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NASHVILLE ELECTRIC SERVICE
VAULT DESIGN GUIDE

(NON-NETWORK)

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NON-NETWORK VAULT DESIGN GUIDE

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NON-NETWORK VAULT DESIGN GUIDE

1. Purpose

1.1. The purpose of this guide is to ensure the furnishing of an electrical vault for utility equipment. Once designed and constructed by the Customer and accepted by NES, the electrical vault will house utility transformers, and other equipment required to serve the Customer's electrical needs.

1.2. It is intended that this document serve as a guide to the Customer in preparing a vault design rather than as a detailed specification. The Customer shall furnish complete descriptive information and specifications of the proposed vault.

1.3. This guide is intended for non-network vaults. See Appendix B for map of network and non-network areas. If a location borders the yellow line, contact NES Account Representative or the NES Engineer to confirm whether to use the network or non-network vault design guide.

1.4. Construction Methods:

1.4.1. Street Level ("At Grade" vault) – required for East Bank projects. Shall provide a personnel (escape) door into the building.

1.4.2. Below Grade – up under building with sidewalk access. Shall provide a personnel (escape) door into the building.

1.4.3. Below Grade – in the sidewalk but outside footprint of structure. Shall be adjacent to the building. Shall provide a personnel (escape) door into the building lower level. Ventilation gratings shall not be below a building entrance/exit door.

1.5. Supporting documents for these Guidelines are in the Electric Service Guidelines, Underground Construction Plate Book, and the Lighting Guidelines. All of these documents can be found at NESpower.com

1.6. Note that NES energizing a Vista or Transformer does not constitute complete acceptance. Often the Vaults must be energized before grading and/or sidewalk installation is complete around the vault lids. NES and/or Metro will require ADA compliant installation prior to final acceptance.

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2. Customer Responsibility

2.1. The word "Customer" in this document refers to the property owner or developer. Many steps will actually be completed by consultants or contractors (Customer's Architectural Team), but the ultimate responsibility rests with the Customer.

2.2. Doors, vents, removable vault tops, and grating shall be designed, constructed, and maintained by the Customer per NES requirements.

2.3. The Customer shall reimburse NES for the cost of any maintenance or cleanup performed in the vault by NES once equipment in the vault is energized.

2.4. The Customer shall have an "Application for New Commercial Service" turned into the NES Account Representative. The owner does need a reasonable estimation of the square footage of the building. At a minimum, the Customer shall provide a site plan, power distribution diagram, and service load calculations when signing up for service. The load calculation can be different than the calculation used to determine the vault size outlined in this guideline.

2.5. The vault shall pass final inspection by the NES Engineer including but not limited to: Vault top removal and replacement before NES equipment can be installed.

2.6. Damage to existing NES facilities by the Customer shall be repaired by NES at the expense of the Customer. Damage to any NES equipment shall be at the expense of the customer.

2.7. Customer shall not locate vault below footprint of the street.

2.8. Customer shall obtain permit with Metro Public Works for Customer-owned vaults and vault tops located in sidewalks. Contact the Permit Office at 615-862-8762; NES Engineer can provide contact names if necessary. Customer shall provide easements indicated on property documents.

3. Drawings

3.1. Preliminary Design Drawings

3.1.1. Customer's Architectural Team shall provide preliminary vault layout drawings for NES review and comment. It is recommended that the preliminary design drawings be included in the design development package.

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3.2. Construction/Approval Drawings

3.2.1. The Customer's Architectural Team shall submit electronic copies of the Vault Design Guide with the sheet numbers, note numbers, and details from the contract documents line by line where each item as applicable is addressed. Electronic copies of the contract documents that are indicated in the marked-up Vault Design Guide shall be submitted for approval. The submittal shall illustrate compliance with ALL applicable requirements listed in this design guide. Architectural, Civil, Structural, Mechanical, Plumbing and Electrical shall review, not just Electrical. The application will be rejected without a marked-up Design Guide. Work with the NES Engineer for the submittal requirements (quantity, size, format (paper copy may be required), etc.).

3.2.2. Re-submittal shall be required if the construction drawings lack enough detail for the NES Engineer to confirm that all requirements are satisfied.

3.2.3. It is recommended that the Customer submit construction drawings for review four (4) weeks before scheduled issue date of contract documents.

3.2.4. Structural, mechanical, architectural, civil, and electrical drawings shall be sealed and signed by a Tennessee licensed engineer for each area of responsibility.

3.2.5. The Customer shall submit the construction drawings to the NES Account Representative and the NES Engineer for final approval before construction. Work with the NES Engineer for the submittal requirements (quantity, size, format, etc.).

3.2.6. The Customer shall notify the NES Engineer immediately of any proposed changes to the vault design after construction drawings have been approved. Any changes to the vault design after the initial design approval will require additional NES review and approval.

3.2.7. Customer shall submit an existing site plan and a final site plan to help coordinate lighting, recognizing existing underground lighting pull boxes, and underground electrical lines indicated on civil plans.

3.3. As-Built Record Drawings

3.3.1. An electronic copy (AutoCAD .dwg format) of the record drawings showing all as-built revisions shall be provided to the NES Engineer before the permanent electric service will be energized.

3.3.2. As-Built drawings with significant revisions from the original construction/approval drawings shall be sealed and signed by a Tennessee licensed engineer for each area of responsibility.

3.3.3. The Customer's Architectural Team shall provide as-built surveys in AutoCAD format and in plan view for infrastructure (duct bank and manholes) installed.

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4. Architectural Requirements

4.1. Vault Inspection and Acceptance (Architect shall note 4.1.1 - 4.1.9 on Architectural drawings)

4.1.1. The Customer shall notify the NES Engineer at least five (5) working days before the grounding inspection. This must be done before the vault walls and floors are poured. NES will not inspect vault without construction drawings of the vault.

4.1.2. The Customer shall notify the NES Engineer at least five (5) working days before the proposed final vault inspection date.

4.1.3. The vault must be complete, secure, clean, and accessible for inspection to take place.

4.1.4. The Customer shall connect a temporary feed (a generator is acceptable) to the panelboard so NES can confirm that the light and receptacle circuits are operational.

4.1.5. The Customer shall remove and replace the vault tops (Functionality Test) in the presence of NES to obtain the acceptance of NES (vault shall be cleaned after lift-out test before handing over to electrical contractor). Rigging hardware and lifting means shall be provided by the customer.

4.1.6. All applicable components of this guide shall be satisfied before the vault can pass inspection and be accepted for use by NES. Vault shall be sprayed down to get rid of dust after electrical contractor completes work, before transition to NES. Installation of NES equipment is contingent on acceptance of the vault by NES.

4.1.7. Contractor to protect lift off slabs and gratings with a layer of plywood. Contractor to coordinate with NES how many sections of grating to leave unprotected for ventilation. Contractor to clean debris from grates prior to turning building over to the owner. Contractors are not to enter the vault after turning over vault to NES. (Omit if no lift off slabs).

4.1.8. Route Vault Miscellaneous Steel Shop Drawings as well as Switchboard Shop Drawings through the NES Account Representative and the NES Engineer for approval.

4.1.9. Vault floor is to be clean and smooth without any irregularities in the finish (slick machine/trowel finish required). Any expansion joints shall be saw cut.

4.1.10. Architect shall be responsible for sharing the NES Vault Design Guide to the design team and applicable parties (general contractors, etc).

4.1.11. Architect to provide codes sheet or sheet index that indicate square footage of each level of structure and total square footage of occupied or unoccupied space.

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4.1.12. See Appendix D NES drawing #UGS-00034 page 3 for building setback for in sidewalk type vaults. Building will need a 17'-6" setback from the street or more with a Section AA/BB lift off slab or a 16'-6" setback with a Section CC lift off slab. Coordinate with Structural Engineer.

4.2. General Requirements (See Appendix D NES Drawings UGS-00033, UGS-00034).

4.2.1. Transformer Size

(a) Transformer sizing and quantity shall be determined by the NES Account Representative and the NES Engineer. Customer to submit total building square footage (conditioned and non-conditioned), along with the breakdown for specific occupancy type (parking, office, retail, residential, hotel, restaurant, etc.) in order for NES to provide the size and quantity of transformers for vault design.

4.2.2. Working Clearance Around Transformers

(a) See Table 2 (Appendix A) for the maximum standard transformer dimensions. See Table 3 (Appendix A) for the minimum working clearance required for one transformer.

(b) The transformers shall be arranged in a vault such that three feet (3') of working clearance is maintained around each unit once they are installed in the operating position with six feet (6') working clearance on the front (primary) side of the transformer with elbows. Two units can share common working space. There shall be no fixed objects located within the working space.

(c) Twenty feet (20') horizontal clearance shall be provided between electrical utility vault and any above ground or underground generator vent exhausts, storage or fuel oil tank, fill valve, vent valve, or air intake in case of vault fires.

4.2.3. Installation Provisions for Equipment

(a) The vault shall be designed in such a way as to allow replacement of any one unit without disturbing the other units in service.

(b) Approval drawings shall illustrate the equipment can maneuver into the operating position around any obstacle while maintaining minimum clearances through the path of travel.

(c) Transformer(s) will likely be moved into position by NES using roller skids or roller dollies. Therefore, the vault floor shall be clean and smooth without any irregularities in the finish (slick machine/trowel finish required). Any expansion joints shall be saw cut.

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(d) Customer installed hoists will not be allowed.

(e) Vault floor shall all be one level. Multi-height vaults are not allowed.

4.2.4. Working Clearances around Equipment Access Requirement

(a) The equipment access should be located in the sidewalk or building wall along a main street. Alleys less than thirty feet (30') wide will not be used for equipment access due to the limited space for trucks and cranes to set equipment. NES may consider equipment access locations other than main streets when an easement is recorded to provide the thirty feet (30') wide corridor for truck and crane access.

(b) The equipment access shall not be located within an area that, if blocked for an extended period of time, would negatively affect operations of the Customer's facility or other surrounding facilities. An example would be a parking area entry ramp.

(c) For Street Level Vaults, provide six feet (6') clearance on the left and right of equipment access door.

(d) For Below Grade Vaults, provide six feet (6') clearance on at least three sides of the vault rim.

(e) Working space shall extend vertically from the surface of the sidewalk to forty feet (40') above the surface for all vaults.

(f) Working space shall extend from the back edge (building side) of the vault access to the street/curb (or other area where the truck or crane will be positioned).

(g) Fixed objects of any kind (fire hydrants, trees, planters, street light poles, building signs etc.) shall not be located within the working space detailed above.

(h) NES will not approve an overhang inside the working space unless it is fully retractable. Fixed awnings, signs, or balconies within the working space are not acceptable.

(i) Provide a 12" separation between any building face and the edge of the lift off slab for "swing room" for the lift off slab and gratings.

(j) Grating locations should be kept as far as possible from doors, windows, fire escapes, and combustible materials.

4.2.5. Street Level Vaults Equipment Access Requirements

(a) Provide a roll-up door or a set of hinged doors for equipment installation.

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1. Roll-Up Door Requirements:

   (i) Roll-up door "Drum Assembly" to be installed on the inside of the vault.

   (ii) Manual operation of the roll-up door is required in power outage situations.

   (iii) The width of a roll-up door shall be a minimum of ten feet (10') wide

   (iv) The height of a roll-up door shall be fourteen feet (14').

(b) Hinged Door Requirements:

1. All hinged doors shall meet the requirements of a personnel access door. See Section 4.2.8 for details.

2. Each hinged door shall be a minimum five feet (5') wide x minimum fourteen feet (14') high and open outward. If doors can only open 90°, the minimum clearance between set of door's panic hardware shall be minimum ten feet (10').

(c) Approximately ten feet (10') x ten feet (10') reinforced flat concrete pad will need to be installed outside the roll-up door or hinged door frame at the same height as the vault floor. The concrete pad shall be clean and smooth without any irregularities in the finish (slick machine/trowel finish required). If a lift out slab and grating combination is designed to sit above this area to bring area to final grade, civil or plumbing engineer to drain area to prevent water retention.

(d) Transformers shall not be installed through any access other than the roll-up or hinged door mentioned above.

(e) Fixed removable wall panels shall not be accepted.

(f) Area outside of vault dedicated for setting and moving transformers shall not have more than 1% slope.

4.2.6. Below Grade Vaults Equipment Access Requirements

(a) Vault depth should not be greater than twenty feet (20') from the elevation of the sidewalk at the sidewalk personnel access.

(b) Vault can be located entirely under the sidewalk or on the first level of a basement. Basement vaults shall extend under the sidewalk for equipment access.

(c) Vault tops and associated grating can be located within a public right-of-way or any other area subject to occasional non-deliberate vehicular traffic.

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(d) Vault tops shall be poured in place. Pre-cast tops are not allowed.

(e) Vaults located in public right-of-ways must be approved by Metro and/or TDOT.

(f) Vaults shall not be located in loading docks or parking garage entrances where expected to be driven on constantly.

4.2.7. Personnel Access General Requirements

(a) Vaults require at least two personnel entrances, one at each end of the vault.

(b) Access for personnel shall be located such that the path of egress leads to an exit that does not open into an unsafe condition such as a driveway. Personnel doors typically lead to the exterior of the facility, electrical room, basement, parking garage, or other common space.

(c) Each door (if provided) shall open in the direction of egress (doors open to outside of vault room) and be equipped with a flat bar exit device (panic door) with door closer on the vault side of the door. See Appendix E for required door hardware. The lock set shall be set up to operate as "storeroom" (ANSI 09) function. Hardware manufacturer notes that an easy field change is required to achieve the "storeroom" function with this trim kit. Details should be discussed with manufacturer's representative. Lock cylinder and core shall be provided and installed by NES. The Customer shall not have access to the vault after equipment has been energized. This hardware is mandatory, no substitutions accepted. All outswing doors shall be equipped with a steel security latch guard plate to protect from tampering and latch prying.

(d) Each doorway (if provided) leading into a vault from the building interior shall be provided with a tight-fitting UL listed door that has a minimum fire rating of 3 hours (Type A).

(e) Stairs shall not be permitted inside a vault. If stairs are required in the path of egress, they must be located outside the vault with no less than a 4' by 8' landing between the vault door and stairs.

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(f) Each doorway (if provided) leading into a vault shall have OSHA approved permanent and conspicuous safety signs installed outside the door (min. 8.5" x 11") reading: DANGER – HIGH VOLTAGE – KEEP OUT. For roll up doors, the sign shall be placed on both left and right sides of the door opening.



(g) An additional safety sign (min. 8.5" x 11") shall be posted below (h) at each doorway, outside the door, reading: WARNING – EMERGENCY EXIT – DO NOT BLOCK.



(h) All access locations and details shall be subject to NES approval.

4.2.8. Street Level Vaults Personnel Access

(a) Street level vaults require at least two personnel doors. The doors shall be on opposite ends of the vault.

(b) If hinged doors are utilized for equipment installation/removal, one of the required personnel doors may be deleted.

(c) At least one of the doors shall provide unrestricted access to NES personnel 24 hours a day/7 days a week. Access shall not be restricted by doors or gates locked with a key other than NES vault key.

4.2.9. Below Grade Vaults Personnel Grating Access

(a) Below grade vaults shall have at least one sidewalk personnel access as described below. NES Engineer may require additional points of access for multiple transformer vaults.

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(b) Access for personnel shall be located such that it is not above electric equipment or conductors in the vault.

(c) Customer must obtain Metro approval and Metro ADA Compliance Division approval for gratings installed in a public sidewalk.

(d) If gratings have elongated openings, then they shall be placed such that the long dimension of the opening is perpendicular to the dominant direction of travel. There shall be no gaps greater than half inch (½") on all sides of the grating.

(e) Detailed design/shop drawings shall be submitted to the NES Account Representative and the NES Engineer for approval. Drawings shall include grating dimensions, weights, and lifting provisions.

(f) A corrosion resistant fixed ship ladder meeting all current OSHA requirements shall be installed at a personnel access through the sidewalk. The ladder shall be installed with a 4:1 slope. See OSHA Standard 1926.1053, for "fixed ladders." Any deviation from the ship ladder requirement shall require approval from NES.

(g) Fixed ship ladder shall have an OSHA approved telescoping ladder extension post that locks in place to guide and provide stability to the user, see Appendix E for NES approved ladder extension. Customer shall make certain that the extension post is installed in such a way as to satisfy the applicable OSHA requirements.

(h) Fixed ship ladder to include a glide rail.

(i) The ladder shall not interfere with clearances required to move transformers into operating position or working clearances around transformers once they are placed into the operating position.

(j) Provide three feet (3') clear working space around all sides of personnel access through a sidewalk.

(k) Protect all exposed steel items from corrosion by hot dipped galvanizing.

5. Structural Engineer and Architectural Requirements

5.1. Fire Rating

5.1.1. The vault shall be designed and constructed in such a manner as to provide a 4-hour separation between the vault and the building (this includes the fan room if required). Two permitted exceptions to this 4-hour separation are listed below.

(a) One UL listed (Type A) 3-hour rated door is permitted into the interior of the building.

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(b) Electric service entrance may be permitted to pass through the 4-hour wall, provided a UL listed firestop system with a 3-hour rating is installed by the Customer. Detailed drawings and specifications shall be submitted to NES for approval of system selected to maintain 3-hour fire rating.

5.1.2. The vault shall be constructed of solidly poured concrete wall meeting 4-hour fire rating. **Filled-Block or pre-cast wall vault room will not be accepted**.

5.1.3. Thermal insulation or fireproofing materials shall not be installed on the ceiling or wall of a vault.

5.1.4. Contractor to include fire caulking on both sides of seams between walls and structural beams, and around both sides of door frames.

5.2. Weights and sizes of equipment are listed in Appendix A.

6. Structural Requirements, (See Appendix D NES Drawings UGS-00033, UGS-00034)

6.1. Vault Inspection and Acceptance (Structural Engineer shall include notes 6.1.1. - 6.1.7. on Structural drawings)

6.1.1. The Customer shall notify the NES Engineer at least five (5) working days before the underground grounding inspection. This must be done before the vault walls and floors are poured.

6.1.2. The Customer shall remove and replace the vault tops (Functionality Test) in the presence of NES to obtain the acceptance of NES (vault shall be cleaned after lift-out test and demonstration before handing over to the electrical contractor for equipment installation). (Omit if no lift off slabs).

6.1.3. All applicable components of this guide shall be satisfied before the vault can pass inspection and be accepted for use by NES. Installation of NES equipment is contingent on acceptance of the vault by NES.

6.1.4. It is recommended that the contractor orders inserts for the lift off slabs as early as possible. NES will not provide the required inserts. See Appendix E for the required inserts. (Omit if no lift off slabs).

6.1.5. Vault Floor is to be clean and smooth without any irregularities in the finish (slick machine/trowel finish required). Any expansion joints shall be saw cut.

6.1.6. Route Vault Miscellaneous Steel Shop Drawings through the NES Accounts Representative or the NES Engineer for approval.

6.1.7. Protect all exposed steel items from corrosion by hot dipped galvanizing.

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6.2. Street Level Vaults

6.2.1. Floor shall be sloped 1.0% to liquid containment pit. Containment pit shall have a 1% slope towards a sump pit on one end that is 18" long x 18" wide x 6" deep for liquid extraction. The 1% slope elevations shall be constant. There shall be no need for steps in vault.

6.2.2. Containment pit shall be covered with grating of sufficient strength to support expected loads. Each section of grating shall weigh less than 150 pounds. There may be multiple pits connected by 4" PVC below slab if required.

6.2.3. Liquid containment capacity shall be greater than or equal to 110% of the volume of liquid in the largest transformer (See Appendix A Table 5).

6.2.4. Where a doorway leads into the vault, a door sill or curb that is of sufficient height to confine the liquid from the largest transformer within the vault shall be provided. In no case shall the height of the sill or curb be less than four inches (4") or greater than eight inches (8"). Door sill or curb (shall be painted yellow) shall be removable if the doorway is used for equipment installation or removal. Angled iron is suggested for removable curb. Sealant shall be installed between the door sill and the vault floor.

6.2.5. The liquid containment pit shall be within the footprint of the vault and not be on a different floor/level.

6.3. Pulling Irons (All Vaults)

6.3.1. Structural Engineer shall show details and sections for compliance

6.3.2. Pulling irons used to position transformers shall be located on each wall, one foot (1') above finished floor, recessed and centered on each transformer.

6.3.3. Additional pulling irons may be required by NES Engineer.

6.3.4. Pulling irons shall be designed and installed to withstand 12,000 pound load and have a minimum eye opening of 6".

6.3.5. The pulling irons are typically cast into a concrete wall. Other pulling iron designs shall be subject to approval by NES. Embedded plates are allowed.

6.3.6. Pulling irons shall be recessed into the face of the wall. Pulling irons shall not extend into clear working space around each transformer.

6.3.7. Pulling irons shall be protected from corrosion by hot dipped galvanizing.

6.3.8. For any conduits that enter through the floor, a pulling iron insert shall be provided above on the wall four feet (4') above the top of the conduit. Coordinate with Electrical Engineer.

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6.3.9. Pulling irons are required to be placed at 9' above finished floor across from any wall "Bayouts" of conduit entrances (opposite wall or near column for cable pull leverage). Coordinate with Electrical Engineer. Location shall be in line with center bayout pipes. These are not required to be recessed.

6.3.10. See Appendix E for recessed pulling iron example.

6.4. Concrete Support Beams

6.4.1. Once transformers are in position, they shall be placed on portable concrete support beams.

6.4.2. The customer shall provide two (2) portable concrete support beams per transformer. The final location of these support beams shall be determined by NES when the transformers are set inside the vault(s).

6.4.3. Support beam details are shown in NES drawing #UN-22304. Recommended part is provided in Appendix E.

6.5. Lift Off Slabs and Grating (Below Grade Vaults)

6.5.1. NES requires cast in place concrete slabs. Equipment must not be directly under gratings. Coordinate this with Electrical Engineer or NES Engineer.

6.5.2. Gratings may be accepted for equipment access if they are required for ventilation and site conditions will not allow for ventilation separate from the vault equipment access.

(a) Customer must obtain Metro and/or TDOT approval and Metro ADA Compliance Division approval for ventilation gratings installed in a public sidewalk.

(b) See Appendix E for required gratings.

(c) Gratings shall not be located above cable racking or other NES equipment to be installed in the vault.

(d) "Electric" Identification plate required on hatch if access is for ladder. Identification plate shall be installed flush with top of hatch, centered on opening edge (non-hinge side).

(e) Grating lifting provisions shall be provided in section of grating.

(f) Detailed design and shop drawings shall be submitted to the NES Accounts Representative or the NES Engineer for approval. These drawings shall include all grating dimensions, weights, and lifting provisions.

6.5.3. Vault tops located within a public right-of-way or any other area subject to occasional non-deliberate vehicular traffic.

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(a) Designs created by use of Allowable Stress Design (structural steel) or Working Stress Design (concrete) shall use AASHTO H-20 or HS-20 Design Loading (Engineer shall indicate on contract documents).

(b) Designs created by use of Load and Resistance Factor Design (structural steel) or Ultimate Strength Design (concrete) shall use HL-93 (Engineer shall indicate on contract documents).

6.5.4. Removable concrete slabs should be provided for equipment installation and removal. Slabs should be poured in place. Pre-casted slabs shall not be accepted.

6.5.5. Maximum weight of lift-off slab shall be 14,000 pounds. Maximum length of lift-off slab shall be fourteen feet (14') (Engineer shall indicate on contract documents).

6.5.6. Four (4) 1-¼" galvanized hollow tube inserts shall be installed in each slab for lifting, See Appendix E for rigging tool requirements.

6.5.7. Indicate to contractor to provide half inch (½") max expansion around slabs for tight gaps.

6.6. Sidewalk Access for Under Building Vault

6.6.1. Where ventilation is required using the access space for below building vaults, grating of type shown on NES drawing #UGS-00033 may be used.

6.6.2. If lift off slabs are designed for this area, max weight shall be 14,000 lbs per section. Provide a 1-foot (1') gap between the building and lift off slab for swing space.

6.7. Electrical Bayout Wall Structural Details

6.7.1. Structural Engineer shall coordinate with Electrical Engineer for location of primary and secondary conduit/cable entrances. If expected to be in the wall, a bayout shall be required. If secondary conduit/cable entrances are from the ceiling, it must be near a wall and not in the middle of the room over electrical equipment.

6.7.2. Bottom of bayout should be 7' above finished floor or as approved by NES.

6.7.3. Bottom row of conduits should be 8' above finished floor or as approved by NES.

6.7.4. See Appendix D NES drawing #UN-41535.

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6.8. Below Grade Vaults

6.8.1. Floor shall be sloped 1.0% to sump pit for removal of water that may enter the vault through the ventilation gratings.

6.8.2. 1% slope elevation shall be constant. There shall be no need for steps in vault.

6.8.3. Sump pit shall be 24" long x 24" wide x 24" deep with a grating cover of sufficient strength to support expected loads. Contractor to cut notch into grating for piping to pass through. Pit can be shallower, but a bigger notch will have to be cut into the grating.

6.8.4. NES requires the installation of a sump pump in the vault to pump water to the nearest storm structure. NES required pump will be equipped with an oil sensing switch to prevent oil from being pumped into public storm water system. NES shall provide the required sump pump(s) for plumbing contractor to install.

6.8.5. The plumbing contract documents shall indicate the size of PVC drain from the sump location up and out through the vault wall to outside the vault. The Plumbing and the Civil design professionals shall coordinate to show the sump drain routed to nearest storm drainage structure for sump pump discharge and the route taken to the storm drainage structure to minimize the number of bends and elbows. The civil contract documents shall show the drain to the storm structure from the vault. See Appendix E for sump pump details.

6.8.6. Note for the contractor to coordinate the storm structure connection with Metro Water Services prior to connection. This connection needs to be routed outside of building.

6.8.7. The plumbing contract documents to indicate a shut off Valve, a PVC to rubber union, check valve, and adequate piping up the wall to the storm drainage structure or building storm system all to be supplied and installed by customer.

6.8.8. The sump pump controller location shall not be located under gratings. Final location of controller shall be subject to NES approval.

6.8.9. See Section 4.2.9. and Appendix E for ship ladder and hatch access information.

7. Mechanical Engineer Requirements

7.1. Ventilation and Equipment Cooling

7.1.1. Vaults shall be located where they can be ventilated to the outside environment without using flues or ducts wherever such an arrangement is practical.

7.1.2. Ventilation adequate to dispose of the transformer full-load losses (heat output) without creating a temperature rise that is in excess of the transformer rating shall be provided.

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7.1.3. Ventilation outlets shall be located as far as possible from doors, windows, fire escapes, and combustible materials.

7.1.4. Ventilation inlet and outlet shall be at opposite ends of the vault room so ventilation system directs airflow across the vault to ensure uniform temperature and no hot spots.

7.1.5. Louvers utilized for ventilation shall include bird screens. Detailed drawings shall be submitted for approval. Louvers shall be fixed in the open position and shall not be controlled by fire or smoke detectors. Steel hot dipped galvanized bars will be required behind the louvers to prevent access to vault.

7.1.6. Mechanical see Sections 6.5 and 6.6 for grating design. Coordinate with Structural and Electrical design professionals.

7.1.7. Mechanical Engineer shall show calculations on the Contract Documents or coordinate with the Electrical Engineer to show. Mechanical Engineer to determine the area of gratings required and coordinate with the Structural Engineer.

7.2. Ventilation by Natural Circulation

7.2.1. A vault ventilated by natural circulation of air shall be permitted to have roughly half of the total area of openings required for ventilation in one or more openings near the floor and the remainder in one or more openings in or near the roof, or all of the area required for ventilation shall be permitted in one or more openings in or near the roof.

7.2.2. The combined net area of all ventilating openings, after deducting the area occupied by screens, gratings, or louvers, shall not be less than three square inches (3 sq-in) per kVA of transformer rating(s).

7.3. Ventilation by Forced Air

7.3.1. The full load heat loss (heat output) for each transformer is listed in Table 5 (Appendix A).

7.3.2. Total full load heat loss of a vault with one transformer installed equals the full load heat loss of that transformer. If multiple transformers are included in the vault design, the total heat loss for all transformers to be considered.

7.3.3. Vault Temperature

(a) The temperature of the cooling air (ambient vault temperature) shall not exceed 122°F (50°C), and the average temperature of the cooling air for any 24-hour period shall not exceed 104°F (40°C).

7.3.4. Vault shall only be accessible to qualified NES personnel.

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7.3.5. Mechanical equipment (filters, fans) shall not be located within the vault structure, they shall be located such that they can be maintained by the customer from outside the vault.

7.3.6. A transformer fan room (adjacent to the transformer vault) will need to be 4-hour rated with 3-hour doors unless the room opens to the exterior of the building. Steel hot dipped galvanized bars will be required to separate this fan from the transformer vault room.

7.3.7. Ventilation registers/grilles shall not be located over electric equipment.

7.3.8. Ventilation equipment shall be standalone. Building heat, smoke, or fire detectors shall not interfere with the operation of the ventilation system. Fire dampers in the ducts are not allowed.

7.3.9. Fans shall be controlled by one thermostat located within the vault. The thermostat shall be rated for installation in a damp environment. Mechanical Engineer to advise location of thermostat and set point to satisfy 7.3.3.

7.3.10. The exhaust should exit above grade in an area that does not interfere with pedestrian traffic. If the exhaust must exit through gratings in the sidewalk, care should be taken to ensure air velocities are low enough not to interfere with pedestrian traffic. It is recommended that these installations be approved by Metro Public Works.

7.3.11. If use of ventilation duct work cannot be avoided, the applicable requirements detailed below shall be satisfied.

(a) Ventilation duct shall be 4-hour rated construction.

(b) Ventilation ductwork that passes through the interior of the building (or parking garage) shall be routed through a 4-hour fire rated enclosure in order to maintain a 4-hour separation between the building and vault.

(c) Detailed drawings and specifications shall be submitted to NES for approval of system selected to maintain 4-hour fire rating.

(d) Customer shall provide drawings sealed and signed by a Tennessee licensed mechanical engineer as described in Section 3.

8. Plumbing Engineer, Fire Protection, Civil, Mechanical Requirements

8.1. Compliance Drawing(s). Provide drawing(s) to show compliance with following concerning the vault, (See Appendix D UGS-00033, UGS-00034):

8.1.1. Piping unrelated to the functions of the electrical service shall not be routed through the vault.

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8.1.2. Fire detection or suppression equipment shall not be located in the transformer vault.

8.1.3. Contract documents shall clearly indicate compliance with this section.

8.1.4. Plumbing contract documents to include documentation for Section 6.8.

8.1.5. Plumbing engineer shall determine appropriate sump discharge size. NES sump model included in Appendix E. See section 6.8.

9. Electrical Engineer Requirements, (see Appendix D NES drawing UGS-00034).

9.1. Required General Notes (Electrical Engineer shall include notes 9.1.1. to 9.1.11 on Electrical contract documents)

9.1.1. The Customer shall notify the NES Engineer at least five (5) working days before the underground grounding inspection. This must be done before the vault walls and floors are poured.

9.1.2. The Customer shall connect a temporary feed (a generator is acceptable) to the vault panelboard so NES can confirm that the light and receptacle circuits are

9.1.3. The location and quantities of light fixtures is for design intent and pricing only. Exact location of light fixtures and devices shall be spot located by NES personnel prior to installation. Contact NES C&M Supervisor five (5) working days prior to installation.

9.1.4. Listed rigid non-metallic conduit, fittings, and boxes shall be used throughout the installation. The entire conduit system shall be installed and equipped so as to prevent water from entering the conduit system. All supports, bolts, straps, screws, and so forth, shall be of corrosion-resistant materials or be protected against corrosion by approved corrosion-resistant materials.

9.1.5. All components of vault electrical system shall be surface mounted. Components of the vault electrical system shall not extend into path of egress or clear working space.

9.1.6. For the purpose of electrical design, vaults shall be considered “Wet Location” for any vault below grade, and “Damp Locations” for vaults at Street Level unless otherwise specified.

9.1.7. The luminaires shall be arranged so that persons changing lamps or making repairs on the lighting system are not endangered by live parts or other equipment. Luminaires shall not be located directly above electrical equipment or conduit penetrations. Luminaires shall not be installed on removable access panels.

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9.1.8. It is recommended that the contractor order grounding inserts as early as possible. NES will not supply these inserts. These must be procured prior to vault wall pour. See Appendix E for the required inserts. See section 9.8 for insert details.

9.1.9. Route Service Switchboard(s) Shop Drawings through the NES Accounts Representative Services and the NES Engineer for approval.

9.1.10. Panelboard schedule should be completed (typed) before vault inspection is requested.

9.1.11. Once the vault is accepted by NES, no admittance into the vault is allowed without NES approval.

9.1.12. Coordinate with the Civil Engineer that the site plan and the electrical drawings have no gaps in scope between disciplines from the primary duct banks to the entrance into the electrical vault.

9.1.13. Once vault design is approved, send PDFs of the Vault – Structural details and the vault floorplans, electrical and grounding plans to The NES Construction and Maintenance section at CM_Carpenters@nespower.com. Include Vault Inspection and address in the subject line.

9.2. Panelboard

9.2.1. A Square D NEMA Type 4X enclosure, 120/240V, 60A/2P branch circuit panel with Square D type QOB breakers shall be installed in the vault to be operated by utility personnel.

9.2.2. Panelboard shall be fed from the Emergency Power Supply circuit of the building.

9.2.3. All receptacle circuits shall be provided and shall have ground fault circuit interrupting (GFCI) outlets for personnel protection.

9.2.4. Two spare 20A/1P breakers shall be installed for future use by NES personnel.

9.2.5. Provide liquid type conduit connectors into panelboard.

9.3. Illumination

9.3.1. Illumination shall be provided for all paths of egress and working spaces around electrical equipment. Illumination level shall be 60 foot-candles or greater.

9.3.2. Electrical engineer shall fill out foot-candle calculation sheet attached showing all calculations and determine number of light fixtures required (Appendix C).

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9.3.3. At least two (2) lighting circuits shall be provided. Lights shall be wired in alternating fashion so that the vault is still evenly lit with one switch in the off position.

9.3.4. Two (2) light switches shall be located adjacent to each personnel access. When a personnel access is provided through the sidewalk grating, two (2) light switches shall be accessible from the top of each ladder.

9.3.5. The lighting circuits shall be wired around the vault, with a junction box near each fixture location. A flex conduit shall connect each junction box to each fixture. See Appendix E for approved lighting fixtures.

9.3.6. Vault lighting/receptacle circuits shall be designed, provided, and installed by the Customer.

9.3.7. Installation shall comply with the latest edition of the National Electrical Code in effect.

9.3.8. Locations of all vault electrical equipment shall be subject to NES approval.

9.4. Receptacles

9.4.1. At least one receptacle shall be provided on each interior wall. Additional receptacles may be required by the NES Engineer. Receptacles shall be duplex type, 20A/125V, NEMA 5-20R.

9.4.2. One duplex type, 20A/125V NEMA 5-20R receptacle dedicated circuit shall be provided on the wall adjacent to each sump. Sump receptacles not required for Street Level Vaults unless otherwise specified by NES Engineer.

9.4.3. Receptacles shall be installed at a height of sixty inches (60”) above finished floor in Below Grade Vaults, and thirty six inches (36”) above finished floor in Street Level Vaults.

9.4.4. One general use receptacle shall be no more than fifteen feet (15’) away from the sump.

9.5. Conduit Entrance

9.5.1. Customer should be mindful of vault/building structural members when laying out primary or secondary entrance.

9.5.2. Conduit entrance penetrating the floor shall not be located within a path of egress or clear working space. Conduit shall not be directly in front of ventilation louvers.

9.5.3. For conduit entrance penetrating a wall, see section 6.3.9 regarding pulling iron location.

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9.5.4. Provide bayouts for all conduit penetrations in the wall.

9.5.5. See Appendix D for NES drawing #UN-41535 for typical conduit bayout details.

9.5.6. Bayout shall not be located under ventilation gratings. Concrete encasement is permissible to extend bayout so no conductor is exposed under a grating. Conduit sleeves shall be permitted under grating if concrete encasement is an obstacle.

9.5.7. Locate bayouts to minimize the amount of cable that passes under ventilation gratings.

9.5.8. Electrical service conduits shall not be located within ten feet (10') of any above ground or underground storage tank, fill valve, or vent valve.

9.5.9. (Below Grade Vaults) Unused conduits shall be filled with duct seal.

9.5.10. (Above Grade Vaults) Unused conduits shall be filled with fire stop.

9.6. Primary Entrance

9.6.1. When manholes are involved, primary ducts shall extend from the vault to within ten feet (10') of the energized manhole specified by NES Engineer. Customer shall be responsible for excavation from the vault to the manhole. Customer shall complete the duct run to the manhole coordinating with NES (NES may have manhole work to complete to make the manhole ready to accept the duct run).

9.6.2. Primary ducts shall be encased in red dye concrete. See Appendix D for NES drawing# UN-42979 for additional duct run requirements.

9.6.3. Primary ducts entering a vault through the floor shall be 8" - 10" from vault wall and extend six to eight feet above finished floor and shall be galvanized rigid steel conduit. Tops of conduits shall be threaded with ground bushing. Conduits shall be straight and square with the walls.

9.6.4. Additional ducts may be required. Verify final arrangement and quantity of ducts with NES Engineer.

9.6.5. The primary conductors are to be supported by a four inch (4") "Angle Iron or Aluminum Angle" support supported from the walls of the room and ceiling if required. "Angle Iron or Aluminum Angle" support shall be positioned so it is one foot (1') in front of the transformer and nine feet (9') above finished floor. The "Angle Iron or Aluminum Angle" support shall be installed after the transformer is installed if the transformer is placed with the front facing the door. See Appendix E for part number.

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9.6.6. Where Primary conduits enter the floor, Elbows (90°) and turn ups shall be galvanized rigid steel conduit as well as 10' back from the elbow.

9.7. Secondary Entrance

9.7.1. One bank of conduits shall be provided for secondary service entrance cables unless otherwise approved by NES Engineer in writing.

9.7.2. Secondary ducts entering a vault through the floor shall extend eight inches (8") above finished floor in Street Level Vaults. Secondary ducts should not enter through the vault floor in Below Grade Vaults.

9.7.3. Conductors shall be copper and the number of secondary ducts, the location of the entrance, and the arrangement of the ducts shall be subject to NES approval. "Compacted" (aka Compact Strand) secondary cable will not be accepted. Number of sets greater than 15 per transformer shall be coordinated and approved by the NES Engineer. 750 MCM compressed is the largest cable our transformer spades will accept. See the Electric Service Guidelines for other wire sizes and lugs in the Commercial Service section.

9.7.4. The electrical construction drawings shall indicate cable racking from the secondary conduits to the transformer. Layout shall be coordinated and approved by the NES Engineer. See Appendix E for part numbers, photos, and method suggestions.

9.7.5. The consulting engineer shall specify the service cable be provided with color insulation per Table 6 (See Appendix A).

9.8. Grounding Provisions

9.8.1. NEMA Std 4-hole ground inserts shall be provided and cast into the concrete structure by the Customer, see Appendix E for required inserts.

9.8.2. At a minimum, ground inserts shall be installed to within 12" of where the primary electrical conduits enter the vault and, on the walls, as illustrated in Appendix D NES drawing #UGS-00035.

9.8.3. Additional ground inserts may be required by NES Engineer.

9.8.4. Install 4/0 AWG – 19 STR bare soft drawn copper just inside the vault wall to form a ring inside the vault walls.

9.8.5. Provide grounding ring per Appendix D NES drawing #UGS-00035.

9.8.6. Customer shall coordinate grounding inspection per Section 4.1.

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9.9. NES Meter Information

9.9.1. Meter locations, room/space requirements, bases, and general information shall be coordinated with NES Meter Department at 615-415-6770.

9.9.2. Meter information is available on the NES website at www.nespower.com under the Builders & Contractors pulldown menu. Download the "Electrical Service Guidelines" under the Guidelines & Manuals pull down. See Meter section of this manual. For more detailed meter information contact the NES engineer.

9.9.3. NES recommends that businesses who have unknown retail spaces with separate meter type loads, to install an adequately sized fused disconnect and a NES approved terminating cabinet with adequate space for meter installations around this equipment. Coordinating space requirements with NES Meter Department.

9.9.4. Coordinate with NES Metering Department for meter base types (All single phase services will require fifth terminal).

9.10. Electrical Switchboard Room Plan Submission

9.10.1. Shall include a ¼ scale drawing or isometric of the switchboard room. This drawing shall indicate transition sections of the gear if the gear is fed overhead from the vault, the fire pump sections if hot sequenced, and the meter equipment space to satisfy the meter requirements of section 9.9.

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APPENDIX A

NON-NETWORK TRANSFORMER SPECIFICATIONS

TABLE 1: Non-Network Transformer Requirements for Standard Service Ratings

Secondary Voltage	Total From 4.2.2		Rated Power	Maximum Available Fault Current
	Size (min)	Size (max)		
(V)	(kVA)	(kVA)	(kVA)	(A)
208Y/120	751	1000	1000	52187
208Y/120	1001	1500	1500	78281
480Y/277	min	750	750	16961
480Y/277	751	1000	1000	22615
480Y/277	1001	1500	1500	33922
480Y/277	1501	2500	2500	56536
480Y/277	2501	3000	3000	67844

TABLE 2: Maximum Non-Network Transformer Dimensions

Rated Power	Secondary Voltage	Rated Current	Width		Length (including connections)		Height (floor to cover)	
(kVA)	(V)	(A)	(In)	(Ft-In)	(In)	(Ft-In)	(In)	(Ft-In)
1000	208Y/120	2776	72	6-0	120	10-0	93	7-9
1500	208Y/120	4164	72	6-0	120	10-0	97	8-1
750	480Y/277	902	72	6-0	120	10-0	97	7-9
1000	480Y/277	1203	72	6-0	120	10-0	93	7-9
1500	480Y/277	1804	72	6-0	120	10-0	97	8-1
2500	480Y/277	3007	84	7-0	120	10-0	117	9-9
3000	480Y/277	3608	96	8-0	144	12-0	120	10-0

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TABLE 3: Minimum Working Clearance Required for a Non-Network Transformer

Rated Power	Secondary Voltage	Rated Current	Width		Length (including connections)		Height (floor to cover)	
(kVA)	(V)	(A)	(In)	(Ft-In)	(In)	(Ft-In)	(In)	(Ft-In)
1000	208Y/120	2776	144	12-0	228	19-0	165	13-9
1500	208Y/120	4164	144	12-0	228	19-0	169	14-1
750	480Y/277	902	144	12-0	228	19-0	165	13-9
1000	480Y/277	1203	144	12-0	228	19-0	165	13-9
1500	480Y/277	1804	144	12-0	228	19-0	169	14-1
2500	480Y/277	3007	156	13-0	228	19-0	189	15-9
3000	480Y/277	3608	168	14-0	252	21-0	192	16-0

TABLE 4: Minimum Clearance Required for Moving a Non-Network Transformer

Rated Power	Secondary Voltage	Rated Current	Width		Length (including connections)		Height (floor to cover)	
(kVA)	(V)	(A)	(In.)	(Ft-In)	(In.)	(Ft-In)	(In.)	(Ft-In)
1000	208Y/120	2776	96	8-0	132	11-0	119	9-11
1500	208Y/120	4164	96	8-0	132	11-0	123	10-3
750	480Y/277	902	96	8-0	132	11-0	119	9-11
1000	480Y/277	1203	96	8-0	132	11-0	119	9-11
1500	480Y/277	1804	96	8-0	132	11-0	123	10-3
2500	480Y/277	3007	108	9-0	144	12-0	143	11-11
3000	480Y/277	3608	120	10-0	144	12-0	146	12-2

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TABLE 5: Miscellaneous Non-Network Transformer Information

Rated Power	Secondary Voltage	Rated Current	Approx. Max Unit Weight	Approx. Max Liquid Capacity of One Unit	Full Load Heat Loss
(kVA)	(V)	(A)	(lbs.)	(gal)	(kW)
1000	208Y/120	2776	14500	750	11
1500	208Y/120	4164	17125	1000	17
750	480Y/277	902	9750	750	8.5
1000	480Y/277	1203	14500	1000	11
1500	480Y/277	1804	17125	1000	17
2500	480Y/277	3007	22375	1200	28
3000	480Y/277	3608	25000	1200	33

TABLE 6: Secondary Cable Color Code

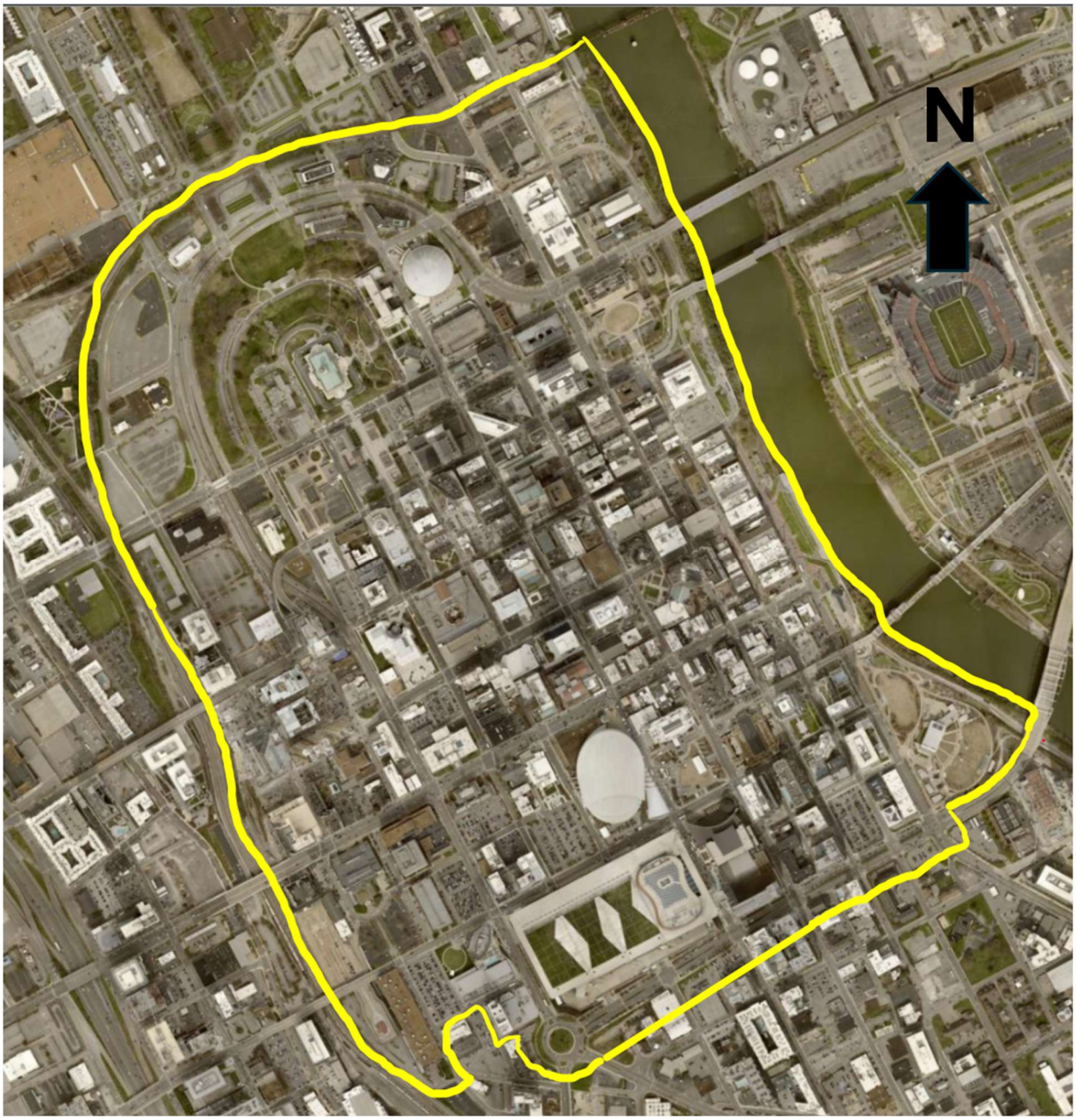
PHASE	VOLTAGE	
	208Y/120V	**480Y/277V**
Neutral	White	Gray
A	Black	Brown
B	Red	Orange
C	Blue	Yellow

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APPENDIX B

NON-NETWORK MAP (EVERYTHING OUTSIDE OF CIRCLED YELLOW AREA)



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APPENDIX C

STANDARD LIGHTING CALCULATION

ROOM NAME: TRANSFORMER VAULT

DATA REQUIRED:

ROOM LENGTH (RL): _____

ROOM WIDTH (RW): _____

ROOM AREA (RL X RW): _____

CEILING HEIGHT: _____

FIXTURE HEIGHT ABOVE WORK PLACE (HAWP): 7’

MAINTENANCE FACTOR (MF): .85

LAMP LUMENS (LL) (OBSTAINED FROM CATALOG): _____

ROOM CAVITY RATIO (RCR) = $\frac{(5)\,(7)\,(RL+RW)}{(RL)\,(RW)}$

COEFFICIENT OF UTILIZATION (CU) (OBTAINED FROM CATALOG): _____

#FIXTURES = $\frac{60\,(RL)\,(RW)}{(2)\,(LL)\,(CU)\,(.85)}$

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APPENDIX D

STANDARD DRAWINGS

31. NES Drawing #UN-22304 - Concrete Support Beams for Vault Transformer

32. NES Drawing #UN-41535 - Standard Vault Bayout Detail

33-36. NES Drawing #UN-42979 – NES Network Conduit System Details

37. NES Drawing #UGS-00033 – Construction Details Vault Grating

38-41. NES Drawing #UGS-00034 - Standard Non-Network Vault Layout

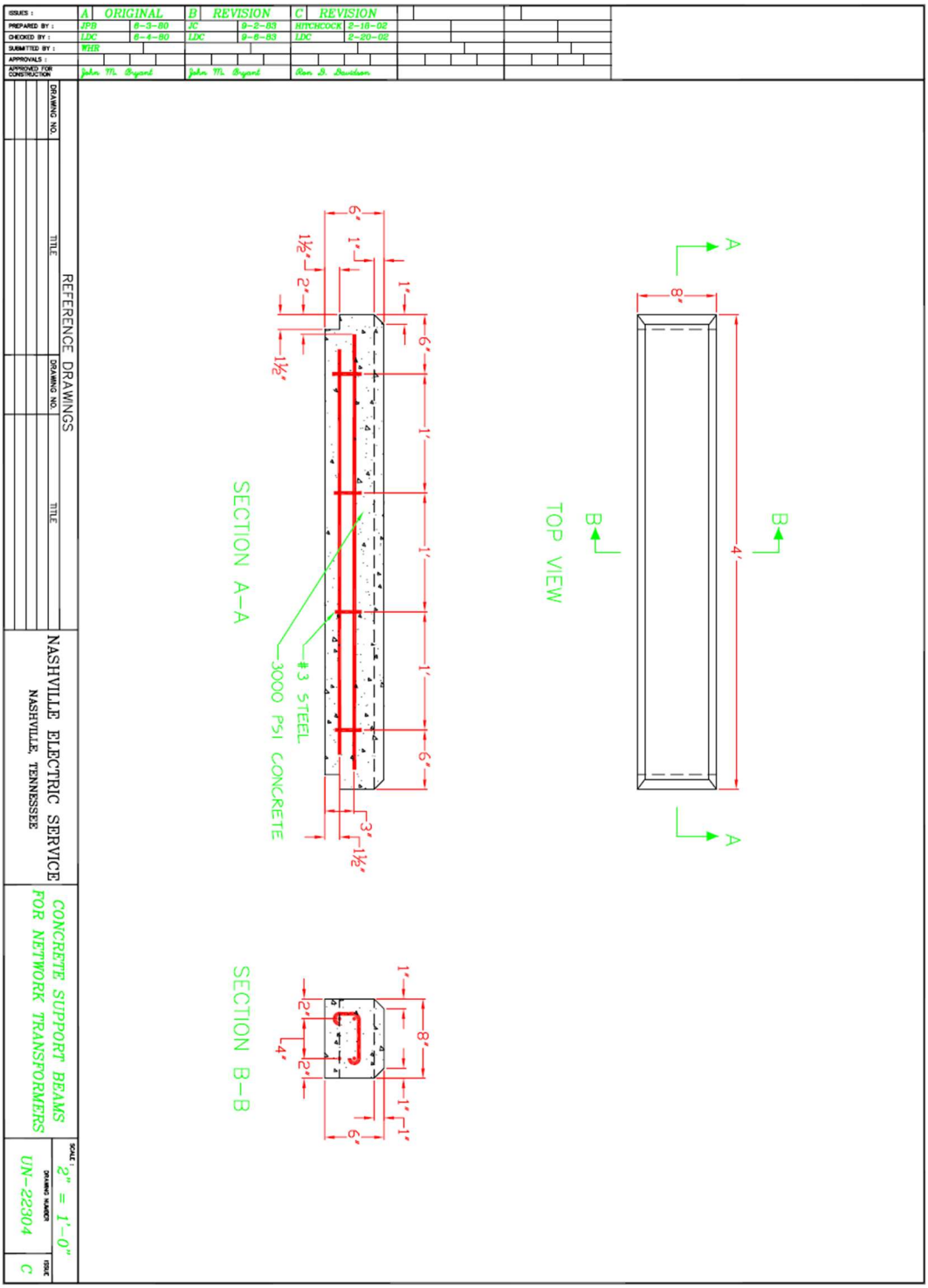
42. NES Drawing #UGS-00035 – Non-Network Vault Grounding Detail

43. NES Drawing #UGS-00049 – Miscellaneous Non-Network Vault Wiring Diagrams

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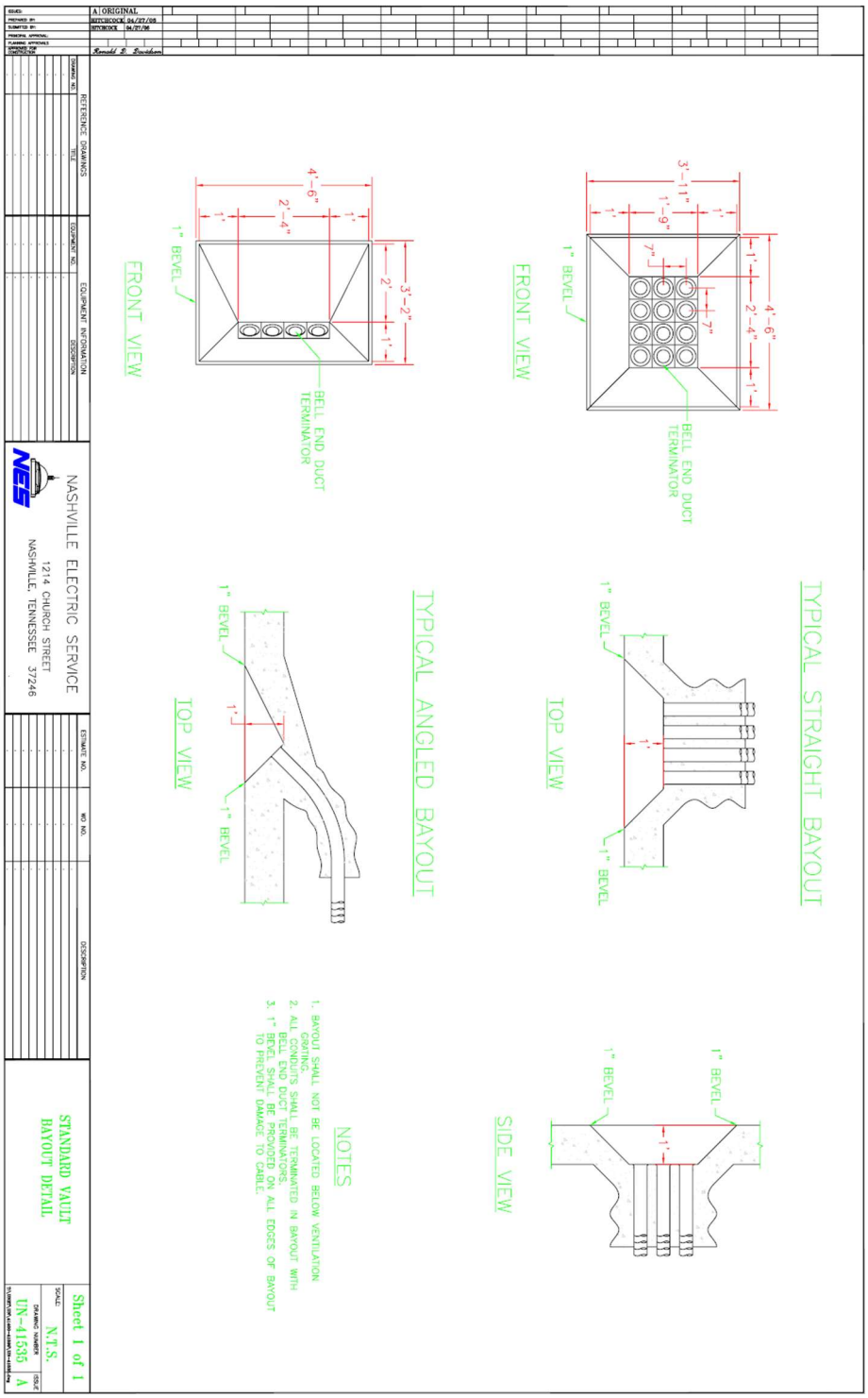
NES Drawing #UN-22304 - Concrete Support Beams for Vault Transformer



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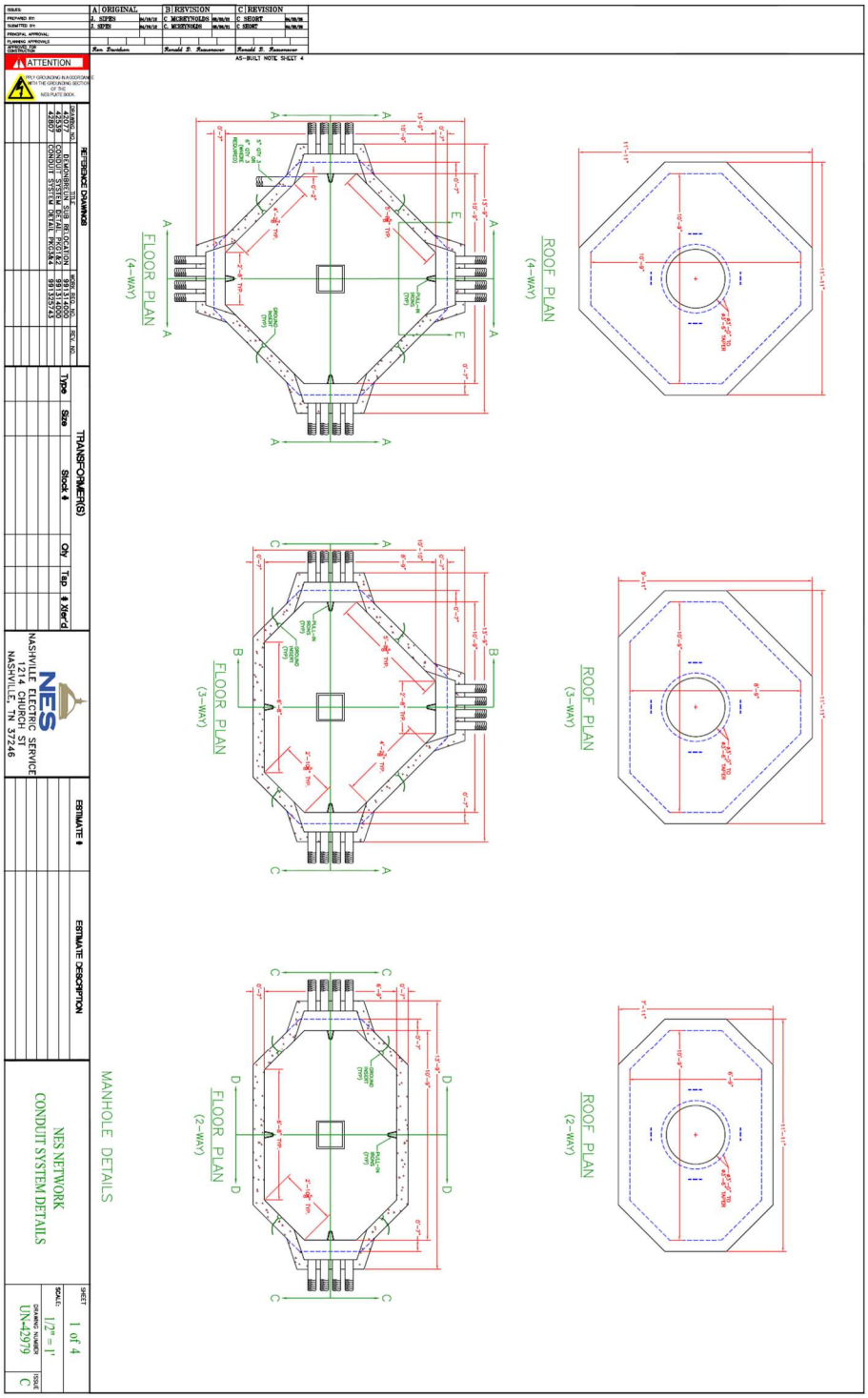
NES Drawing #UN-41535 - Standard Vault Bayout Detail



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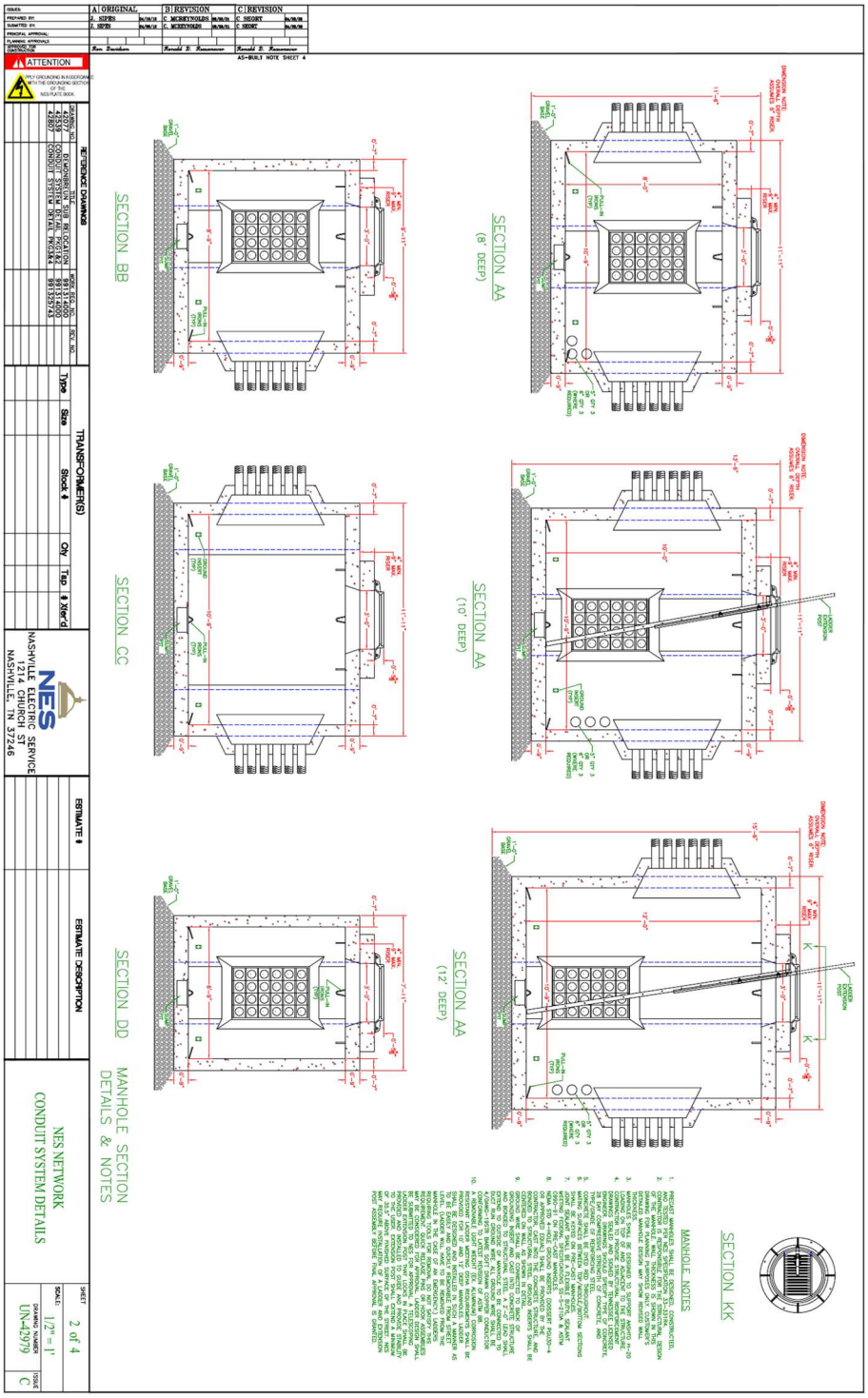
NES Drawing #UN-42979 - Conduit System Details



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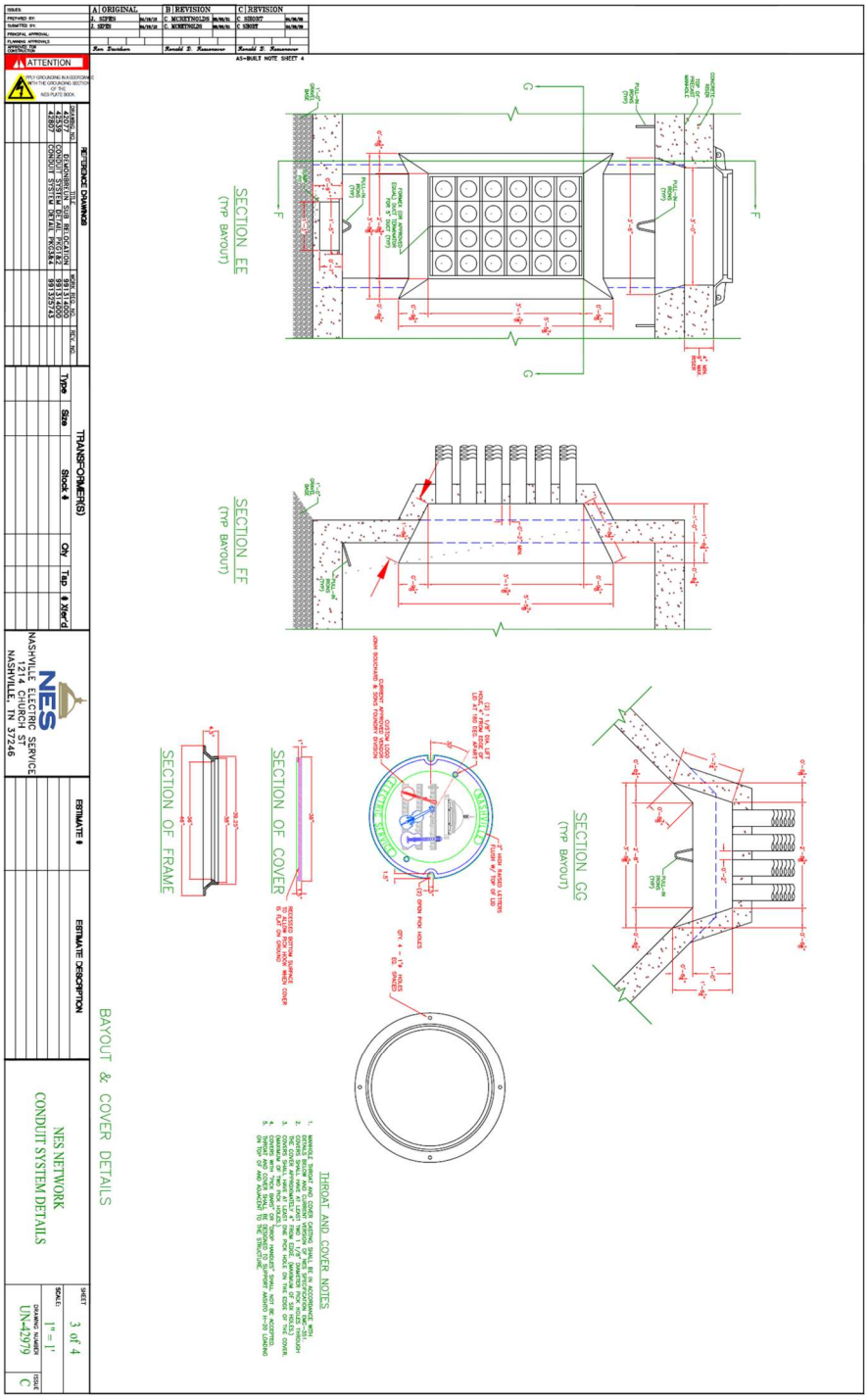
NES Drawing #UN-42979 - Conduit System Details



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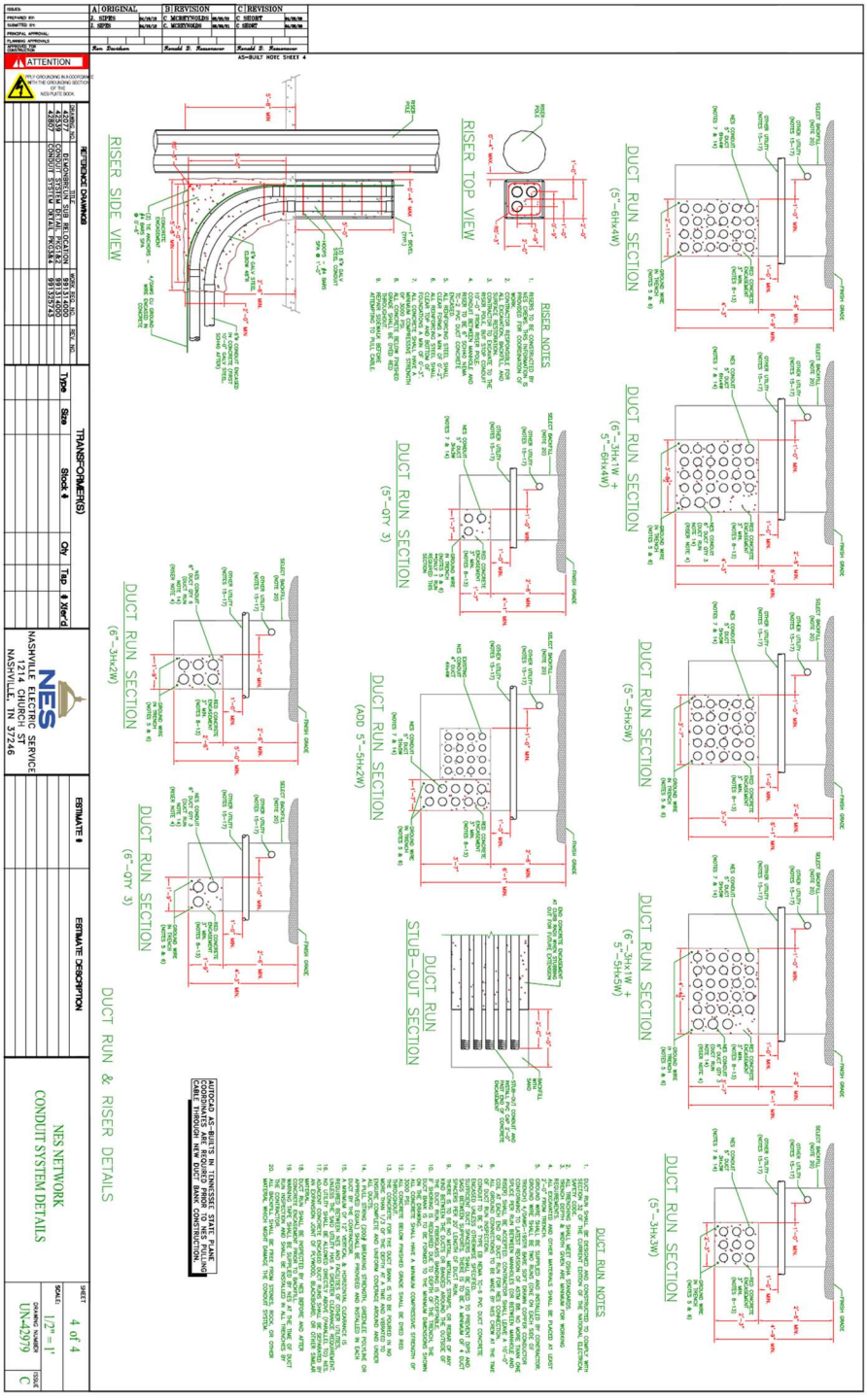
NES Drawing #UN-42979 - Conduit System Details



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NON-NETWORK VAULT DESIGN GUIDE

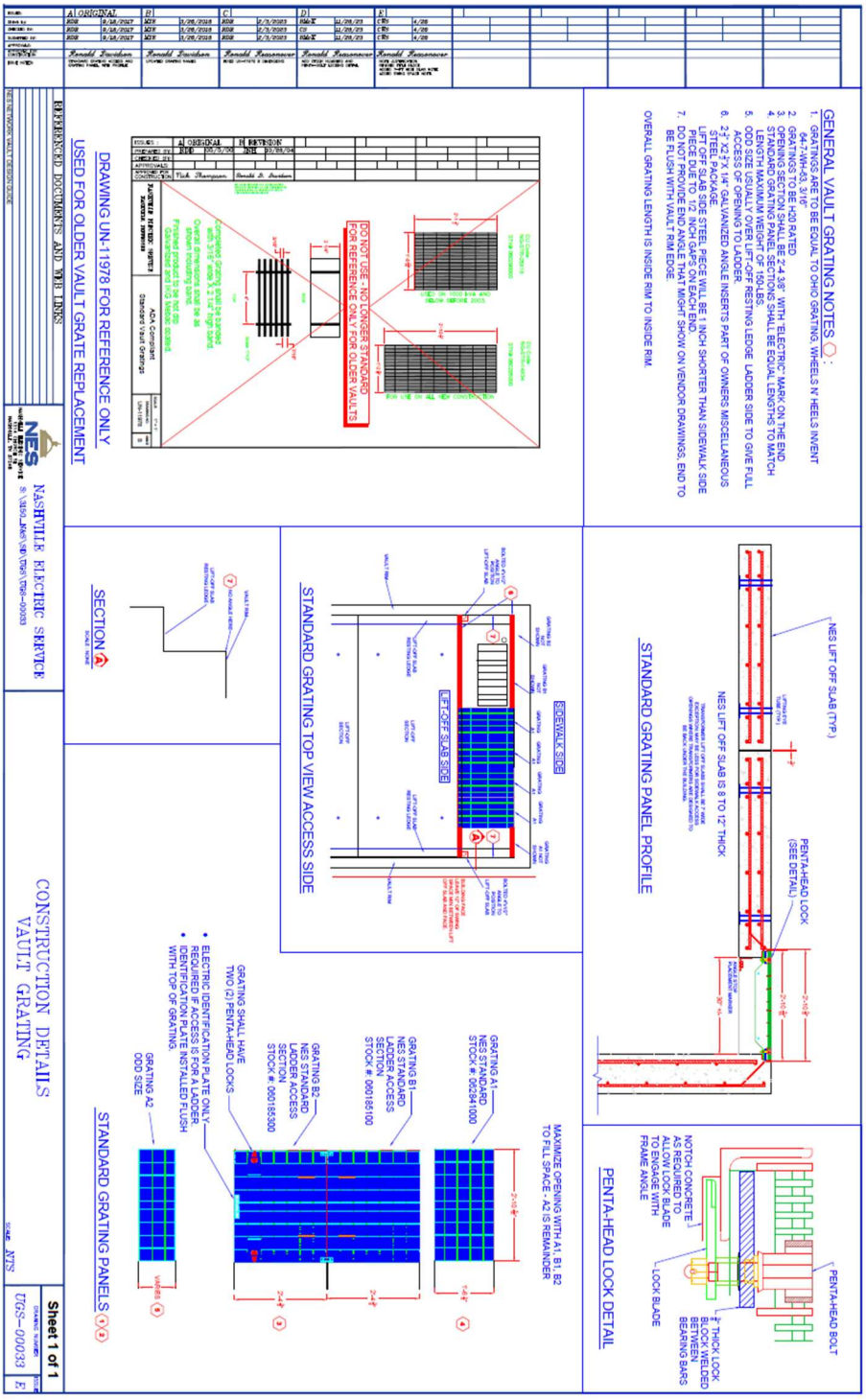
NES Drawing #UN-42979 - Conduit System Details



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NON-NETWORK VAULT DESIGN GUIDE

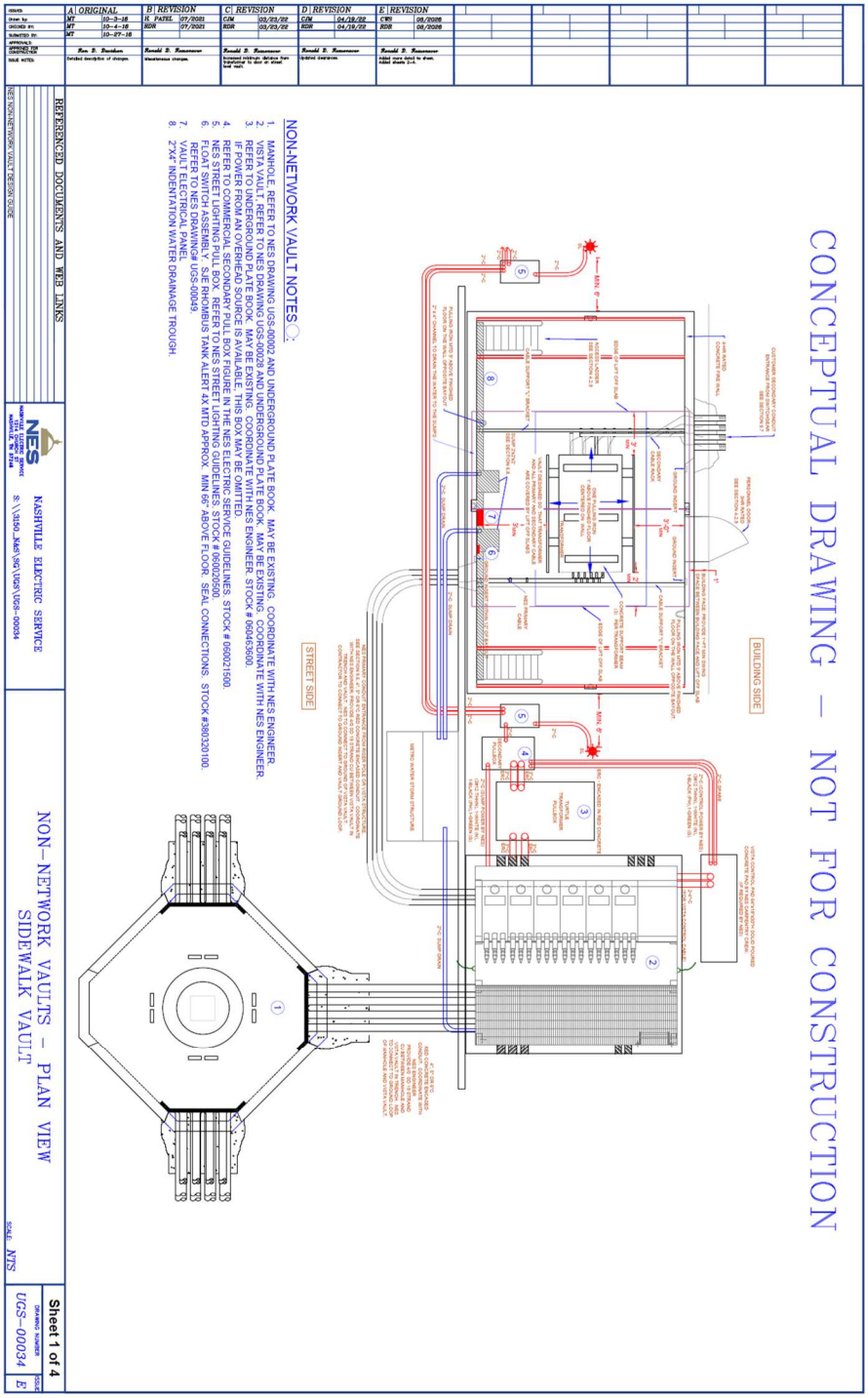
NES Drawing #UGS-00033 - Standard Non-Network Vault Layout



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NON-NETWORK VAULT DESIGN GUIDE

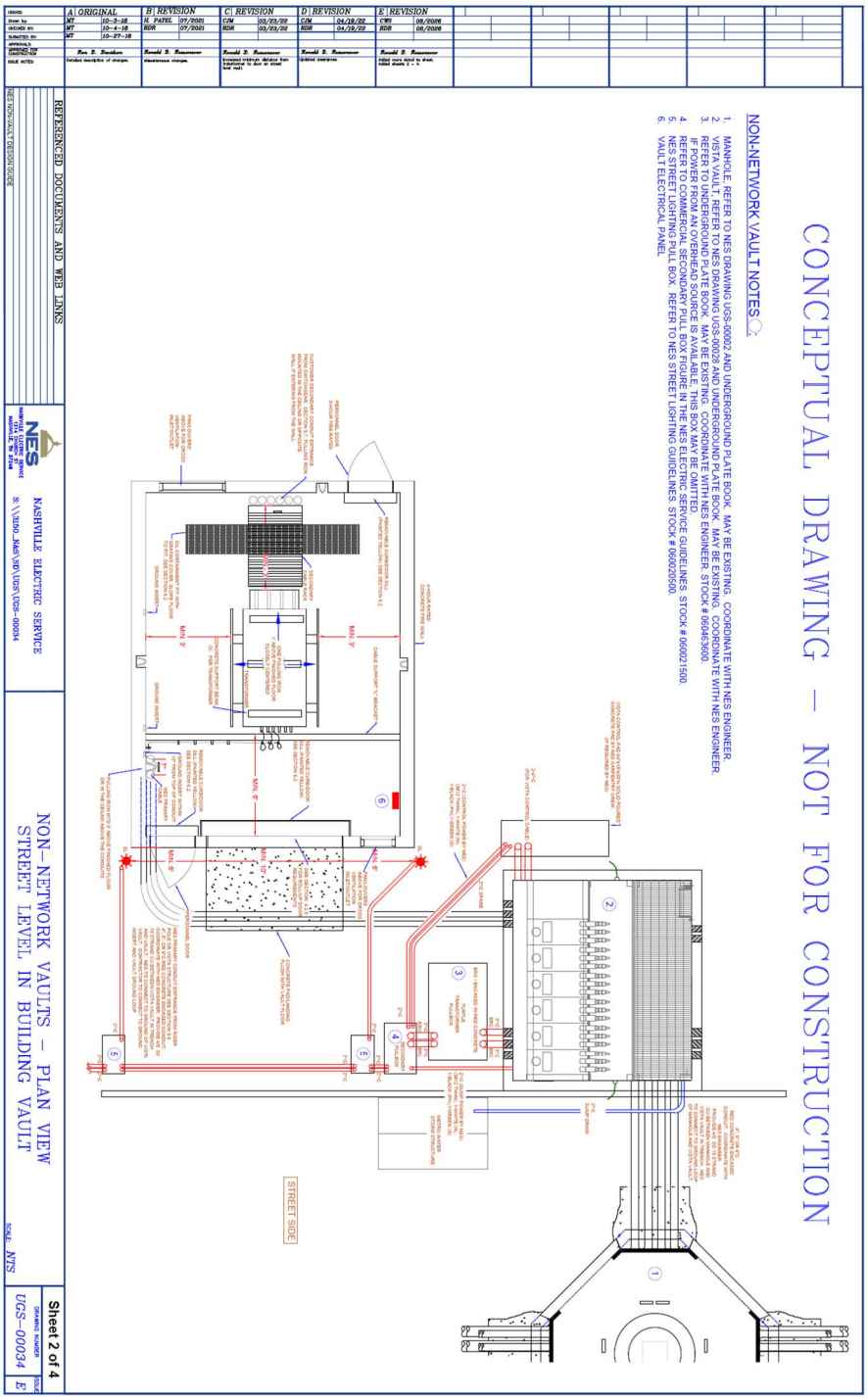
NES Drawing #UGS-00034 - Standard Non-Network Vault Detail



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NON-NETWORK VAULT DESIGN GUIDE

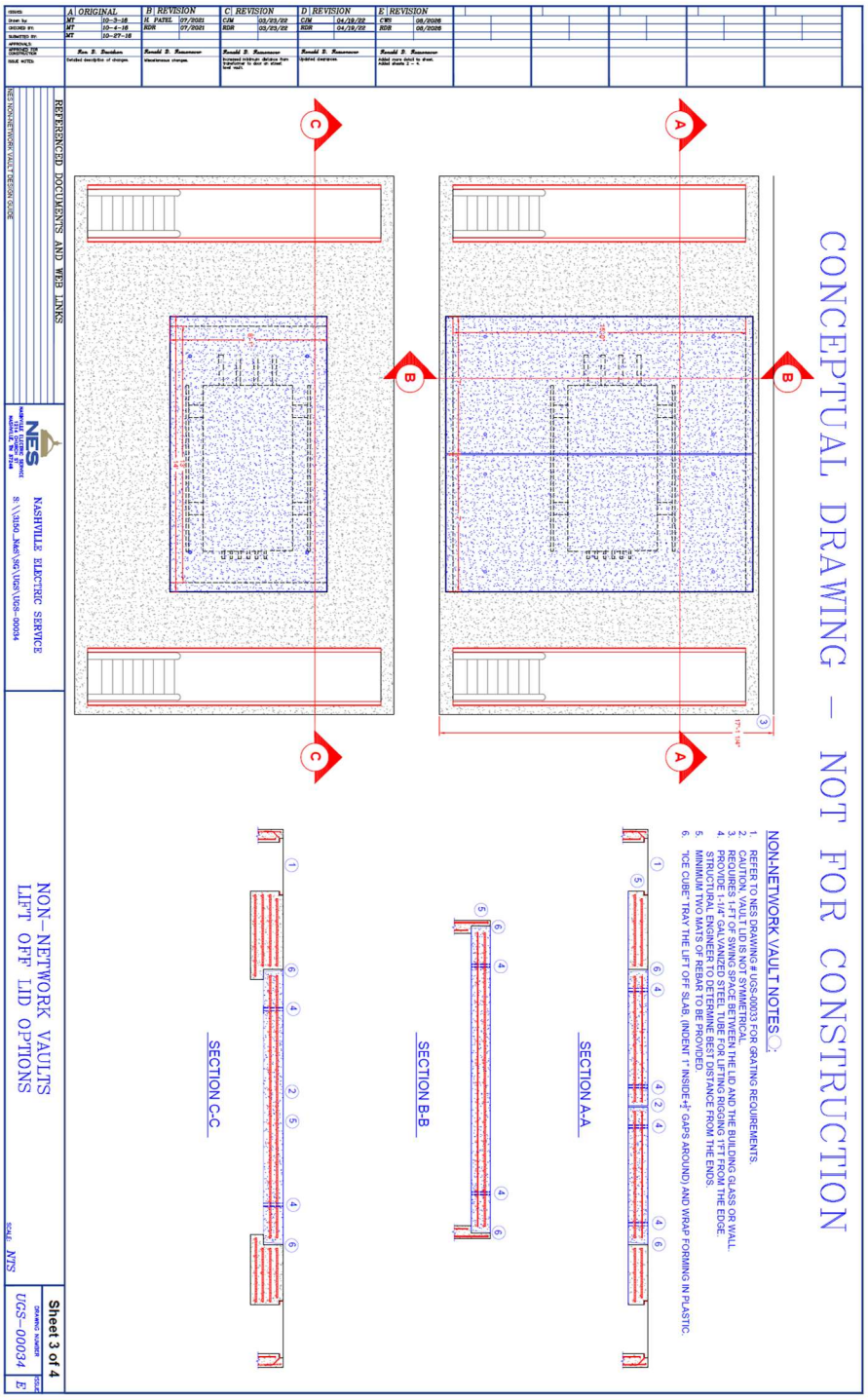
Drawing #UGS-00034 - Standard Non-Network Vault Detail



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NON-NETWORK VAULT DESIGN GUIDE

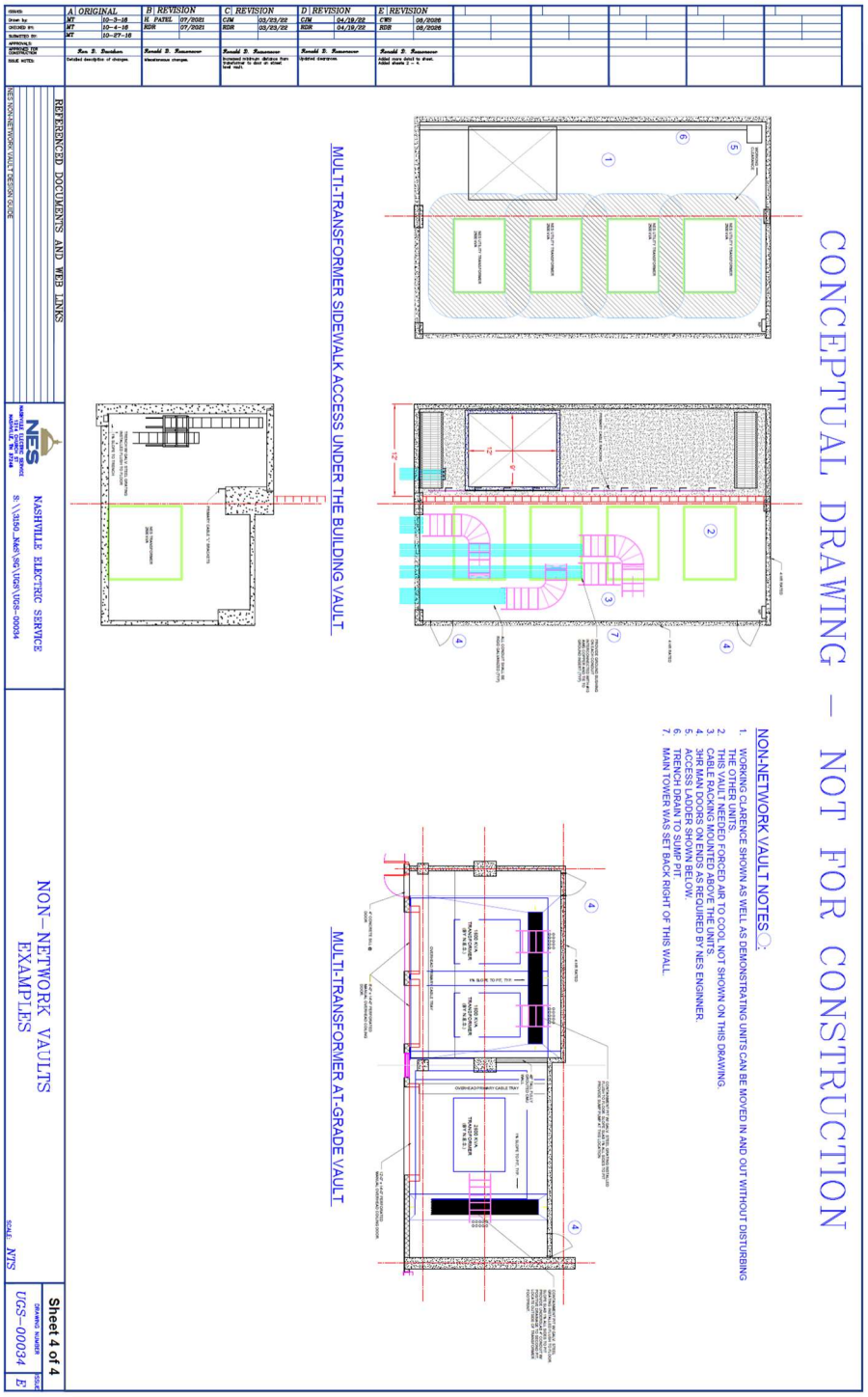
NES Drawing #UGS-00034 - Standard Non-Network Vault Detail



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NON-NETWORK VAULT DESIGN GUIDE

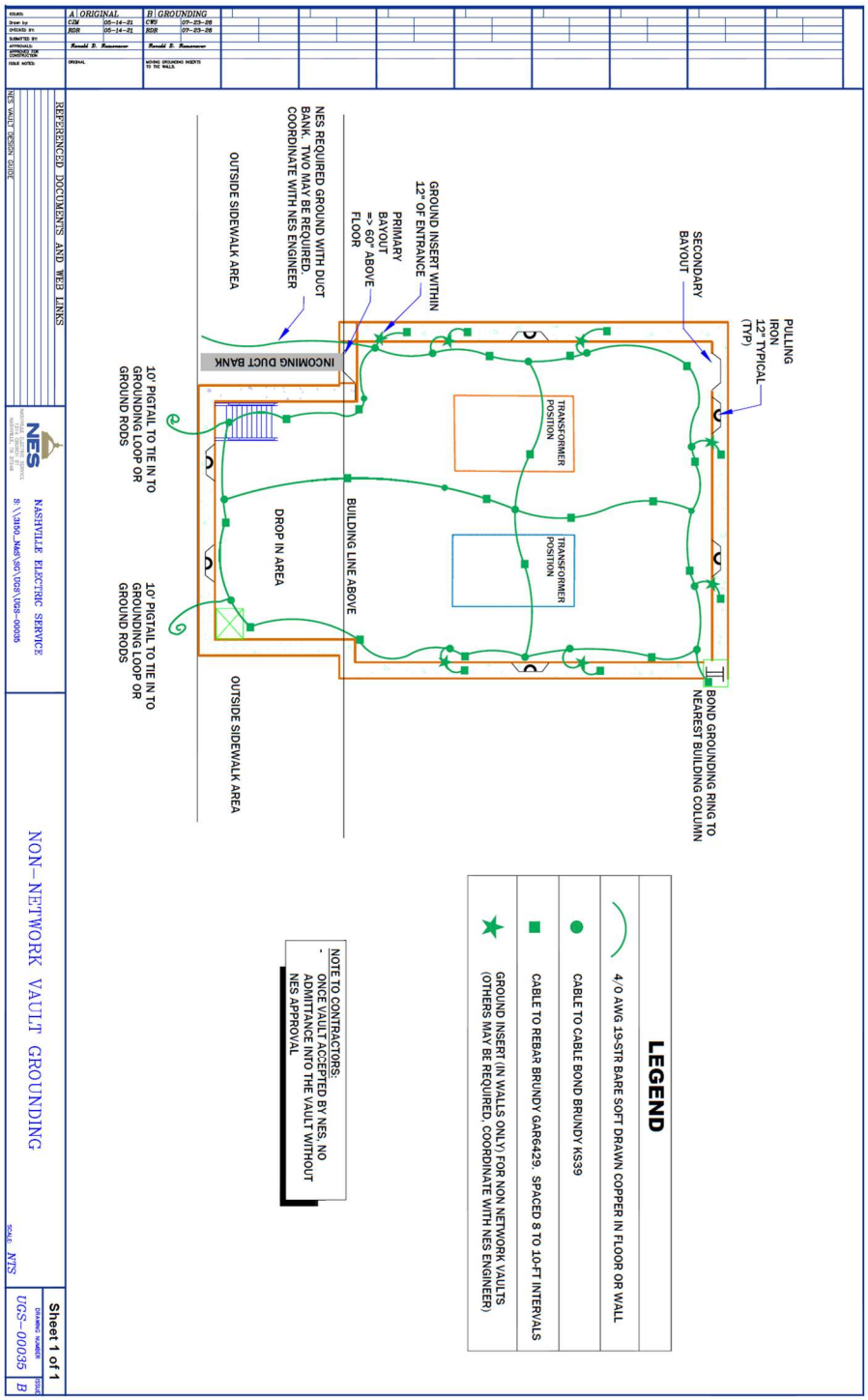
NES Drawing #UGS-00034 - Standard Non-Network Vault Detail



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NON-NETWORK VAULT DESIGN GUIDE

NES Drawing #UGS-00035 – Non-Network Vault Grounding Detail

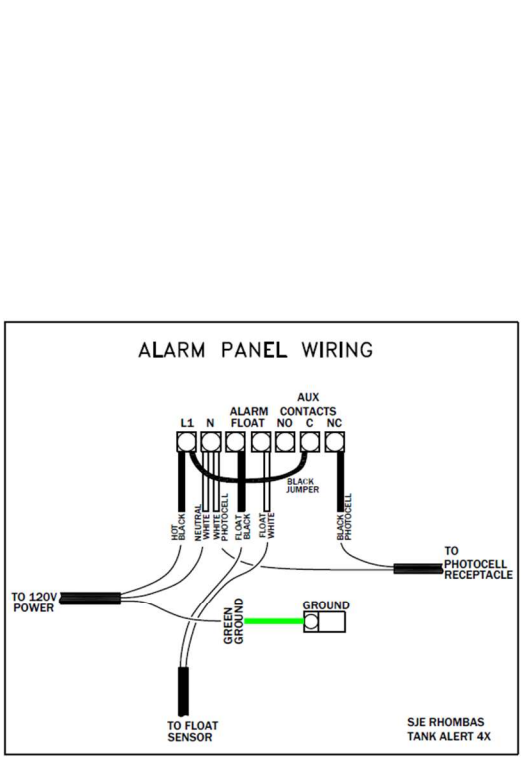


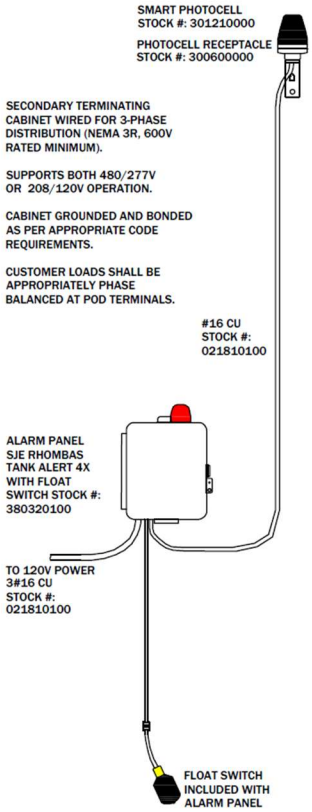
Docusign Envelope ID: EA368D93-7306-832E-834C-25BA852B7F18

NES Drawing #UGS-00049 – Miscellaneous Non-Network Vault Wiring Detail

Referenced Documents
Plate Book (Underground)
Design Manual (N/A)
Procurement Specifications (301210000)
Job Drawing Border (8.5X11)
S:_3150_N&S\SG\UGS\UGS-00049

ISSUES: A ORIGINAL
Drawn by: CWS 07/26
CHECKED BY: RDR 07/26
SUBMITTED BY: CWS 07/26
APPROVALS:
APPROVED FOR CONSTRUCTION R. D. Reasoner
ISSUE NOTES:





PHOTOCELL WATER ALARM

NOTES:

1) CONTRACTOR TO PROVIDE ALARM PANEL AND WIRING CONNECTIONS.
2) CONTRACTOR TO INSTALL PHOTOCELL AND RECEPTACLE PROVIDED BY NES.
3) COORDINATE EXACT LOCATION OF DEVICES WITH NES CREW.
4) SEE NES DRAWING # UGS-00034.

SHEET 1 OF 1

NES NASHVILLE ELECTRIC SERVICE STANDARDS

MISCELLANEOUS NON-NETWORK VAULT WIRING DETAIL

SCALE: NTS
DRAWING NO. UGS-00049
ISSUE A

Docusign Envelope ID: EA368D93-7306-832E-834C-25BA852B7F18

APPENDIX E

REQUIRED HARDWARE (not an exhaustive list)

CUSTOMER PROCURED AND INSTALLED

Grounding Provisions - Ground Inserts

Manufacturer: Burndy®

Product: YGF29-4N Drawing Number SD082518-01

Cable Range: Min. #2 STR. 292 D - MAX. 250 MCM - 575 D

Vault Lift Off Slab – Steel Tube Insert

Manufacturer: N/A

Product: 1-¼ ”- Galvanized Steel Tube cut to the approximate thickness of the lift off slab

Grating

Manufacturer: Ohio Gratings Inc.®

Product: Wheels n’ Heels® InVent 64-7-WH-63 3/16” Galvanized

Vault Door - Panic Hardware

Manufacturer: Yale®

Product: 7100 Series flat bar exit device with door closer

Outside Trim: Augusta trim lever Type 626(F) Series wide escutcheon trim

Lock Set: Setup to operate as “Storeroom” (ANSI 09) function

Lock Rim Cylinder and Core: Shall be provided and installed by NES

Personnel Access - Ladder

Corrosion resistant, per OSHA Standard 1926.1053, for “Fixed Ladders”

Docusign Envelope ID: EA368D93-7306-832E-834C-25BA852B7F18

Personnel Access - Ladder Safety Post

Manufacturer: Bilco®Product: LadderUp® Safety Post model LU-2

Primary Cable Support Fiberglass Bracket for Underground Cable Support

Manufacturer: Underground Devices®

Product: Part #MM10 – Mounts with 3/8” anchors and extends from walls 9-11”

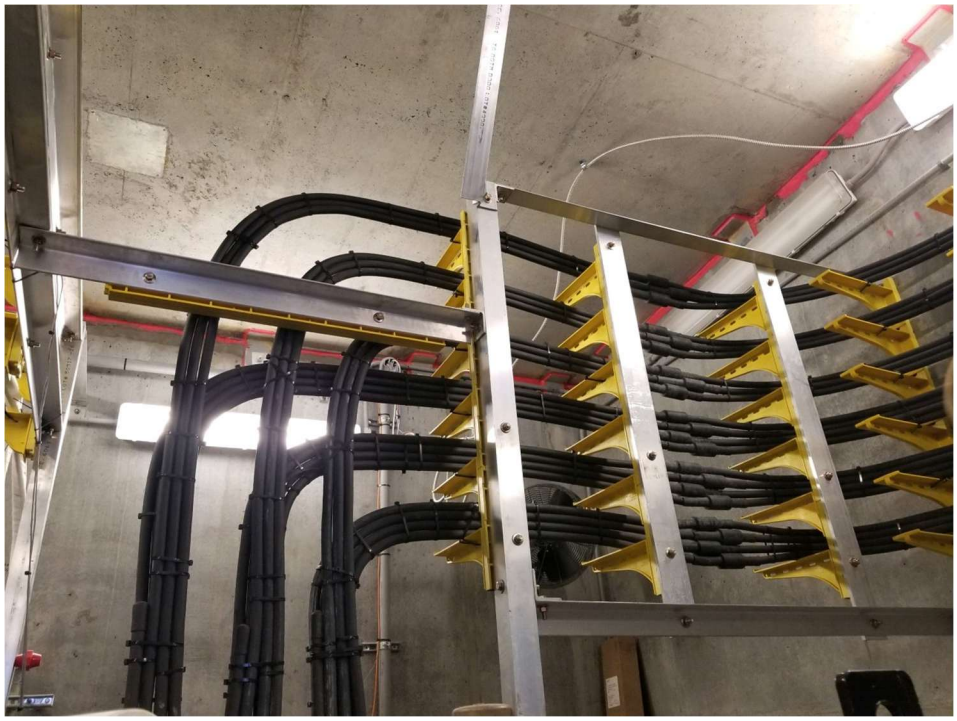
Secondary Cable Racking

Manufacturer: Underground Devices®

Product: Heavy Duty Rack - Part #CR36-B

Manufacturer: Underground Devices®

Product: Cable Arms (14”) – Part #RA14



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NON-NETWORK VAULT DESIGN GUIDE

Manufacturer: Thomas & Betts®

Product: Cable Tray - Aluminum, H Beam, Series #1, 6” Side Rail, 36” Wide, 12” Rung Spacing



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NON-NETWORK VAULT DESIGN GUIDE



Lighting

Manufacturer: Lithonia Lighting®

Product: CSVT L48 5000LM MVOLT 40K 80CRI Wet Rated.

Manufacturer: Columbia Lighting

Product: LXEM-4-40ML-RFA-EDU

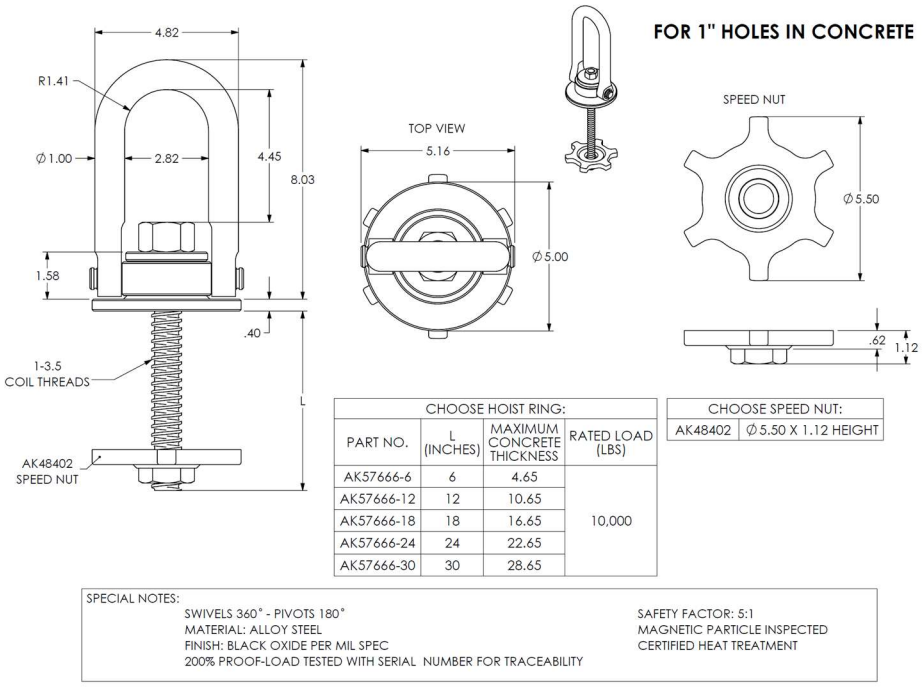
Manufacturer: Cooper

Product: 4VT3-LD5-6-G-UNV-L840-CD1-U

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NON-NETWORK VAULT DESIGN GUIDE

Typical Rigging Assembly (provide 4, L should >/= depth of the slab + 6 inches)



Contact Mazzella at 615-256-8658 - 1241 Foster Ave Nashville or
Actek Manufacturing & Engineering sales@actekmfg.com or 800-752-7229

Concrete Support Beams

Manufacturer: Oldcastle Precast

Product: 8”x4’0x6” Precast NES Network Vault Support, Special #98617-1 Item #2500035

Sump Pump (provided by NES)

Manufacturer: Stancor: Avenger Series – Model SE-50

Manufacturer: Zoeller: Model 940-0013

Manufacturer: Fluid Systems: 153-00271 OSS-100

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NON-NETWORK VAULT DESIGN GUIDE

Recessed Pulling Iron Example



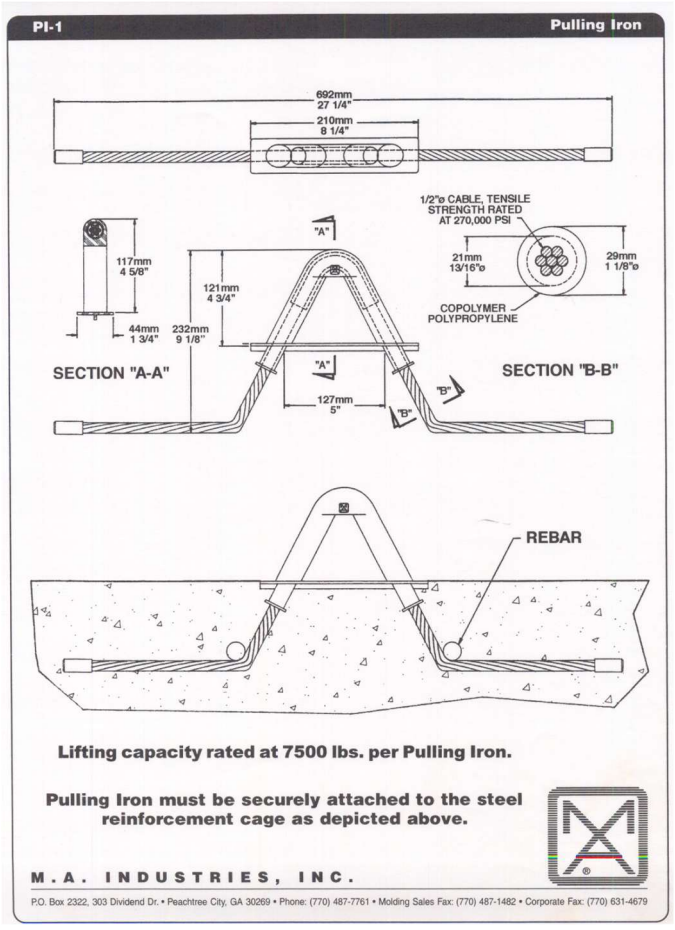
Cable Pulling Iron Pocket

Cable Pulling Iron Pocket:

Pulling iron pocket for cable pulling irons

Advantages:
- For use with uncoated pulling iron cables
- Economic two piece design
- Reusable lid
- Faster assembly – less tape needed
- A more stable and secure fit





Docusign Envelope ID: EA368D93-7306-832E-834C-25BA852B7F18

NON-NETWORK VAULT DESIGN GUIDE

Revision Date	Revision History	Approvals
07/02/2015	Original issue – based on Network Vault Design Guide and Dry Vault Design Guide.	*Wes Suddarth* Created By _____ Supervisor _____ Manager
11/3/2016	Combined Non-Network & Network vault design guides.	Created By Supervisor Manager _____ Manager
07/19/2021	- Separation of Non-Network & Network design guides - Updated Sections - 1.3, 2.4, 2.6, 3.2, 4.1, 4.2, 6.3, 6.5, 6.6, 6.8, 7.1, 7.3, 8.1, 9.1, 9.2, 9.3, 9.5, 9.6, 9.7, 9.8, 9.9 - Appendix A – Updated Tables 2 & 3 - Appendix B – Added Non-Network Map. - Appendix D – Updated Standard Drawings - Appendix E – Updated hardware list and added photos	Created By Supervisor Manager

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03/23/2022	- Appendix A, Table 3 – Increased required minimum working clearance length.	Created By Supervisor Manager
04/22/2022	- Updated sections 4.2.2.b, 4.2.4.c, 4.2.4.d, 4.2.6.c, 4.2.6.f, 9.1.2, 9.2 - Appendix A, Table 3 – Updated required minimum working clearance length. - Appendix D, Drawing UGS-00034 - Updated	Created By Supervisor Manager
9/04/2026	General Changes "Refer to" references changed to "See…" Took out NES department references (since several have changed names) to NES Engineer, NES Account Representative…. 1.3 2.4 3.2.5 4.1.8, 4.2.1, 4.2.9(e), (f) 6.1.6, 6.2.3, 6.5.2(f), 6.7.4, 6.8.5 8.1.5 9.1.9, 9.6.5,9.7.3, 9.7.4, 9.7.5, 9.9.2 Specific Changes 1.3 Changed "red" to "yellow" 1.4 Added paragraph. 1.5 Added paragraph. 1.6 Added paragraph. 3.2.1 Changed some of the grammar. Changed the main method of delivery to be electronic but paper might be required. 3.2.2 Changed the wording ***are being satisfied*** to ***are satisfied***. 3.3.1 Deleted the printed copy. 3.3.3 Changed ***ductbank*** to ***duct bank***.	*Cedric W. Short* Created By *Ronald D. Reasonover* Supervisor *Tony Richman* Manager

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	4.1 Changed what should be included on the drawings is from 4.1.1 to 4.1.9. 4.1.1 Added NES would not inspect the vault without Construction Drawings. 4.1.10 Changed wording ***to share this*** to ***for sharing the***. 4.1.12 Rewrote paragraph. 4.2 Added to See Appendix D NES Drawings UGS-00033, UGS-00034. 4.2.1(a) Changed wording ***break down*** to ***breakdown.*** 4.2.3(c) Changed transformer to plural. 4.2.9(d), (e) Deleted paragraphs. Paragraphs below lift up two. 6.1 Added to See Appendix D NES Drawings UGS-00033, UGS-000034. 6.4.2 Changed the requirement for just 2 beams per transformer. 6.5.1 Deleted Paragraph – other paragraphs moved up one. 6.5.6 Removed the Dayton Lifting Inserts and replaced it with a hollow tube at the Crew's request. 6.6.1 Changed the wording about the grating. Referenced USG-00033, not 36. 6.6.2 Removed the mention of the lift off inserts. 6.7.4 Changed to Appendix D. 6.8.1 Removed the mention of a preferred space and sheet number. 6.8.3 Changed the sump dimensions to 24"x24"x24" 6.8.5 Changed the wording ***to indicate size*** to ***shall indicate the size***, ***shall be chosen to minimize the amount of bends and elbows*** to ***to minimize the number of bends and elbows***. 6.8.6 Changed the wording ***Note for contractor*** to ***Note for the contractor***, ***coordinate storm structure***, to ***coordinate the storm structure***, ***Needs to be routed*** to ***This connection needs to be routed***. 8 Added Civil Engineer to the list. 8.1 Added to See Appendix D NES Drawings UGS-00033, UGS-000034. 9.1 Added to See Appendix D NES Drawing UGS-000034. 9.1.6 Changed the wording ***vaults at grade***, to ***vaults at Street Level***. 9.1.13 Added paragraph. 9.2.5 Added liquid type connectors into panelboard. 9.4.2 Removed the requirement for the 250-V plug. 9.5.5 Added Appendix D to the statement. Removed (Provided by NES Engineer). 9.6.1 Changed the wording around the energized manhole. 9.6.2 Added Appendix D to the statement. Changed the drawing# to UN-42979. Removed (Provided by NES Engineer).	

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	9.7.3 Secondary conductors shall be "copper". Conductor sets greater than 15 shall be coordinated and approved by the NES engineer. 9.8.2 Removed the ground inserts from the floor and placed them on the wall. Added ***Appendix D*** and the Drawing # to the statement. 9.8.5 Added ***Appendix D*** to the statement. Appendix A Added the 480Y/277 750-kVA transformer to all transformer tables. Appendix B Revised the Map (area around the round-about/Cummins Station, and Central Sub to the railroad bridge changed. Appendix D Added the page numbers. Changed the drawing order of the Appendix Replaced UN-40717 with UN-42979 NES Network Conduit System Details UGS-00033 Construction Details Vault Gratings Added Sheet. UGS-00034 Standard Non-Network Vault Layout Revised drawing to show manhole to vault conduit/pull box requirements including Vista, Vista control pedestal (if required), turtle transformers, street light connections, solid concrete construction, two 24x24x24 sumps. Added the float switch assembly. The extra information caused sheets 2-4 to be added for the similar equipment for a Street Level Vault, Lid Options, and multi-transformer vault examples. UGS-00035 Non-Network Vault Grounding Detail Revised drawing to indicate transformer connections to be on the walls and no longer in the floor. UGS-00036 Removed Sheet UGS-00049 Miscellaneous Non-Network Vault Wiring Diagrams A new sheet that shows how to wire the water alarm system. (Uses a smart photocell to send a message to C&M). Appendix E Removed the Dossert Insert. Indicated a Steel Tube Insert for the Lift Off Lids. Typical Rigging Assembly – supplied the detail cut sheet. Added a second sump pump manufacturer. Revised the photo of the Pulling Iron.	

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10/15/2026	9.2.1 Added NEMA 4x enclosure to the requirement.	DocuSigned by: Cedric Short 59CE5153311D40F... Created By DocuSigned by: Ronald Reasonover D08B36F9953F4B6... Supervisor DocuSigned by: Tony Richman AA2ACBBD668B45D... Manager