the mechanical ventilation system. If your building will have a forced intake ventilation system, you will need to ensure there is a separate natural ventilation system from the building for the network protector rooms. All utility used for the ventilation and alarm system shall be separate from the building. The ventilation system will be maintained by you.

For further details please refer to the “Space Allocation Drawing Review” section under the Design and Planning Phase or the “265/460V Transformer Vaults and Network Compartments Structure Design Guideline” under attachments.

Metering:

High-rise residential buildings with a 460V installation cannot be individually metered. You will need to use a master meter and sub-meters for your building. Unlike a 120V installation, the 460V installation electric meter must be installed after the disconnect switch. Fire pumping is an exception to this. For more details please discuss with our Customer Project Manager.

Flood Plain:

The flood plain is based on the 2010 SLOSH Hurricane Inundation Map, applicable to Hurricane Zones 1, 2, and 3.

We do not install 265/460 volt transformers below grade in the flood plain. This installation type is not a submersible design and must be installed at least one foot above the flood plain.

265/460 volt transformer installations in the flood plain must be an Interior Distribution Design that is above the flood plain.

If you plan on having an installation in the flood plain, we strongly recommend you review Con Edison’s design requirements for the flood plain prior to setting up a meeting with our Customer Project Manager in order to obtain our concurrence on the vault location requirements.

Single Service and Excess Distribution Facilities:

According to the New York State PSC Rates and Tariffs No. 10- Electricity, Leaf #35: 5.2, “the Company reserves the right to determine the location of the service.” Electric service will be supplied to a building or premises through a single service, unless Con Edison decides it is necessary to install more than one service. Excess Distribution Facilities (EDF) can be

requested by the customer, but will only be granted if the extra facilities do not affect the construction and utilization of the initial service line.

Buildings that share any services, such as gas, water, sewage, telecom, alarms, etc., must put in a request for excess distribution facilities. The facilities will only be granted if it is economically sound for the rate payer to provide the excess distribution facilities. For example, if you are trying to build two brand new towers that are in two different blocks and lots but they share a sewage service, only one single electrical service from Con Edison will be provided to you for your distribution service to serve both buildings. No excess distribution facilities will be provided unless requested by the customer and granted approval from Con Edison. If EDFs are granted, the customer will be responsible for the EDF cost.

Contribution in Aid of Construction (CIAC):

According to the New York State PSC Rates and Tariffs No. 10- Electricity, Leaf #40: 5.3.5, if you choose the 265/460 volt service, you may be subject to pay the incremental cost difference above the \$2.0 million threshold. If the overall construction cost is expected to exceed \$2.0 million, Con Edison will perform a revenue analysis to determine if you should pay a CIAC charge. The revenue analysis takes the expected peak demand and calculates the pure base revenue for a 5-year period. For example, if the project cost is \$3.0 million and your pure base revenue is \$400,000/year, equaling \$2.0 million over five (5) years, your contribution will be \$1.0 million to make up the difference.

Clear Access:

- No trees, planters, or street furniture can be installed in front of or near transformer vaults.
- You will be responsible for:
 - Contacting the City of New York Parks and Recreation to get their approval for the removal of any trees or planters and the relocation of street furniture within the proposed vault location.
 - The costs associated with the removal/relocation of trees or planters.
- Trees or planters shall be a minimum of seven (7) feet away; however, this distance may be greater to avoid tree branches growing over vaults
- Street furniture shall be a minimum of five (5) feet from transformer vaults.
- No awnings, building overhangs, or canopies shall be installed over transformer vaults without Con Edison's approval.

- Must be a minimum of forty (40) feet without obstruction.
- Must have a minimum clearance of three (3) feet to the grating edge.
- Transformer vaults must be located a minimum of five (5) feet from fire hydrants.
- Transformer vaults must be located a minimum of three (3) feet from other utility lines.
- Transformer vaults shall not be located in front of or behind bus-stop shelters.

During the construction phase, clear access is required for Con Edison to perform any work. For more details see “Clear Access” in the definitions.

Driveway or Loading Dock:

- Transformer vaults shall not be located in front of the active loading dock and driveway.
- *Exception:* If you receive special approval from NYCDOT and Con Edison, you will be able to install vaults located in driveways, however you will need to pay incremental Con Edison costs. These costs will include special grating designs, increased maintenance, etc.
- You must provide Con Edison unrestricted, 24-hour access for maintenance and/or routine work. This agreement will be in writing and will be transferable to subsequent building owners.

Contaminated Sites:

- You must provide Con Edison with soil borings, an environmental study such as an Environmental Phase II Report, and building plans at the start of design.
- Transformer vaults should not be installed in contaminated soil. If the soil is contaminated, you will be required to remediate the condition and receive our approval on the proposed remediation method. You may over-excavate and replace with clean fill. You will incur the cost for remediating the contaminated soil. Remediation of the soil must be in compliance with local jurisdiction.

Overall Sidewalk Vault Installation Process

In order to better service you, we would like to ensure that you understand the milestones associated with providing service to the facility. Services requiring installation of transformers are complex and generally, in Manhattan, require twenty (20) months from NYCDOT initial approval/reception of space allocation drawings to complete. This time frame provides nine (9) months for design and eleven (11) months for construction. The amount of time for installations in other boroughs may vary due to more liberal permit stipulations on street construction. This is to be reviewed on a site specific basis.

A typical vault project can be broken up into three different stages: the Initial Service Assessment stage, Planning and Design stage, and Service Construction and Energization stage (see Figure 1).

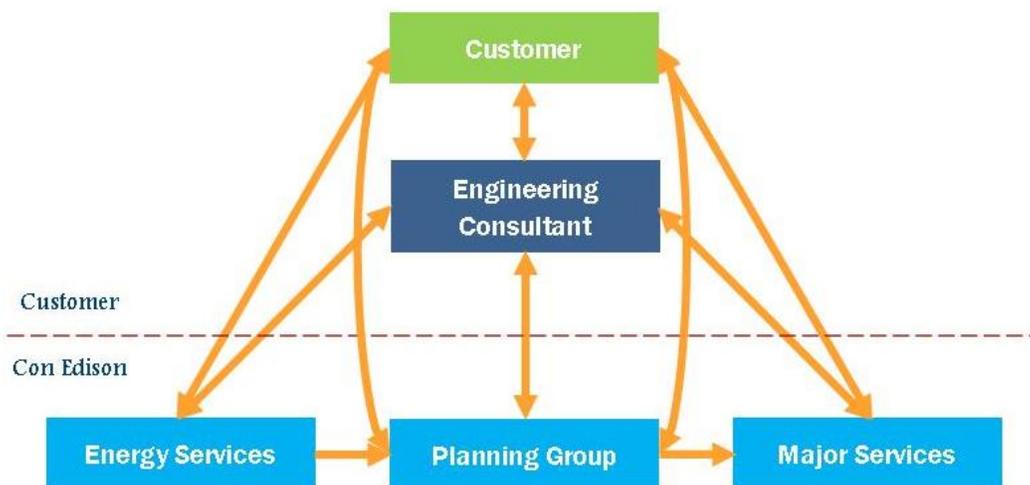


Figure 1 Typical interaction between a customer and Con Edison

As our customer, we look forward to working with you on this project, and to avoid any miscommunications, we will appoint a Customer Project Manager (CPM) who will act as the liaison between the Customer and Con Edison for each project stage. The CPM will ensure that the design service requirements of all the local authorities who have jurisdiction are clearly communicated to you and that any questions you have are directed to the appropriate company internal departments.

The project coordinator in charge of each project stage of the process is shown in Table 1.

| Project Stage | Project Coordinator |
|---------------------------------------|----------------------------|
| Initial Service Assessment | Energy Services |
| Planning and Design | Planning Group |
| Service Construction and Energization | Major Services |

Table 1

There are several departments, such as engineering, surveying, etc., within Con Edison that are also involved within those stages. Some departments will assess your design while others will be making system changes to provide service. It is important you are aware that your construction schedule may cause scheduling constraints for the different groups in the Company. For example, Con Edison does not typically start the engineering design phase until the customer has obtained the DOT's initial approval. The Customer and Con Edison need to work together to ensure that tasks are scheduled and completed in a time frame that minimizes delays.

There are a number of key milestones involved in a transformer vault installation project. Figure 2 outlines the milestones of a sidewalk vault installation as they pertain to Con Edison and you. 460V Vault installation projects typically take two to three years or more to be completed due to the complexity of the design process. The 460V design is a more involved process and can have design effects on your building. Review of your space allocation design package can take an extended amount of time if our design requirements are not met. Early submission and close coordination are critical to ensure your desired service date is met. Con Edison's construction activities will be coordinated to accommodate your schedule.

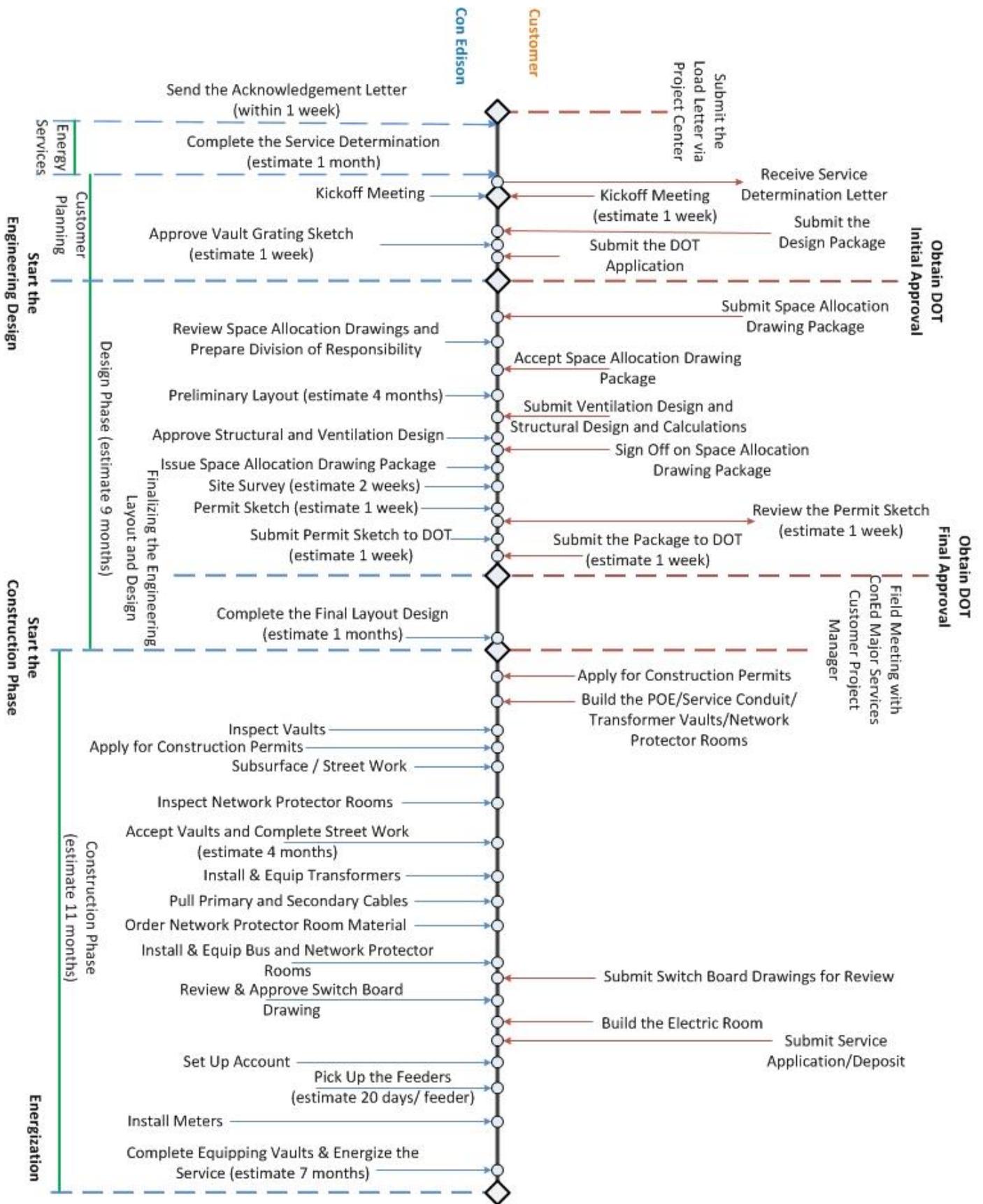


Figure 2 - Project's Major Milestones for a Sidewalk Vault Installation

Initial Service Assessment Phase:

For the initial service assessment phase, the project will be handled by Energy Services project coordinator.

- **Submission of Load Letter to Con Edison:** The initial service request (electric load letter) is typically submitted by you or your engineering team to the Con Edison website via Project Center. The load letter should include a detailed breakdown of all individual loads, preferred location of service, and square feet for the building. (Note “Checklist: Load Letter/Service Request” in definitions for details)
- **Service Determination Completion by Con Edison:** After Con Edison’s energy services project coordinator has reviewed the service request, the Con Edison engineer will perform a system load study and provide a service determination indicating the service voltage, the number of feeders and transformers, the preferred point of entry, etc. You will use the service determination to develop a preliminary design.

In addition to the electric load letter, you should also submit a gas/steam load letter and a service request for any temporary service, demolition service, Emergency Generator, Co-Generator, or Distribution Generator (DG) that may also be needed so we are aware and can plan accordingly to accommodate these additional services.

Design and Planning Phase:

Once we have communicated the service determination to you via email or letter, if a 460V transformer vault is required, the project design and planning phase will be handled by the CPM from the Planning Group. This phase will be discussed in greater detail to further develop the aforementioned milestones.

- **Kickoff/Preliminary Customer Meeting:** The assigned CPM from the Planning Group will schedule a meeting with you to discuss Con Edison’s vault installation service requirements and any site-specific issues. During the course of this meeting, your project schedule and expected completion date will be discussed with respect to how your/Con Edison-related portions of the project can be optimally sequenced.
- **Obtaining DOT Initial Approval:** The assigned CPM from the Planning Group will work with and support you to develop a feasible vault design. The CPM will review your submitted

Building Pavement Plan, which will show the vault grating sketch, and sign off/approve the vault grating sketch. You will use the approved sketch to obtain DOT initial approval. Con Edison's engineering team typically will not start formal design work without this approval. It is the Customer's responsibility to obtain the DOT initial approval. We recommend you expedite this step in order to avoid delays in your construction schedule.

- Receipt of Customer's Design Package: You will need to provide the building's design plans, space allocation drawings, Soil Boring Report, and Environmental Phase II Report to assist our engineering team with its design work. (Note "Checklist: Customer Design Package" in definitions section will provide more details)

- Space Allocation Drawing Package Review: The assigned CPM will work with you to develop an acceptable Space Allocation Drawing Package. This package will be used for Con Edison's inspections during the construction phase of the project and is crucial that they meet all of our requirements. There are many aspects of this package that will be reviewed and approved. Listed below are the items that are to be included and reviewed in the Space Allocation Drawing Package.
 - Space Allocation Drawings: A typical design for a 460V transformer vault is approximately 15 feet x 10 feet with 10 inch thick walls and a height of 10 – 11 feet per vault. Network protector rooms are typically 10 – 12 feet x 10 feet with 8 inch thick walls and a height of 10 feet per room. Your space allocation drawings should also indicate the location of the point of entry, sump pump location, water proofing and the location of the conduits and conduit knock outs.

 - Structural Design Drawings and Calculations: The structural drawings are needed to ensure that Con Edison's assets will be properly supported with the customer's design. The structural design should support a 40,000 lb. live load for transformers and 3,000 lb. live load for the network protector. The floor of the structures needs to have a minimum thickness of 10 inches on soil, 8 inches on rock and 6 inches on steel beams. Floor and wall thickness should be a minimum of 8 inches. The drawings should reflect any reinforcement requirements for the vaults and network protector rooms and the rebar details. For a detailed list of requirements, please see "265/460V Transformer Vaults and Network Compartments Structure Design Guideline" under Attachments.

- Ventilation Design Drawings: The ventilation drawings are needed to verify that there is proper natural ventilation as per Con Edison's design requirements. Gratings need to provide open area for ventilation of 2 square feet per 100 kVA. The design should be based on a 95°F (35°C) outdoor ambient temperature, up to a maximum allowable temperature of 145°F (50°C). The average temperature should not exceed 113°F (45°C). You will need to also provide an air flow diagram with your ventilation designs. For a detailed list of requirements, please see "265/460V Transformer Vaults and Network Compartments Structure Design Guideline" under Attachments.
- Concrete Mix Design: The concrete design is needed to ensure your submitted mixture meets Con Edison's design requirements. The concrete mixture must have a minimum strength of 5,000 PSI at 28 days; the air content should be 6% with a 1.5% tolerance; and the slump shall be between 4 and 6 inches. For a detailed list of requirements, please see "265/460V Transformer Vaults and Network Compartments Structure Design Guideline" under Attachments.
- Division of Responsibility: Part of the Space Allocation Drawing Package will include a document called the Division of Responsibility which will be prepared by the Planning Group Customer Project Manager. The Division of Responsibility will outline, in detail, the material provided and construction performed by the Company as well as what material and construction the Customer is responsible for.

The duration of this review may be prolonged if there is not adequate communication between the customer and Con Edison. We typically would like to finish the space allocation review after three revisions. If there are any pressing issues, we may ask to have a meeting to address these issues and prevent further delay. Participation from the owner is crucial for the review. The overall process for the Space Allocation Drawing Package review can be seen in Figure 3.

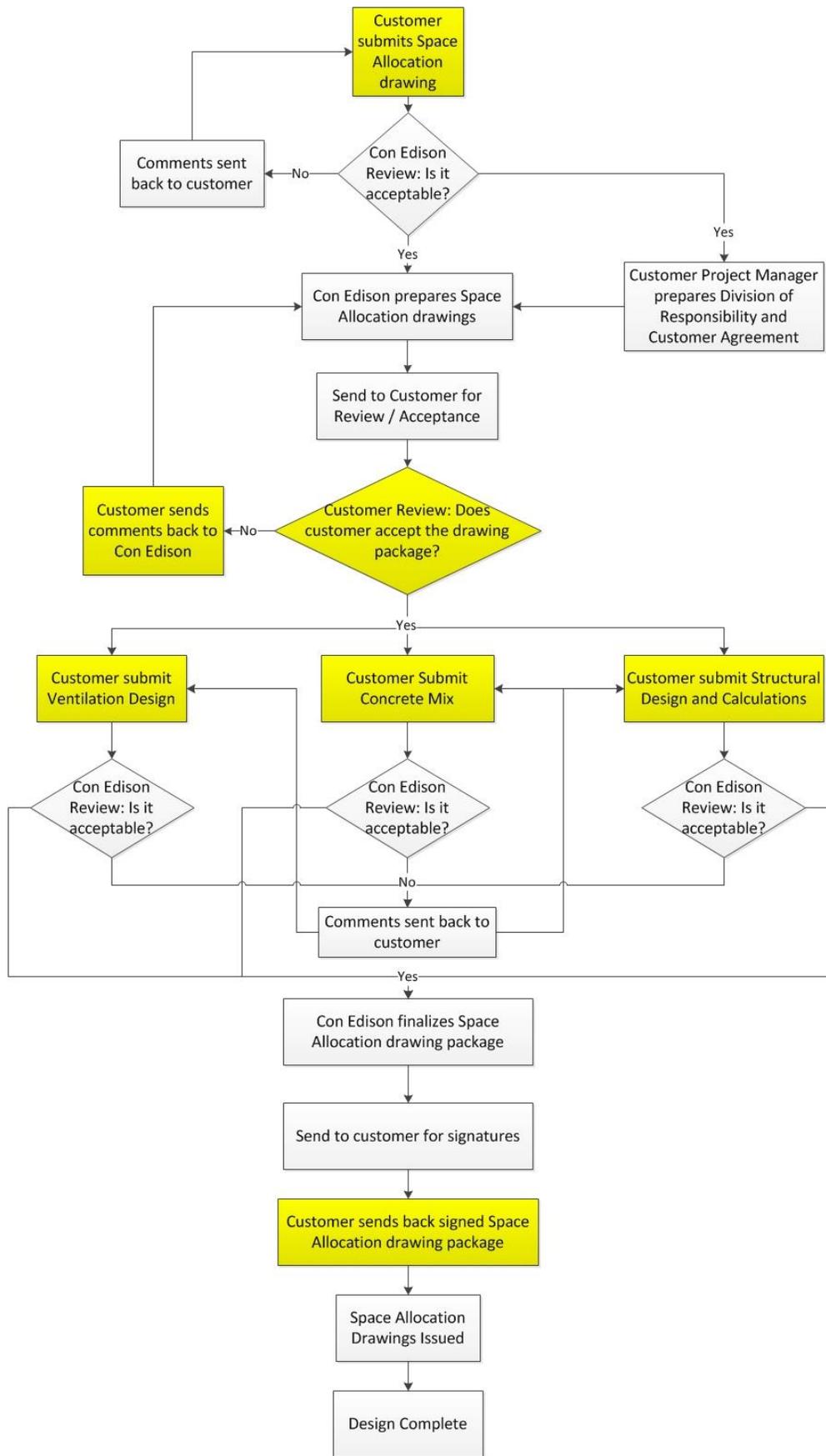


Figure 3 – Space Allocation Process Flow Chart

- Customer Agreement (AKA 50-51 Agreement): With a 265/460 installation, you will enter a Customer Agreement, where Con Edison will provide a reimbursement for the material and construction. This agreement will allow you to maintain control of the site and all construction logistics, such as the soil remediation. You will also be required to obtain ADA gratings for the transformer vaults (see “ADA Grating” in definitions for more details). Con Edison will equip the transformer and associated equipment after construction is completed and has passed our inspections. The execution of this agreement will require Customer and contractor signatures plus the supporting documents: Certificate of Insurance and W-9 Form. For additional details, please discuss with your assigned CPM.
- Obtaining Subsurface Recommendation: You and your team will be required to remediate the area where the vaults will be sited if the soil is contaminated. Our engineering team will assess the soil conditions based on submitted reports, such as Soil Boring and Environmental Phase II reports, from you.
- Preliminary Layout Generation: Our engineering team will generate an advanced construction preliminary layout soon after you have been granted DOT initial approval.
- Performance of Site Survey: Our Vault & Bus team will inspect the future work area to verify company assets and assess construction feasibility for installations with existing structures only. Depending on the outcome of the inspection, the group will also generate a grating sketch. Our Survey team will prepare an SD-1&2 filing.
- Grating Sketch Review: The CPM from the Planning Group will send the grating sketch to you and your team for review and comments. This review is necessary because the DOT expects total alignment between Con Edison and your design documents. Once you and your team’s comments are incorporated, the grating sketch is sent to the DOT, after a Con Edison professional engineer (PE) has signed off on the design granted that it meets all the requirements or a design waiver has been approved. If accepted by the DOT, you will receive a notification via email that they can schedule a meeting for final approval.
- SD-1&2 Filing with DEP: Con Edison’s transformer vaults need to be able to drain out any rain water that may enter the vaults. In order for that to occur, the vaults must be connected to the NYC sewer system, which needs approval from the NYCDEP. Con Edison will submit the SD-1&2 filing to the NYCDEP to request approval to connect the vault drain line to the

city sewer system. The sewer drain line installation and final sewer connection will be performed by you and a copy of the approved SD-1&2 will be provided to you.

- **Obtaining DOT Final Approval:** With DOT notification, you will meet with the DOT to review the final design package. Con Edison's grating sketch will be reviewed with your drawings. If the DOT accepts the design and grants final approval, you will then be able to apply for work permits.
- **Completion of Con Edison Final Layout:** Once the Customer has been granted DOT final approval, it may take Con Edison additional time to finalize the final design and construction layouts. Like any business, projects require additional funding and approvals to start, which may also take additional time for Con Edison to prepare.
- **Field Meeting:** Once all engineering and funding approvals have been granted, layout is completed, and the space allocation drawing package has been signed off by you (the Customer) and the Company, the Planning CPM will schedule a field meeting with you and the Major Services CPM who is assigned to you for the construction phase. The construction timeline will be discussed and the project will be formally transferred to the Major Services CPM.

The duration from DOT initial approval to final layout completion typically takes nine (9) months. However, with the dedicated work from Con Edison, this duration may be reduced or extended depending on your responding time, review of the space allocation drawing package and DOT approval time.

Service Construction and Energization Stage:

For the service construction and energization stage, the project will be handled by the Customer Project Manager from Major Services.

The duration from final layout completion to service energization is about eleven (11) months. However, the duration of work may increase or decrease depending on your construction schedule.

- **Service Construction:** You should ensure clear site access at all times to allow Con Edison to complete the necessary subsurface/street work before the embargo period. During the

construction of the transformer vaults, the Major Services CPM will be performing inspections to ensure the vaults are being constructed according to the drawings. The following inspections will be performed:

- Rebar
- Concrete mix (slump test)
- Location of equipment installed by Customer to match space allocation drawing
- Plumbing
- Waterproofing
- Confirm ground plate included

The City of New York places an embargo on non-emergency street excavations during the winter holiday period to minimize traffic disruptions. New York City's embargo periods are typically from the week before Thanksgiving to January 2nd of the next year. Not all areas of NYC are affected by the embargo period. The location of your installation will determine if this will have an effect on you. The time frame for construction is typically four (4) months to complete the work. The duration is dependent on the street permits availability. If Con Edison can only obtain weekend or night permits, it may cause project delays or prolong the construction time frame.

- **Electrical Installation:** You should ensure clear site access to the work area to allow Con Edison to perform any necessary electrical tests for an electrical installation. We do not typically perform non-emergency work on primary feeders, such as customer service pick-ups and drops, during the peak summer period between May 15 and September 15. Customers typically need two (2) feeder pick-ups before they can energize their service. For each primary feeder, pick-up/drop times take an estimated twenty (20) days to complete.
- **Metering/Energization:** The Customer needs to follow the Con Edison Electric Blue Book to install the meter panel and phone lines as per PSC requirement.

As a new customer, we will require a service application and security deposit from you in order to ensure that our services will not be withheld.

Conclusion

We look forward to partnering with you on your project and the timely completion of its service facilities. If you require any additional information or would like to give us feedback about our services, the contact for the Con Edison project manager for your site can be found at: **<http://www.coned.com/es/contacts.pdf>**

Attachments

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 be compliant Con Edison Engineering specifications and 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 EO-1121

For the Drainage and Feeder routing:

- Architectural drawings showing the transformer vault and NWP compartment.
- Plumbing drawings showing vault floor drains.
- 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 EO-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.

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
- 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.

Definitions

ADA (Americans with Disabilities Act) Grating

ADA gratings are gratings that provide an accessible pathway for pedestrians with disabilities, while still giving proper ventilation for the transformer vaults.

ADA gratings are non-standard gratings. Whether or not a project requires ADA gratings is determined by the DOT. The customer will be responsible for obtaining ADA gratings on their own. Con Edison will reimburse the Customer the cost of standard gratings; the Customer is responsible for the difference in cost of the gratings.

There is one vendor that Con Edison approved for the ADA gratings. 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

Authority Having Jurisdiction (AHJ)

An agency or municipal authority responsible for inspecting and approving a customer's installation and equipment and for issuing a certificate of inspection or equivalent.

BOB Hold (Borders on Bridges Hold)

Effective February 1, 2011, any planned work requiring a DOT Construction Permit that may potentially be within 100 feet of a bridge structure will be placed on a BOB Hold. If any proposed work is within 100 feet of a bridge structure, permittees must submit a scaled drawing showing the work and exact location. If the work is more than 100 feet away from the bridge structure, permittees may send a certification by e-mail stating so.

For more information on the Bridge on Border Holds visit the NYCDOT website:

http://www.nyc.gov/html/dot/downloads/pdf/bridge_hold_maps.pdf

Building Pavement Plan (BPP)

Documentation that details what work is to be performed on any of the affected sidewalks and reflects new vault and grating locations. Con Edison requires the customer to submit a DOB approved BPP that will be used to obtain DOT initial approval.

Bus

A low resistance conductor or copper tube linking different circuits or components, such as transformers and cables together.

Bus Design

Depending on the location of the network protector rooms, Con Edison may install the equipment or you may be required to install the equipment. The bus detail design will not be issued until the vault construction detail has been inspected by Con Edison personnel. If the customer requests a bus detail design for bidding purposes, Con Edison will issue a standard package without verified field conditions for bidding purposes only.

Bus To Bus Tie

Cable connecting the paralleling networks of two or more 265/460 Volt Transformer installations.

Certification of Insurance

A document issued by an insurance company/broker that is used to verify the existence of insurance coverage under specific conditions granted to listed individuals.

Under the Customer Agreement, the Owner shall warrant that the construction is sound and in conformance with Con Edison's specifications and approved drawings and meets all requirements of applicable laws and regulations. You will ensure that Con Edison will not be liable for personal injury or property damage directly sustained in connection with such construction. You are required to furnish to Con Edison a copy of the certificate of insurance.

Checklist: Customer Design Package

Requirements for 265/460 Vault Installations to be submitted by your design team

- Environmental Phase 2 Report or Environmental Impact Statement for the site or Disclosure by the Owner which has to be certified by PE. Note: If the soil was found contaminated, it is the customer's responsibility to remediate the area.
- Soil Report with Boring Data and Boring Map from the Proposed Vault Area if the Vaults are located on the sidewalk.
- Survey of Property showing Property Line, Block and Lot Numbers, Footprint of the Building and elevation of Vaults with relation to Category 3 Hurricane Flood Zone.
- Builder's Paving Plan with Sidewalk Elevations in Area of Vaults.
- Building Drawings, included site plan with all the Utilities points of entrance (Sewer Location etc.), Building's First Floor or Ground Floor, and Basement Floor Plan, Structural and Foundation drawings for the Building in the Area of the Vaults with Floor Elevations. Space design for the Network Protector Compartments and Transformer Vaults.

- Details of any Special Construction at the Vault Location such as Planting Areas, Sidewalk Snow Melting devices, Street Lights, Hydrants, Standpipe and etc.
- Space Allocation Drawings.
- Structural Load Calculation, Drawings and Rebar Details.
- Ventilation Design Calculation Independent to building.
- Concrete Mix Design.

Checklist: Load Letter/Service Request

Con Edison requires, but not limited to, the following information to provide a service determination:

- Customer scope of work indicating if it is new construction, an existing building that is undergoing gut renovation, the addition of loads to an existing building, etc.
 - For existing buildings that are undergoing a gut-rehab in only a portion of the building, we need the ‘delta’ addition of loads, if applicable – old equip. load, new equip. load.
- Gross square feet of entire building, gross square feet of each area broken down by usage (retail, office space, restaurant, residential, etc.).
- For residential buildings, the number and size of each apartment, such as the number of 1-bedroom and 2-bedroom apartments.
- Largest motor load including the full load amperage, lock rotor amperage, and voltage.
- An expanded list of the expected connected loads (i.e. instead of listing “mechanical systems-1000 kW”, breakout to “800 kW of chiller, 200 kW of continuous pumps”).
- Submission of temporary service request concurrently with potentially large load requirements (e.g. electric cranes) highlighted.
- Preferably include plot plans/architectural plan showing the preferred point of entry (POE) and any addresses that will be compassed by the footprint of the job.

Clear Access

Clear access to a job site ensures that there are no physical or environmental conditions that could pose as a potential hazard or obstruction to a Con Edison worker or our Contractor. Physical conditions can include broken stairs, broken sidewalk cellar doors, floods, sewage, fleas, vermin, or structural defects. This also includes overhead hazards from cranes, bridges, etc. Environmental conditions can include damaged asbestos-containing material (ACM) or presumed asbestos-containing material (PACM), chemical spills, mercury spills, improperly

stored chemicals, active asbestos or lead abatements, or other recognized hazardous exposures in the direct path of access.

Company

Consolidated Edison Company of New York, Inc.

Company Responsibility

The Company Responsibility lists what structures the Company must provide or furnish during the construction phase of the project. The details of these responsibilities are listed in the Division of Responsibility and briefly outlined in the Developer's Agreement.

Concrete Mix

A customer submitted design that must conform to Con Edison's design requirements. Some design requirements include an air content of 6% (+/- 1.5%) and a slump between 4 – 6 inches.

Customer

A present customer or an applicant for the Company's electric service.

Customer Invoice

A document that itemizes your transaction with Con Edison that will include the price of services.

Customer Manhole

Manhole containing high voltage/ low voltage cables that provide the connections to the service within the customer's property line.

Customer Service Disconnect Switch

A switch that disconnects the electrical service to allow for maintenance work to be performed on any affected structure.

Disconnect Manhole

Manhole containing disconnect switches for high voltage cables.

Division of Responsibility

A document outlining what work the customer must perform and what work the Company must perform.

Drainage

Removal of excess rain water from transformer vaults directly into a city sewer system.

Emergency Generator

In order to receive an emergency generator on site, the customer should visit Con Edison's website for details: <http://www.coned.com/dg/applications/applications.asp>.

The customer must:

- File a new Electrical & Gas service request via Con Edison Project Center and sign an agreement ensuring there is no back feed to Con Edison.
- Meet the NYC Fire Department and Building Departments Emergency Power Building Law.

The customer should understand the following:

- When natural gas is the primary fuel choice for the Emergency Generator, a separated meter service line, an outdoor shut-off valve, a designated and signage posted that the valve must be operated by the firefighting personnel only will be required.
- These are not Con Edison requirements. The NYC Building and Fire Code must be satisfied for complete gas service and power authorization.
- This dedicated gas service for the Emergency Generator will be an EDF service.

Environmental Phase II Report

A report that indicates whether the soil in a construction area is clean and free of contaminants or requires remediation.

Excess Distribution Facilities (EDF)

Distribution facilities that are installed in excess to those normally provided by the Company at the request of the customer. For details see New York State PSC Rates and Tariffs No. 10-Electricity, Leaf #36: 5.2.4, Excess Distribution Facilities.

Feeder Restrictions

A limitation imposed upon the removal from service of feeders or equipment to prevent unsatisfactory operating conditions.

Final Layout

A final layout is prepared based on office records, work location inspection, or by including field information obtained from the preliminary layout if one was required. The final layout may include all or some of the following details where applicable:

- Pertinent field notes including but not limited to environmental and health and safety related messages.
- Final cable lengths, sizes.
- Conduit types, location and degree of conduit bends, if required.

- Parking restrictions.
- Grades.
- Detailed manhole views.
- Detailed transformer manhole & vault dimensions.
- Profiles based on test pit data, if required.
- Final duct selections.
- The boundary of a wetland area, if required.
- Special construction notes limited to the locations of other services in the area (i.e. gas mains and services); gas regulator stations; transmission feeders; steam mains and services, if the information is applicable to the work that will be performed.
- If the work requires digging with machinery, a Code 753 is required.
- Other information required by local governmental authorities.

Gas Service

Another service that Con Edison can supply to a job site/building

For the gas service, the customer will submit a load letter through Project Center and this will be assigned to the Major Services Customer Project Manager.

Grating Sketch

Con Edison's final design sketch that is signed off by a professional engineer. This sketch will then be submitted to the DOT. The customer then requires DOT final approval on the sketch.

Historic Building

For any historic building within 90 ft. of a construction site, we may be requested to monitor the vibration due to the construction, as the vibration may cause damage to the building such as a break into a rock bed. Construction may require local jurisdiction approval.

Holiday Embargoes

Period of time where the NYCDOT stops any non-emergency street excavation work. The holiday embargo typically starts in mid-November and lasts through January 2.

Inspections

A Con Edison qualified personnel will perform careful examinations of the gas and electric services systems to maintain and ensure the good quality of services before services are energized.

Interior Distribution Systems

A transformer vault installation within the Customer's property which is not adjacent to the property line. A request must be made and installed by the Customer for an interior distribution system.

Louver

Structure that gives natural ventilation to transformers installed inside buildings

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
- Michaelman 1-610-837-9914 Sammy or samye@micronworks.com

Maintenance Charge

As part of the EDF charge, the charge associated with the upkeep of the excess facilities that the Company installs. A customer may pay these charges on an annual basis or as a one-time lump sum payment.

Major Services CPM

A Major Services Customer Project Manager (CPM) is in charge of the construction aspect of the project. Once the Con Edison engineering package is completed by the Planning Group CPM, the case is transferred over to the respective Major Services CPM, whom coordinates the rest of the construction phase. The Major Services CPM also handles gas service and temporary service for your site.

Network Protector

A device that contains relays, fuses and switches that are designed to prevent reverse power flow. Network protectors for a 265/460 transformer vault installation must be inside the building.

Non-Standard AC Services

The Non-Standard AC services are:

- Single-phase, three-wire, 120/240 volts.
- Single-phase, two-wire, 120 volts, supplied from a single-phase 120/240 volts transformer.
- Combination of single-phase, three-wire, 120/240 volts and three-phase, three-wire, 240 volts.
- Three-phase, four-wire 265/460 volts

- High tension

Piles and Pile Mat

A thick concrete mat that rests on concrete and wood piles that have been driven to a thirty (30) ton capacity into soft or unstable ground to provide a suitable stable foundation. It usually forms part of the foundation of a building (typically a multi-story building), structure, or support base for heavy equipment, such as transformers and transformer vaults.

Planning Group CPM

The Planning Group Customer Project Manager (CPM) is in charge of the design and planning stage of the project.

Point of Service Termination/Entry (POE)

Point where the customer's cables or bus are connected to the Company's cables or bus.

Preferred POE

The point of entry that the customer wants to utilize. Con Edison will determine the additional costs associated with the request that customers are required to pay.

Premises

According to the New York State PSC Rates and Tariffs No. 10- Electricity, Leaf #33: "Premises means a parcel of land; or more than one building and/or parcel of land proximate to each other if there is common use, whether or not such buildings or parcels are individually owned or leased or separated by public or private roads."

Primary Cables

Cables that transport the distribution voltages (4kV, 13kV, 27kV and 33kV).

Pringle Switch

Device used to prevent failure of transformer system when a take-off is used to service another building.

Rebar

Epoxy-coated steel reinforcement bars that are used in the construction of the transformer vaults and network protector rooms.

Rock Removal

The removal of sound rock or boulders that cannot be removed with ordinary soil excavating equipment and must be removed by blasting or plug and feather, chippers, bull points, or similar drilling and breaking methods. Under the Customer's Agreement, Con Edison will provide a

reimbursement for the rock removal. When rock is found the customer is to stop and notify the Con Edison's CPM, in addition the customer must notify the CPM when the rock removal is completed. Failure for notifying the CPM about the rock removal start and end will result in Con Edison denying reimbursement.

SD-1&2 Filing

Form submitted to the DEP to get approval to connect the vault drain line to the city sewer system.

Service Determination

A service ruling indicating the service voltage, the number of feeders and the number of transformers, the preferred point of entry, etc.

Service Removals for Demolitions

A request that is submitted to remove Con Edison's services for demolition purposes. The request should be submitted online via Project Center.

Service Sleeve

A conduit installed through the basement wall or vault at the customer's premises that allows company utilities to enter the building.

Service Take-off

Bus or cable extension to Company's point of service termination.

Service Take-off cables

Cables connected to the Company's point of service termination.

Set of Cables

One cable of each phase and the neutral. All cables are of the same size.

Slump Test

A test that measures the consistency of a concrete mixture or the ease of which the concrete flows.

Soil Boring Report

A report used to determine if piles and a pile mat are required at the job site. Borings need to be taken from within twenty-five (25) feet of the proposed vault location to determine the soil conditions. If the soil borings show a weak blow count, a pile and pile mat will be needed.

Soil Contaminated

Soil containing any presence of oil, gasoline, asbestos or any other material that is deemed a contaminant by Con Edison.

Standard AC Services

The Standard AC Services are as follows:

- Three-wire, 120/208 volts (two conductors and a neutral of the three-phase four-wire system).
- Single-phase, two-wire, 120 volts (supplied from the three-phase four-wire system).
- Three-phase, four-wire 120/280 volts.

Street Conduits / Street Ties

Cables between a Network Protector, Bus Compartment or Crab Vault and the secondary network grid.

Sump Pump

A sump pump is a pump used to remove excess water that has accumulated in a water-collecting sump pit.

Temporary Service

A nonpermanent electric service that can be requested in order to provide energy to the construction site or other temporary activities such as fairs and celebrations. The Customer must submit a separate load letter for the temporary service loads that would be needed to start construction. After permanent service has been energized, you have a maximum of two (2) years for continuing to use the temporary service before disconnecting it. Failure in disconnecting the temporary service will result the service to be charged as an EDF service.

Transformer Vaults

Structure to house a transformer installed on sidewalks or within buildings

Ventilation

The mechanical system or equipment used to circulate air or to replace stale air with fresh air.

W-9 Form

An IRS form, also known as "Request for Taxpayer Identification Number and Certification", which is used by an individual defined as a "U.S. person" or a resident alien to verify his or her taxpayer identification number (TIN). Under the Developer's Agreement, the customer needs to furnish a copy of the W-9 form in order to obtain reimbursements.

Waterproofing

A process that will provide continuous, watertight protective coating on concrete and masonry structures housing facilities of the electrical distribution system.