ELECTRIC SERVICE REQUIREMENTS

SOUTHERN NEVADA

JUNE 2021 EDITION

Date of Publication: June 23, 2021

NVEnergy

2021 ELECTRIC SERVICE REQUIREMENTS

Introduction

The Information and instructions contained in the Electric Service Requirements (ESR) Book represents the manner in which the distribution system is to be constructed in order to provide safe, reliable and cost effective electrical service to our customers. The following pages identify the construction methods acceptable to NV Energy (NVE). This book is intended for use as a reference for NVE personnel and electrical contractors who work on or around NV Energy's electrical grid.

Instructions for Use

These standards are to be followed for new construction, major rehabilitation and rebuilding of existing facilities. They conform to the most current National Electrical Safety Codes (NESC), NV Energy (NVE) requirements and local governmental requirements such as the RTC and NDOT. An NVE representative must approve, in writing, any deviation from the requirements set forth in the ESR. Any distribution plant not built to standard for reasons of expediency or material shortage must be corrected and rebuilt to standard at the earliest opportunity.

PLEASE NOTE THAT YOU HAVE A RESPONSIBILITY IN THIS EFFORT! You are expected to become familiar with these construction standards, to comply with them, and to participate positively in their improvement by proposing practical and economical changes. Only with your cooperation and conformance can the main object of standardization become a reality.

Within each revised standard, the changes made are specifically identified by a revision bar (|), typically located adjacent to the revised area in the left-hand margin of the page. **In addition, the NV Energy ESR has been significantly reformatted for usability. Especially note the separation of sections entitled "ELECTRIC SERVICE REQUIREMENTS" and "CLEARANCES."**

Questions

Any questions regarding this edition of the ESR book should be directed to the **NV Energy T&D Standards Department** e-mail: tdstandards@nvnergy.com. To recommend changes to a standard please complete the ESR Change Recommendation Form (R-SB).

Copies

For your convenience, full and partial electronic versions of the ESR book are available on-line at:

http://www.nvenergy.com/business/newconstruction/newconstructionS/servicestandards.cfm

THIS PAGE INTENTIONALLY LEFT BLANK

Table of Contents

General Information

Electric Service Requirements

Trenching

Conduit and Cable

Concrete Structures: General Requirements

Clearances

Equipment Pads

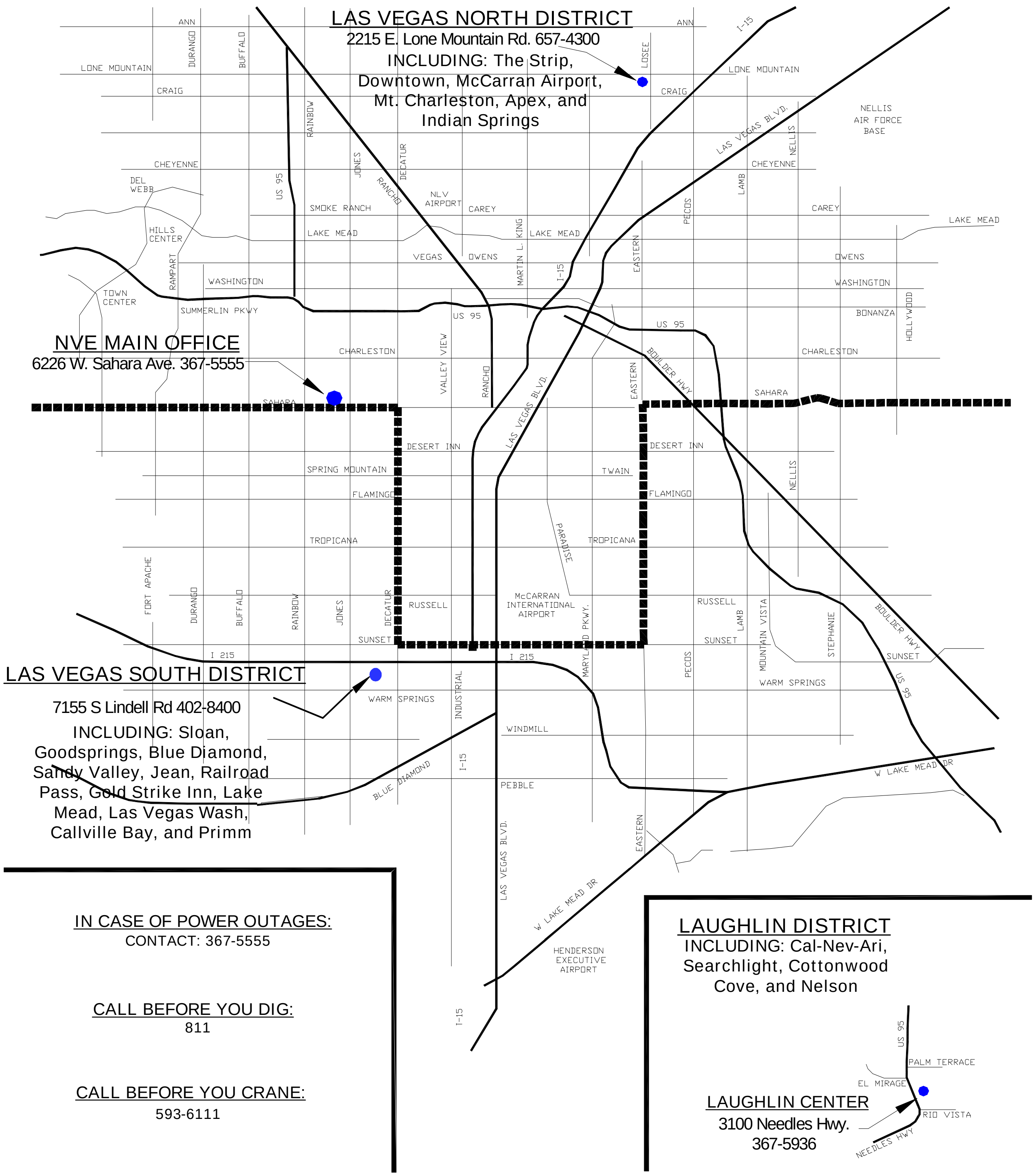
Vaults and Boxes

Metering Equipment: Installation Requirements

Metering Equipment: Material Requirements

Engineering Requirements

General Information



IN CASE OF POWER OUTAGES:
CONTACT: 367-5555

CALL BEFORE YOU DIG:
811

CALL BEFORE YOU CRANE:
593-6111

NV Energy	Electric Service Requirements			R-DSAM
	District Service Area Map			
Drawn:	Eng:	Appr:	Date:	Revision: 1A
SM	RD	DA	06/17	Page 1 of 2

THIS PAGE INTENTIONALLY LEFT BLANK

ESR CHANGE RECOMMENDATION FORM

Name: ____Date:_____________________
Company: _______________________________ Phone: ___________ Email: _____________________
ESR Standard ID/Title: ____ Sheet: ___ of ___
Recommendation Type: Addition:___ Change:___ Correction:___ Other:_____________________
IMPORTANT: Is this recommendation related to a safety concern? Yes: ___ No: ___

Recommendation: ____

Reason/Problem Encountered: ____

Additional information: ____

Your ideas and recommendations are important to assist us in providing the best possible Service Requirements for the construction and operation of the NV Energy distribution system. Use this form to communicate those ideas to us.

Please complete the above information giving as much detail as possible (use the back of this form, if necessary), and attach any marked up drawings or sketches, material/equipment information, schematics, etc. to aid in the evaluation of the request. Send to:

NV Energy
Supervisor, T&D Standards
P.O. Box 98910, M/S B19AM
Las Vegas, Nevada 89151-0001

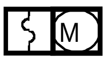
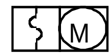
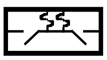
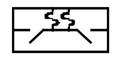
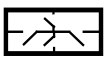
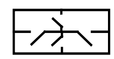
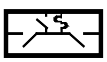
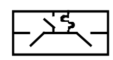
Or FAX the T&D Standards Department at: (702) 402-6575.

Table of Contents

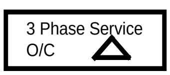
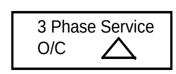
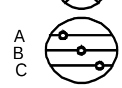
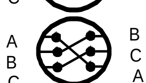
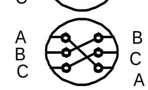
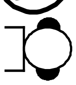
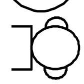
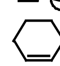
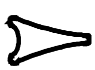
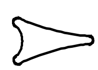
SYMBOLS FOR WORK ORDER MAP

EXISTING | PROPOSED

1. CABINETS

EXISTING		PROPOSED
	Meter Cabinet	
	Fused Meter Cabinet	
	Fuse Cabinet (LF-4)	
	Meter Switch & Fuse Cabinet (DF-9 or LF-9)	
	Switch Cabinet (DF-10 or LF-10)	
	Switch & Fuse Cabinet (DF-11 or LF-11)	
	Padmount Capacitor Bank	

2. NOTES AND TAGS

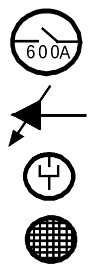
EXISTING		PROPOSED
	Open/Closed Delta Bank	
	Rail Road Services	
	Overhead Phase Configuration	
	Overhead Phase Roll	
	Conduit Stub with 3M Marker	
	Hex = Note No. Call Out	
	Driveway	
	Street Light	
	Fire Hydrant	

General Information

SYMBOLS FOR WORK ORDER MAP

EXISTING | PROPOSED

3. OVERHEAD DEVICES

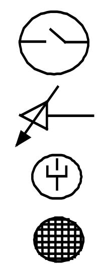


Air Break Switch

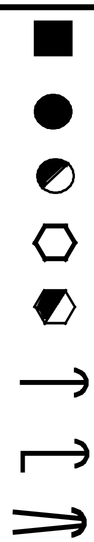
Regulator

Overhead Capacitor Bank

Tap



4. POLES AND GUYS



Transmission Pole

Distribution, Sole – Use Pole

Distribution, Joint – Use Pole

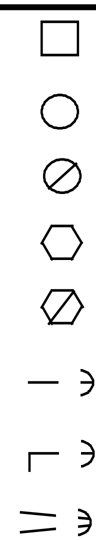
Sprint, Sole – Use Pole

Sprint, Joint – Use Pole

Down Guy

Sidewalk Guy

Strut Guy



5. RISERS

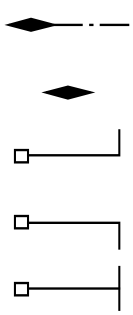
Primary Existing and New Distribution Poles

General Information

SYMBOLS FOR WORK ORDER MAP

EXISTING | PROPOSED

6. SECONDARY EQUIPMENT



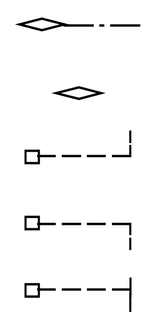
Overhead Service Drop

Overhead Secondary Tap

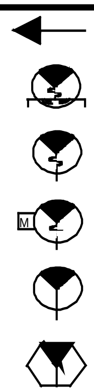
Underground Service Left

Underground Service Right

Underground Service Tee



7. TRANSFORMERS



Single Phase Overhead

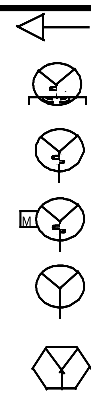
Single Phase Padmount

Three Phase Padmount Fused

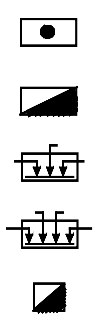
Three Phase Padmount Fused/Metered

Three Phase Padmount Non-Fused

Three Phase Inside Vault Room



8. UNDERGROUND BOXES



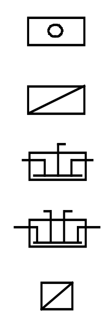
Manhole

Splice Box

Pull Box w/3-Way Underground Module

Pull Box w/ 4-Way Underground Module

Secondary J-Box (Handhole)



SYMBOLS FOR WORK ORDER MAP

EXISTING		PROPOSED

9. WIRE AND CABLE

Existing	Description	Proposed
	Overhead Primary Wire (954 AA)	
	Overhead Primary Wires (all others)	
	Overhead Secondary Wire	
	Underground Feeder Cable (3-1000 kcmil)	
	Underground Primary Cable (3-1/0)	
1-1/0	Underground Primary Cable (1-1/0, Phase A, B, or C)	1-1/0
1-1/0 4C	Underground Primary Cable 1/0 in Separate Conduit	1-1/0 4C
4C 4C	Underground Conduit (Empty 4" = 4C, 6" = 6C)	
	Underground Secondary Cable	
4C 1	Underground Secondary Cable in Separate Conduit	4C 1
CIC 1	Underground Secondary Cable in CIC	CIC 1
1	Underground Secondary Cable 2-350 kcmil & 1-4/0	1
2	Underground Secondary Cable 2-4/0 & 1-2/0	2
3	Underground Secondary Cable 2-2/0 @ 1-1	3
4	Underground Secondary Cable in CIC 2-500 & 1-350 kcmil	4

THIS PAGE INTENTIONALLY LEFT BLANK

COMMON ABBREVIATIONS

AASHTO:	American Association of State Highway & Transportation Officials
ACI:	American Concrete Institute
AEIC:	Association of Edison Illuminating Companies
ANSI:	American National Standards Institute
APWA	American Public Works Association
ASTM:	American Society for Testing & Materials
CFR:	Code of Federal Regulations
DIS:	NVE's Distribution Installation Standards
DMS:	NVE's Distribution Material Standards
EEI:	Edison Electric Institute
ESR:	Electric Service Requirements
EUSERC:	Electric Utility Service Equipment Requirements Committee
IEEE:	Institute of Electrical and Electronics Engineers
ICEA:	Insulated Cables Engineers Association
NEC:	National Electric Code
NEMA:	National Electrical Manufacturers Association
NESC:	National Electric Safety Code
OSHA:	Occupational Safety and Health Administration
PUCN:	Public Utilities Commission of Nevada
UL:	Underwriters Laboratories
WUCG:	Western Underground Committee Guide

CONTACT INFORMATION

NV Energy – Administrative Headquarters:
6226 West Sahara Avenue
Las Vegas, Nevada 89146
Phone: (702) 402-5000

NV Energy T & D Standards Department:
NV Energy
T & D Standards Department
7155 Lindell Road, M/S #B19AM
Las Vegas, Nevada 89118
Email: tdstandards@nvenergy.com
Fax: (702) 402-6575

Outage Reporting:
Phone: (702) 402-2900

Call Before You Dig:
Phone: 811

Call Before You Crane:
Phone: (702) 402-2929

Table of Contents

THIS PAGE INTENTIONALLY LEFT BLANK

1. Purpose

This standard is to be used as the specification for the Applicant's portion of the Underground Distribution System for NV Energy.

2. Table of Contents

3. Terminology

The terms below are defined as follows:

"Applicant"	-	The owner and/or developer of the land to be served by the underground electric system, and/or the entity installing a portion of the system.
"Company"	-	NV Energy (or NVE)
"Engineer"	-	The Company's Engineer/Designer or their representative.
"Inspector"	-	The Company's designated Inspector.
"Work"	-	Labor and material required for the system to be installed.
"Approved Equivalent"	-	An item approved by the Manager of Standards Department as acceptable to the Company as a substitute for a specified item.

4. General Service Requirements

1. The location of each point of service delivery must have Company approval before construction.
2. In areas where the Company owns and maintains an underground distribution system, the Company will designate the point from which the Applicant will be served. This designated point will be considered the point of service connection.
3. The Applicant shall ascertain from the Company if the underground system is in place to the premises to be served. The Applicant shall furnish the required trenching, backfill (per RT-1), and install the Company-supplied vinyl marking tape above the Company cables or duct. The point of service delivery shall typically be at or immediately adjacent to the building wall nearest the point at which the service cables enter the building. The point of service connection may be from a pole, handhole or pad mounted transformer.
4. For commercial use, Applicant shall furnish and install ducts. For residential use, NVE shall furnish ducts and the Applicant shall install these ducts.
5. The Applicant shall furnish, install and maintain at his expense, facilities for the termination of the underground service cables at the load, including any pullboxes, or other required equipment.

6. A separate section at the Service Entrance Panel for terminating and pulling is required for all underground services as per RPM-1, 2, 3, 4, 5, 6, 43 and 45. This section shall be free of all earth and water pipe ground leads or connections, and shall not be used as a junction point to feed any other service.
7. The service conduit shall not enter the side of the service entrance pulling section.
8. All materials and equipment furnished by the Applicant for a service connection shall be installed in compliance with the current edition of the National Electric Code, local ordinances and the Company's Electrical Service Rules filed with the Public Utilities Commission of Nevada. The equipment, when exposed to the weather, shall be rain tight.
9. Only personnel authorized by NVE will be permitted to connect an Applicant's service to (or disconnect from) the Company's underground distribution system.
10. All underground structures shall be inspected by the NVE Inspector, and will not be released until final adjustments (including adjustments to the final grade) are completed and inspected by the NVE Inspector.

4.1 Rules and Regulations

All procedures and standards quoted herein must be in accordance with the Company's Tariffs, Rules and Regulations as approved by the Public Utility Commission of Nevada.

4.2 Changes

By mutual consent (in writing) changes, additions, or deletions from this Specification may be made without voiding this Specification.

4.3 Partial Conveyance of Underground Distribution Facilities

The Applicant will convey to the Company certain portions of the underground facilities which should have been completed and installed, if the Company elects to accept these facilities. Should this conveyance take place, the Company will assume responsibility for maintaining and operating these facilities. Conveyance of facilities shall in no way relieve the Applicant of liability due to use of defective materials, poor workmanship or damage by a third party.

5. Scope of Work

5.1 Work by Applicant

The Applicant shall perform all work necessary to construct portions of the underground system in accordance with the Company layout drawings and as follows:

A. Applicant shall furnish offset, final elevation, and property line stales (and chisel marks on curb) at pullbox, manhole, pad and handhole locations.

B. Applicant shall furnish excavation and approved backfill of trenches for the CIC or conduits.

C. Applicant shall furnish/install transformer and equipment pads, including all hardware, handholes, pullboxes, manholes/vaults, and grounding as shown on Company drawings.

D. Applicant shall be solely responsible for protecting the CIC, conduits and structures from superimposed loading created by construction equipment or otherwise. Applicant shall repair or pay for damage to the above material to meet the Company specification.

E. Applicant shall ensure that excavated material is immediately removed from the site; underground facilities are installed promptly; temporary repairs are made in the area; and the area is restored, equal to or better than, its original condition.

5.2 **Work by Company**

The Company will perform the work necessary for a complete and working underground distribution system, including furnishing and installation of transformers, cable, cabinets, switches, pole risers, and all connections as provided for in the Company Rules and Regulations.

5.3 **Extent of Work**

A. The extent of work and detailed information shall be shown on the approved layout drawing. During the progress of work, such additional detail drawings as the Engineer may consider necessary for clarification will be furnished to the Applicant, and these additional drawings shall be made part of the specification. The layout drawings shall be made part of the specification. The layout drawings must be approved by the applicant, and the applicable government agency.

B. Where the interpretation of a specification or clarification of intent of any drawings is required, the determination of the Engineer will prevail.

6. Performance and Inspection of Work

1. To enable proper inspection of materials and workmanship, Applicants shall inform the NVE Inspector at least 72 hours before commencing any item of construction or installation of material on main trenches, and 48 hours before work on service trenches. Materials and/or workmanship failing to meet the requirements of this Specification, or installed without prior notification to the Inspector, will be subject to rejection. Any work rejected shall be immediately corrected at the Applicant's expense. No work shall be embedded in concrete, backfilled, or otherwise covered or concealed until it has been approved by the inspector.
2. All materials and workmanship shall be first quality in every respect; plumb and true; and according to the specific requirements of the layout drawings, Company Standards, and this Specification. All work shall be subject to inspection by the Inspector who may exercise such control as required to safeguard Company interests.
3. If any portion of the completed underground distribution system fails to operate satisfactorily due to defects in the Applicant's work, the defect and any damaged portion of the system shall be corrected at the Applicant's expense and to the satisfaction of the Inspector.

7. Trenching

7.1 **Excavation ***

A1. Applicant shall not begin trenching in residential developments until the following items are complete:

i. Sewer, gas, and water services (including meter loop), are stubbed into property.

ii. Curb and street light footing are installed.

iii Property line chiseled on curb.

iv. Finish grade stakes provided (applicable for all types of developments).

v. Approval obtained from the inspector (applicable for all types of developments).

A2. In all cases, applicant shall not begin trenching until the following requirements are met:

i. Foundations and pads for all permanent structures shall be in place, including garages, storage buildings, equipment buildings etc.

ii. Building numbers shall be displayed in a manner satisfactory to the utility, properly identifying all permanent structures.

iii. Sewer, gas and water mains shall be installed, including drop inlets and fire hydrants.

iv. Grading shall be at sub – grade (within six (6) inches of final grade) or less.

v. Final grade stakes shall be provided (applicable for all types of development).

vi. Approval shall be obtained from the NVE Inspector (applicable for all types of development).

A3. Alternatively, applicant shall not begin trenching in residential developments until the following is installed:

i. Applicant may install sleeves for future gas mains at electric crossing locations and for future services under the curb at curb crossings. NV Energy to inspect vertical and horizontal separation of all gas sleeves to electric conduits prior to secondary main wire pull.

ii. Applicant shall provide pothole provisions at all crossing locations.

B. Excavation of trenches shall be as shown on approved company layout drawings and specifications.

C. Edge of NVE trench shall be a minimum of 36” from edge of water, and gas pipe.

D. All other non-NV Energy conduits will maintain 12” radial separation.

E. All non-NV Energy crossings will maintain 12” vertical clearance.

F. Excavated trench shall be straight, free from water, and the bottom level. Blocking or shoring material shall be removed by Applicant during backfill procedures.

G. Excavated material shall be placed a minimum of two feet from either edge of the trench to prevent material from falling into the trench.

7.2 **Backfill ***

A. Backfill shall be performed according to RT-1, and meet applicable governmental codes and ordinances.

B. Natural backfill shall be free from stones, caliche, or lumps of material exceeding 3” and free from sod, frozen earth, and organic materials. Backfill #2 stranded bare copper wire in bottom of trench with natural soil to a depth of 3” prior to placing sand or concrete backfill.

C. Sand per RT-1 shall be placed above and below the CIC or conduit in two backfill operations. It shall be compacted to 90% of the relative maximum density.

D. The Applicant shall place the sand in trenches immediately after the installation of the CIC or conduit. Under no circumstances shall the sand (per RT-1) be installed without prior notification of the inspector. When the trench contains two or more levels such as a joint trench, additional backfill operations shall be required. If any damage occurs to the CIC or conduit where such damage results from the failure of the Applicant to place backfill in accordance with the Company Specifications, the Applicant shall be responsible fro the cost of repair.

E. The Company will provide and the Applicant shall install a 6” wide Red Vinyl Marking Tape 15”-18” below finish grade and over the CIC or conduit.

7.3 **Compaction of Backfill ***

A. Backfill shall be secured with mechanical tamping units (not the tire or track of a vehicle).

B. Backfill shall be placed in 6” layers.

C. Backfill shall be moistened as required to obtain compaction.

D. Compaction shall be 90% of the relative maximum density, as determined by method Nev. T101 or T102, or as directed by the NVE Inspector.

* State and Federal highway crossings are to be installed per their respective standards.

** American Public Works Association.

8. Concrete

8.1 **General**

A. All concrete poured in the field, unless otherwise permitted by the inspector, shall be ready – mix and shall conform to the latest issue of ASTM Specification C-94.

B. Manholes, pullboxes, handholes, transformer pads, or enclosures shall be constructed and installed in accordance with the Company construction standards.

C. Concrete for load bearing or supporting structures shall be per RS-G2 specification.

D. Concrete for conduit encasement shall be per RC-3 specification.

8.2 **Materials**

A. Rebar shall be free from any material or coatings that would reduce bond, and shall conform to the latest issue of ASTM Specifications A-15 and A-305.

B. Welded wire fabric (mesh) shall be 4x4 – W4.0 x W4.0 or approved equivalent, and shall conform to the latest issue of ASTM Specifications A-82 and A-185.

C. Cement shall be clean, fresh, Portland cement (Type V) or other approved by Company.

D. Fly ash shall be Type F and shall meet the requirements of ASTM C618.

E. Aggregate shall be clean, sound uniformly graded, and of proper size for the work being constructed, as approved by the Inspector.

F. The water shall be clean and fresh.

G. Any admixture used shall be of a type and brand which will not impair the quality of the concrete and which is approved by T & D Standards Department.

8.3 **Workmanship**

A. The forms shall be constructed of smooth material and be true to lines and dimensions as indicated by the drawings. Only approved form ties shall be used. Forms shall be tight, of adequate strength, and completely removed upon completion of the work or at such other time when the concrete will support the imposed loads.

B. Where material is to be embedded in concrete, it shall be held securely in place, using templates if necessary, to prevent movement or displacement during concrete placement.

C. Reinforcing shall be shaped and spaced as indicated on the drawings and fastened to prevent movement during concrete placement. All bars shall be securely tied at intersections. Laps shall not be less than 30 diameters. The thickness of concrete over bars and other reinforcement shall not be less than 1-1/2”. Materials shall be measured accurately for each batch and mixed thoroughly until all the aggregate is coated with mortar.

D. All combined ingredients shall be mixed for a minimum of 90 seconds.

E. Forms shall be clean and wetted prior to placement of concrete. Concrete shall be placed by an approved means immediately after mixing and in layers that will satisfactorily consolidate. The size of any unit pour shall meet with the approval of the NVE Inspector, and pouring shall be continuous until each unit pour is completed. The concrete shall be worked into all corners and recesses until thoroughly consolidated.

F. No finished surface shall contain honey comb or segregation. Defects shall be remedied as directed by the NVE Inspector. Uniformed interior surfaces shall be steel troweled to a smooth dense surface. Uniformed exterior surfaces shall be floated, steel troweled, and lightly broomed to obtain a non-skid surface.

G. Surfaces shall be kept continually moist for a period of not less than seven days using either wetting or an approved curing method.

9. Facilities

9.1 Splice Boxes & Handholes

Approved standard precast boxes for electric underground use shall be furnished and installed according to Company construction standards, and the approved layout drawing.

9.2 Transformer & Equipment Pads

A. Approved precast concrete pads for transformers and other equipment shall be furnished and installed in accordance with the Company construction standards.

B. Field poured concrete pads for transformers and other equipment shall be installed in accordance with Company standards.

9.3 Manholes

A. Manholes shall be installed as shown on the layout drawing and in accordance with the Company construction standards complete with CIC or conduit entrances, pulling eyes, sumps and associated hardware.

B. Structural steel for the cover or roof reinforcement shall conform to ASTM Specification A-36. Plates and structural steel shapes shall either be hot dip galvanized for exposed applications or shop coated with an approved zinc paint for embedding applications.

9.4 Grounding

A minimum of 8 grounds (made electrodes) are required per sliding mile for primary voltages. Depending on the standard application, one or more of the following maybe considered a suitable grounding electrode:

- A #2 stranded bare copper wire 100’ in length placed in bottom of trench along with a 5 foot tail inside pad or vault
- If the trench is too short: 2-50’ #2 stranded bare copper wires in the incoming and outgoing trenches along with 2-5’ tails inside pad or vault.
- Only at the discretion of the NVE Inspector, a ½” x 8’ copper clad ground rod can be installed.

NOTE: Backfill #2 stranded bare copper wire with natural soil to a depth of 3”.

9.5 Construction or Temporary Power

All such power shall be provided at the expense of the Applicant and must be coordinated through the Districts.

1. Purpose

The purpose of this standard is to assist the customer in planning for an acceptable location and type of termination for overhead service from the NVE overhead electric distribution system.

2. Table of Contents

3. Limits

The requirements of this standard are limited to single or multiple dwelling residences with a 400a maximum single phase entrance. If the length of service is such that it would prove electrically prohibitive, a transformer and primary extension may be required, in which case, NVE's overhead line extension rule will be applied. NVE will install a single span of service drop from its pole to the customer's permanent approved support, provided the customer has made a bona fide application for service and NVE's distribution-pole line is located on the customer's premises or in an easement (public or private) adjoining said premises.

4. Customer Responsibility

The customer shall furnish, install and maintain, at his expense, the riser conduit, service entrance conductor, weather head, service equipment and grounding in accordance with local, state and national codes.

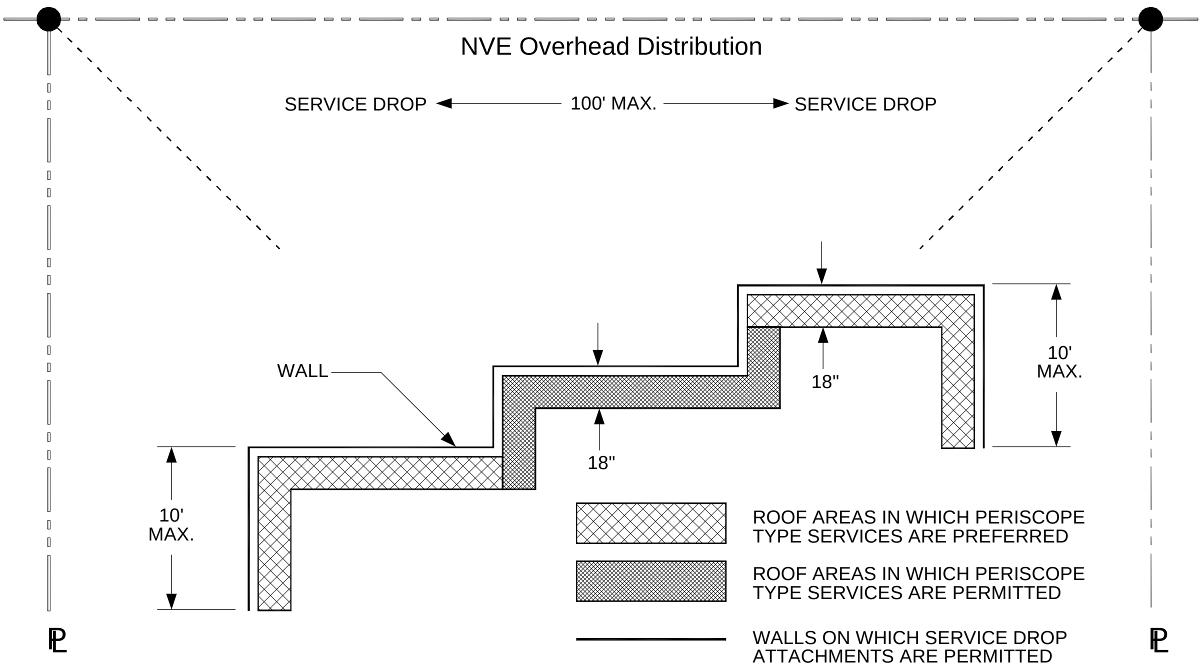
See 2.2GN05 (Standards Volume 1) for generator transfer switch requirements.

5. NVE Responsibility

NVE will furnish, install and maintain the service drop conductors, connectors to service entrance conductors and any meters. Service and Meter Location

6. Service and Meter Location

All service drop locations shall be approved by NVE prior to construction of the service entrance. The location of the point of the attachment of the service drop at the building shall be such that it can be reached with a single span, 100 feet maximum from NVE's pole with no overhang of adjacent property and with proper clearances maintained. This point of attachment will normally be on the building wall facing the nearest NVE line or on a periscope through the roof. The weather head shall not be located on any wall which is less than 24" from any common property line. When it is impractical to attach service drop below the level of the weather head, the termination shall not consist of more than 3 feet of exposed open wire and shall not extend around the corner of the building. A minimum of 18" of service entrance conductor shall be extended out of the weather head, so that an 8" drip loop can be obtained below the weather head. Meter facilities shall be located within the first ten feet of structure. The meter location must not be fenced or otherwise obscured from view of meter readers, or impair the access of operations personnel. Where NVE allows the meter facilities to be fenced, the customer shall provide a means for direct access by NVE personnel, (i.e., gate).



NOTES:

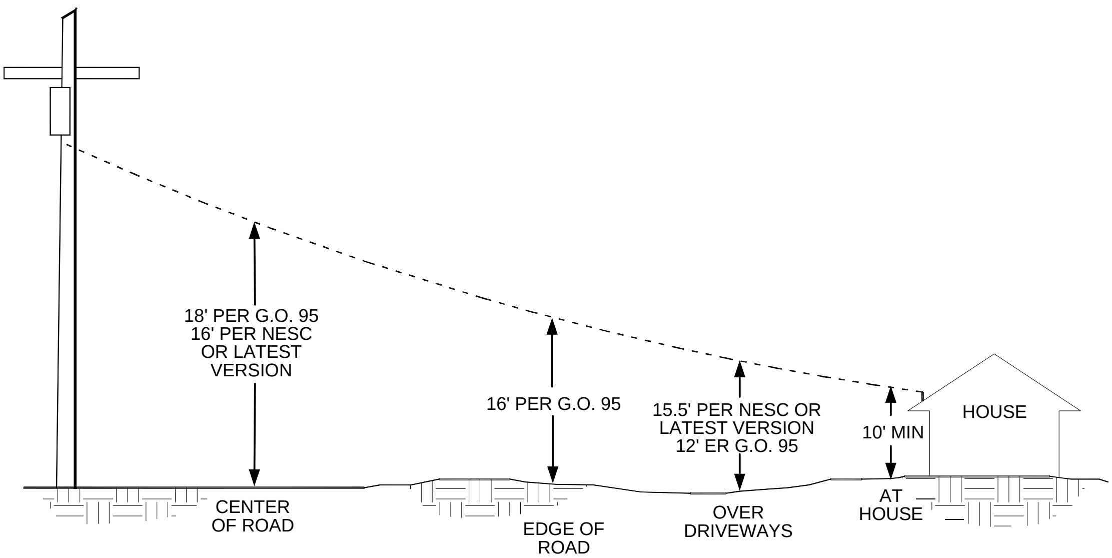
1. Service drop shall be attached to the wall facing the nearest NVE pole line.
2. If a preferred location is not practicable, consult NVE in regard to an alternate location.
3. All service locations are subject to NVE approval. Installation of additional facilities at the customer's expense or future relocation at his expense may be prevented by early consultation of NVE.
4. A working space (36"x36"x78") in front of all meters is required to permit installation and provide a safe working environment for NVE personnel. Any exception from this requirement must be approved by NVE.
5. The customer for architectural reasons may conceal or recess the service entrance and meter in through the outside wall where permitted by local codes.

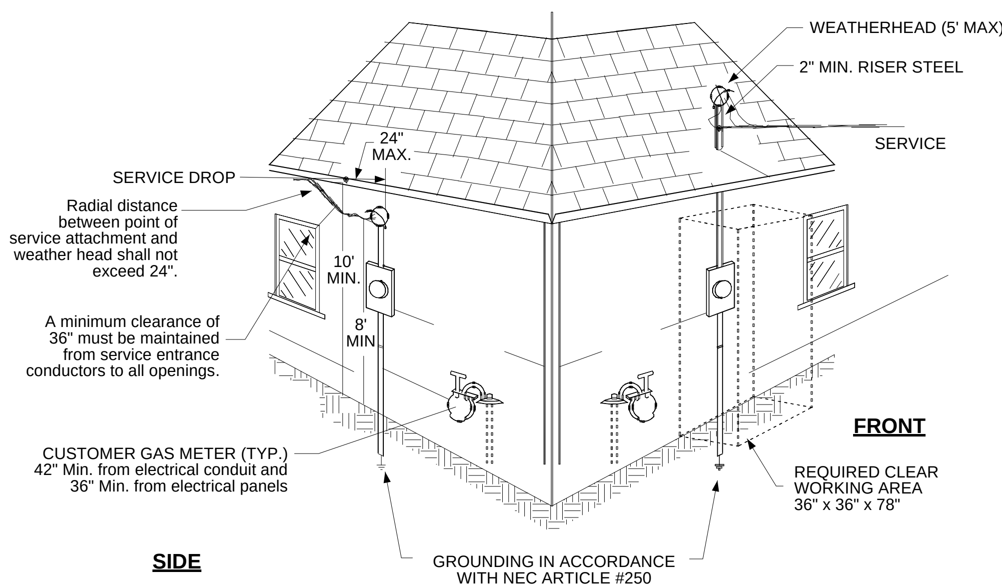
For detailed cabinet requirements, see GM0001M, Electric Metering General, Section 5.2.

For detailed service equipment requirements, see RM0001M, Electric Metering Residential.

7. Clearances

The minimum acceptable clearances for overhead service drops are outlined in the latest version of the National Electric Safety Code / G.O. 95. Upon request, your NVE representative will specify a point of attachment which will provide the required clearance of the service wires above thoroughfares and structures and from windows, doors, and exits of buildings.

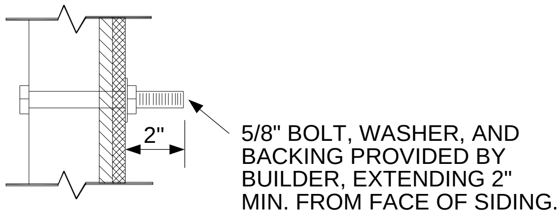




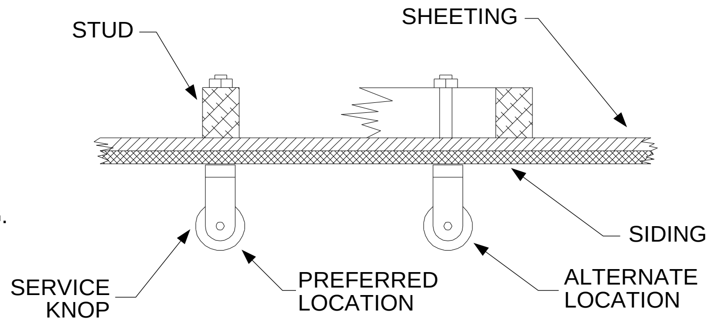
ALL SERVICE EQUIPMENT SHALL BE MADE RAIN-TIGHT BY APPROVED FITTINGS

BUILDING CLEARANCES SERVICE DETAILS

8. Service Attachments and Weather Heads



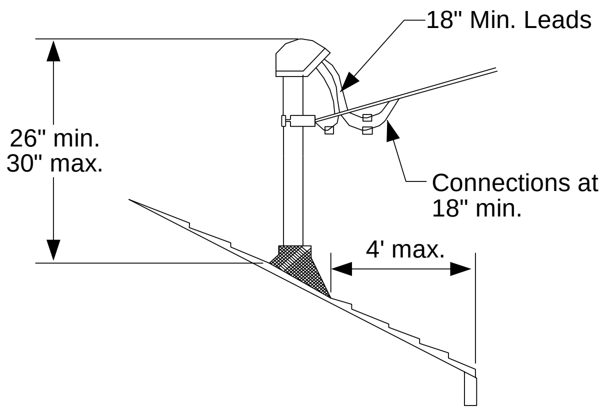
SIDE VIEW



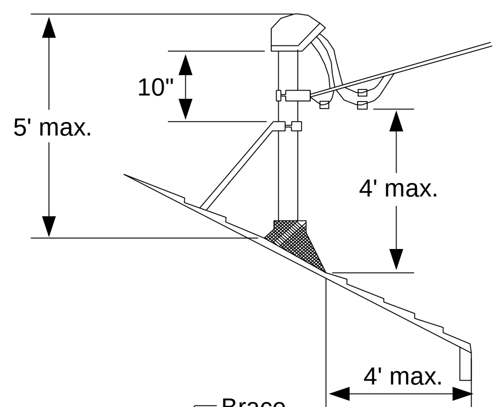
TOP VIEW

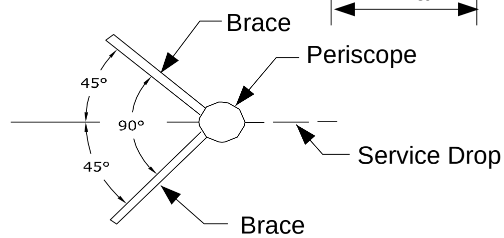
Two types of service attachments are used by NVE, service knobs which attach to the building and periscopes which extend above the roof. Typical methods of attaching residential overhead service are illustrated in this section. Where the building is high enough to permit proper clearance, the service knob can be located on roof rafters or wall studs. Customer will provide backing for service knob (min. 2”x4”), securely anchored to building frame. Service knobs will not be attached to roof fascia or wall sheeting unless proper backing is provided.

UNBRACED PERISCOPE



BRACED PERISCOPE





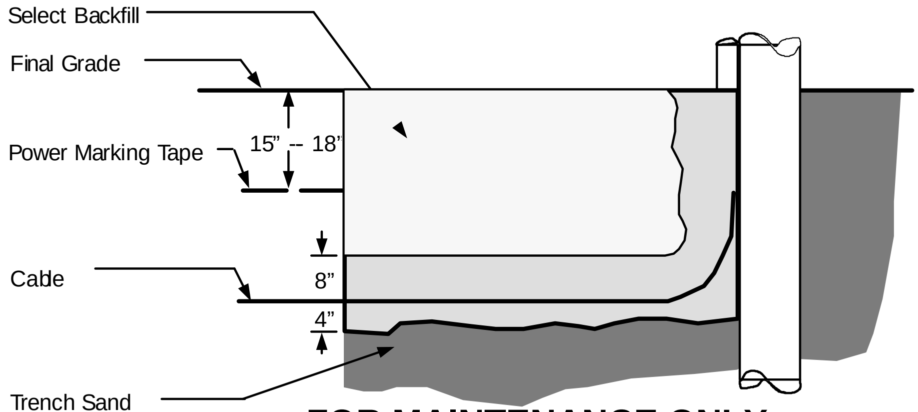
TOP VIEW

A periscope should be used when proper clearances cannot be maintained with a service knob attachment. Periscope to be minimum 2” rigid steel securely fastened to building stud. Periscope to extend minimum of 26” above roof. See NEC 230-B.

NOTES:

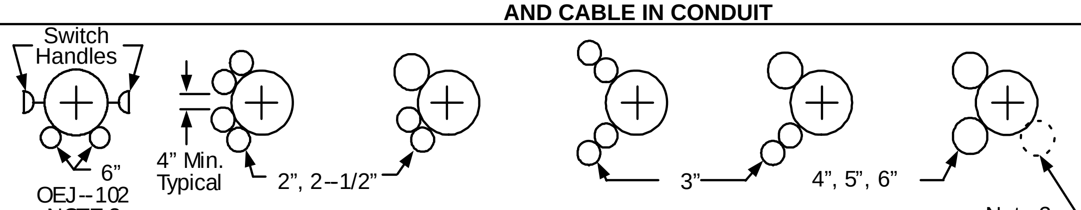
1. Periscope structures projecting over 30” above the roof must be braced against the pull of the service drop conductors. Bracing, when required, shall consist of two galvanized steel members installed at approximately 90° spread. Minimum size shall be ¾” galvanized steel pipe or 1-1/4” x 1-1/4” x 1/8” galvanized steel angle. Periscope bracing shall be anchored through subroof with minimum 3/8” galvanized carriage bolts.
2. **Riser conduit will not have couplings above the roof.**
3. Point of attachment of service drop must be high enough to meet required clearance.
4. Alternate service attachment points must not be more than 24” from weather head.
5. Service conductor must extend minimum 18” from weather head.
6. A ladder will not be used during installation of terminations.

THIS PAGE INTENTIONALLY LEFT BLANK

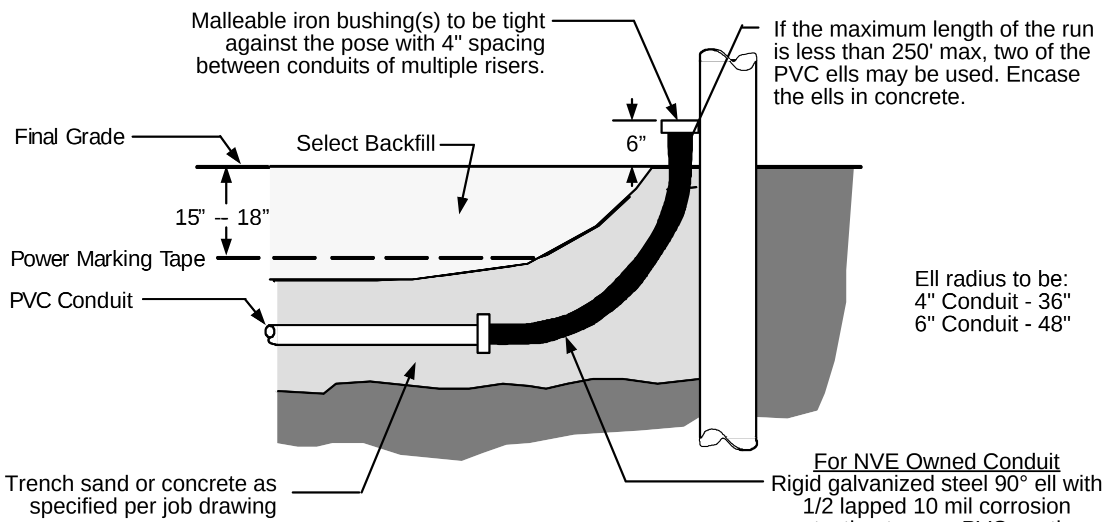


FOR MAINTENANCE ONLY

DIRECT BURIED CABLE
AND CABLE IN CONDUIT



Allowable conduit size and configurations under vent boots



CONDUIT RUN

NOTES:

1. **Designer –** All power and communication risers shall encompass a maximum of half the pole, the remaining half is to be kept clear for pole change outs.
2. **Designer –** Minimum pole ground-line circumference of 44" is required when installing spare 6" conduit for parallel 1000 kcmil feeder risers.
3. **Contractor –** For 2 way switch riser OEJ-102, place conduits in a quadrant of the pole that is at a right angle to the overhead primary conductors. Verify conduit location with NVE Construction Team Leader.

THIS PAGE INTENTIONALLY LEFT BLANK

Table of Contents

THIS PAGE INTENTIONALLY LEFT BLANK

1. Purpose

This Standard is to be used as the specification for the applicant's portion of the Underground Distribution System for NV Energy.

2. Table of Contents

3. Preparation of Trench Bed

1. All excessive loose material shall be removed from the trench. Excessive loose material may be defined as any material which would cause settlement, create soft unstable conditions, or that would contaminate or intrude into bedding material. The bottom shall be smooth and even.
2. Unstable soils such as older trench fills or soft natural ground shall be over-excavated and replaced with compacted granular material in compliance with the Trench Backfill section.
3. Where the excavation is in rock with a rough surface, the bottom shall be leveled with pre-moistened, machine compacted sand fill to provide a smooth, firm bottom prior to placing the bedding material.

4. Placement of Bedding Material

1. Sand material for bedding shall consist of clean, granular material. The sand must be pre-moistened and machine compacted; flooding is not allowed.
2. The cables or conduits shall be embedded with a minimum depth of four inches of sand below the cable or conduits, three inches on the sides, and a minimum depth of eight inches of sand over cables or conduits.
3. With the cables or conduits installed, the bedding material shall be consolidated.

   Machine compaction or compaction testing equipment should not be used within eight inches of the cable or conduits.

5. Power Trench Sand

1. Power Trench Sand shall conform to the latest revision of Clark County Uniform Standard Specification 208; In addition, the material shall conform to the following gradation requirements:

Sieve Sizes	Percentage By Weight Passing
3/8”	100
No. 4	80-100
No. 16	40 – 80 (*)
No. 200	5 – 20 (*)

(*) NVE requirements to minimize the void ratio for thermal conductivity. Uniformly graded material, such as pea gravel (high void ratio), is not acceptable. The soluble sulfate content shall not exceed 0.3% by dry weight of soil.

2. The plasticity index of the material shall conform to the latest revision of Clark County Uniform Standard Specification 704.

6. Approved Trench Sand Supplier

1. Refer to RT-2 for a current list of Approved Trench Sand Suppliers and sources (also available at **www.nvenergy.com**).
2. Approval of a sand source and supplier is effective for a period of 3 years and is contingent upon continued compliance with NVE and Clark County Uniform Standard Specifications. If at anytime the sand does not meet NVE/CC standards, the sand will be rejected and the supplier may have to re-qualify the source of the non-conforming sand.
3. To become an approved Power Trench Sand supplier, the following documents and a sample must be submitted to NVE T&D Standards. A representative from a licensed soil testing laboratory shall collect sand samples at the source location for testing.
   - A. Test report(s) from a licensed soil testing laboratory signed and stamped by a professional engineer.
   - B. Letter from the testing facility stating that all submitted test reports conform to requirements in NVE RT-1 specifications. The letter must be signed and stamped from a professional engineer from the testing facility.
   - C. Sample of the tested sand in a one-pint container. The sample container shall be labeled with: 1) Source Location, 2) Supplier Name, 3) Supplier Telephone Number, 4) Testing Laboratory Name, 5) Testing Laboratory Telephone Number, and 6) Test Date.

   Hand deliver all the required information to the following location:

NV Energy
T&D Standards Department
7155 Lindell Rd
M/S B19AM
Las Vegas, NV 89118
Ph: (702) 402-6541

7. Trench Backfill above Sand Bedding

1. To comply with the Clark County Uniform Standard Specifications, all trench backfill under existing or future streets and sidewalks within existing or future street right-of-way, shall be compacted to a minimum of 90% of the maximum dry density per ASTM D1557 and AASHTO – T180 or as specified by the governing authority.
2. Material shall be compacted in lifts with a compacted thickness not greater than 6” for each layer.
3. The native soils (or import materials) used as a backfill shall comply with the following:
   A. Shall contain no rocks larger than 3”.
   B. Shall be free of organic materials that will decompose.
   C. Shall not contain broken rocks such as caliche or concrete debris, which have sharp edges.
   D. Soil classified as CL or CH (moderate to high plasticity clay) are not acceptable on the basis that moisture control and the ability to compact these soils in trenches to 90% is very difficult to impossible to accomplish. Soils classified as SS and GC (clayey sands or clayey gravels) are generally acceptable for compaction.

8. Unacceptable Bedding or Trench Backfill Material

The rejection of any material, by the inspector, may be made on the basis of the existing condition of the soils and the ability to be properly compacted according to specifications. These conditions include soils that are to wet, too dry, or in hard clods, which will not blend and can not be compacted by the equipment used.

NOTE: State and Federal highway crossing are to be installed per their respective requirements.

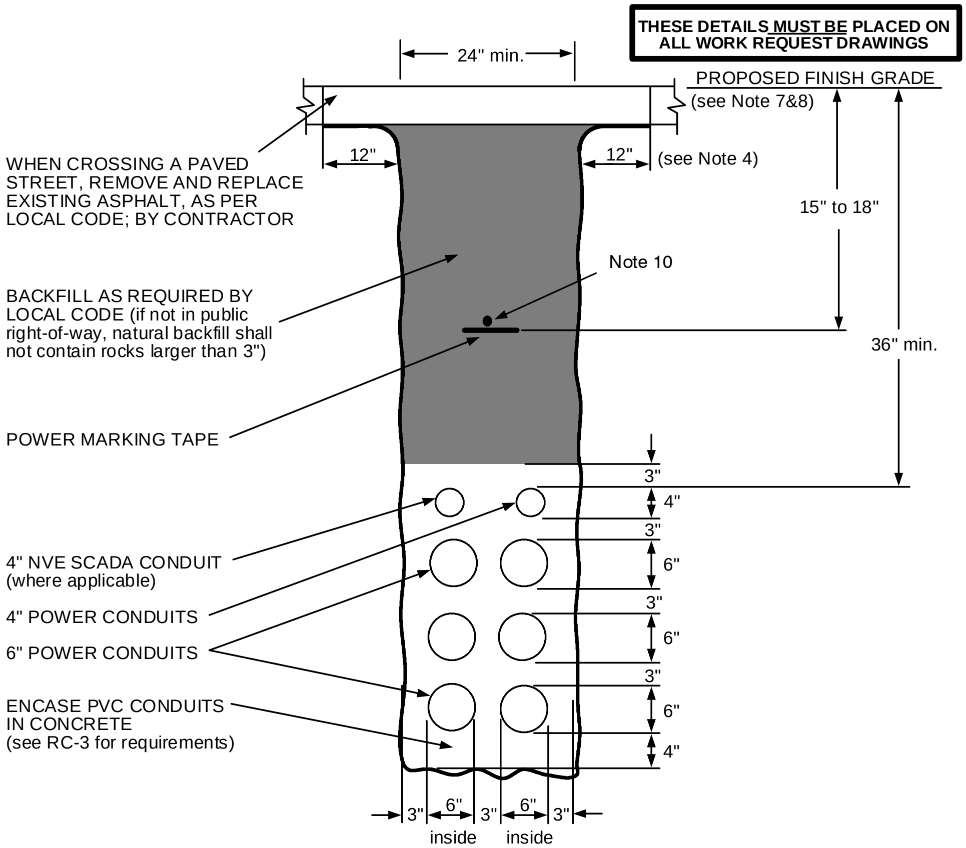
THIS PAGE INTENTIONALLY LEFT BLANK

Supplier	Source/Pit Location/Crusher	Date Approved	Re-Test and Approval Deadline
Aggregate Ind.	Sloan Pit	12/11/2018	12/11/2021
Mel Clark Inc.	Lone Mountain	10/23/2018	10/23/2021
LV Paving	N – 5th Street Crusher	2/10/2021	2/10/2024
LV Paving	Viento Crusher	2/10/2021	2/10/2024
LV Paving	Lone Mountain Crusher	2/10/2021	2/10/2024
LV Paving	LHoist Crusher	2/10/2021	2/10/2024
LV Paving	Sunset Crusher	2/10/2021	2/10/2024
LV Paving	Blue Diamond Crusher	2/10/2021	2/10/2024
Wells Cargo	Spring Mountain Pit	2/10/2021	2/10/2024
Wells Cargo	Lone Mountain Pit	2/10/2021	2/10/2024

NOTES:

1. **To Suppliers:**
   Sand sources not re-tested and approved prior to the above date, will be removed from the approved suppliers list.
2. **To Home Owners and Contractors:**
   When ordering sand, you must specify: Power Trench Sand.

THIS PAGE INTENTIONALLY LEFT BLANK



NOTES:

1. See RT-G for general trenching requirements.
2. All Electric facilities will maintain 36” horizontal separation from Water, and Gas.
3. All clearances/separations from Sewer shall comply with the Clark County Water Reclamation Design and Construction Standards for Wastewater Collection Systems as last revised.
4. All non-NV Energy utility crossings shall maintain a minimum of 12” clearance from edge to edge. When running parallel with other Non-NV Energy utilities a minimum of 12” of horizontal separation from edge of conduit to edge of conduit shall be maintained.
5. Vinyl marking tape is provided as supplemental protection because NVE cannot control the final grade elevation due to possible future surface grade changes by the developer or owner.
6. Excavated material shall be placed a minimum of two feet from both edges of the trench to prevent material from falling into an open trench.
7. Proposed finish grade is to be measured from the top of the pavement/sidewalk.
8. Where the finish grade cannot be determined, the trench depth in an undeveloped area shall be determined by the NVE Inspector with a minimum trench depth of 5’.
9. Prior to installing conduit in trench, place one of the following:

   A. A #2-7 stranded bare copper wire (made electrode) 100 feet in length in bottom of trench along with a 5’ tail inside pad or vault.

   OR

B. If trench is too short, place 2-50’ #2-7 stranded bare copper wires in the incoming and outgoing trenches along with 2-5’ tails in the pad or vault.

C. Note: Backfill #2-7 stranded bare copper wire with natural soil to a depth of 3” prior to placing sand backfill.

10. When all electric conduit in the trench is for future use (i.e. empty), install an approved tracer wire on top of the power marking tape for the entirety of the trench and terminate each end in an approved RS-10 handhole.

1. Criteria for Concrete Encasement of All Conduit Duct Banks

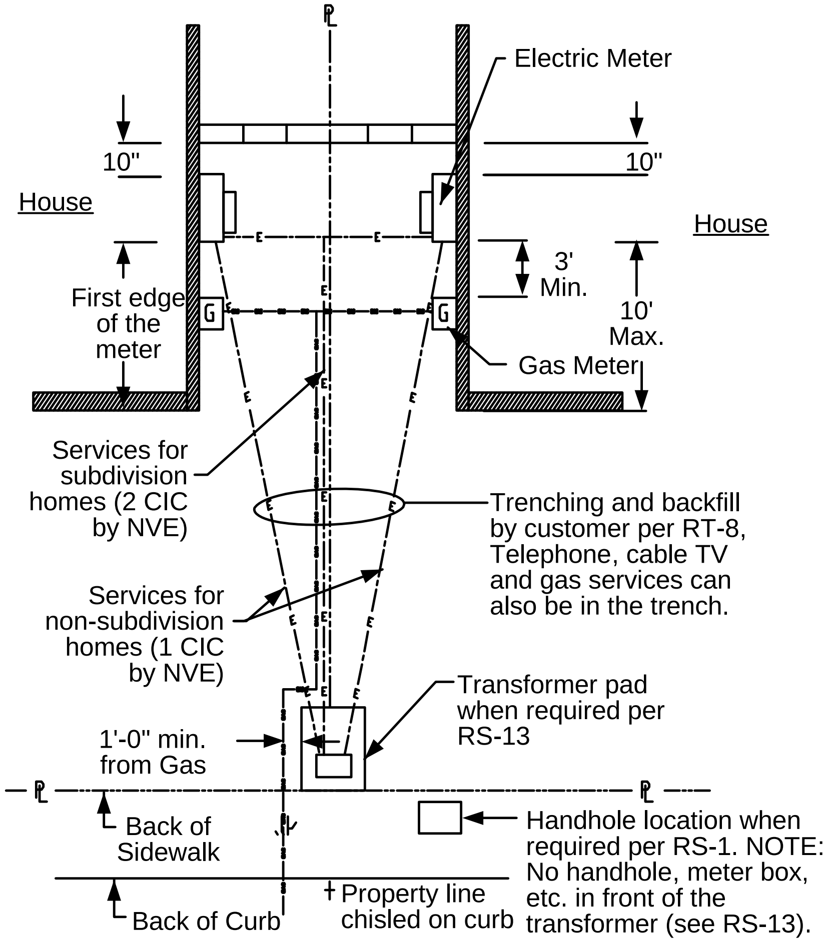
1. Encase with 300 psi concrete (per RC-3) all conduits installed:
   - A. Under roads
   - B. In railroad easements
   - C. In areas with potential erosion
   - D. In areas with poor compaction
   - E. In trenches with 3 or more 6-inch conduits
   - F. In locations that at the discretion of the NVE Underground Inspector(s) are required for reasons of public safety and/or NVE System reliability.
2. Encase with 3000 psi concrete (per RC-3) all conduits installed:
   - A. Within 10’ of a high pressure gas line
   - B. Beneath natural or concrete lined washes and drainages
   - C. In locations that at the discretion of the NVE Underground Inspector(s) are required for reasons of safety and/or NVE reliability.
3. Encase with 300 or 3000 psi concrete (per RC-3 and 1.2.2 above) all conduit(s) steel case bores deeper than 60” and extend concrete encasement from final bore depth to standard conduit depths at each end of bore.

2. Criteria for Emergency Only 6” Conduit(s) Installations

1. A minimum of one (1) additional 6” emergency conduit per circuit/feeder installation is required.
2. Any additional emergency conduits are solely at the discretion of NVE designer(s).

3. Criteria for Future Load 6” Conduit(s) Installations

Install a 6” conduit(s) in location that at the discretion of NVE Distribution Planning are required for future load service or for reasons of system reliability.

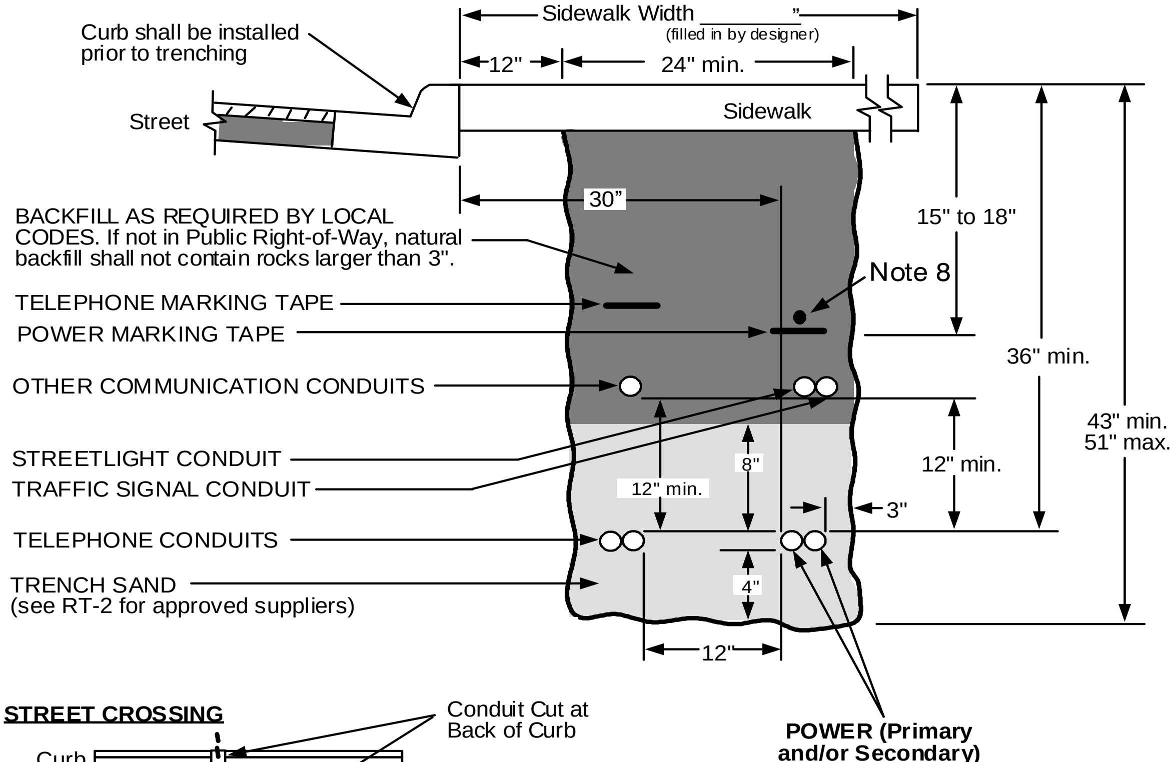


NOTES:

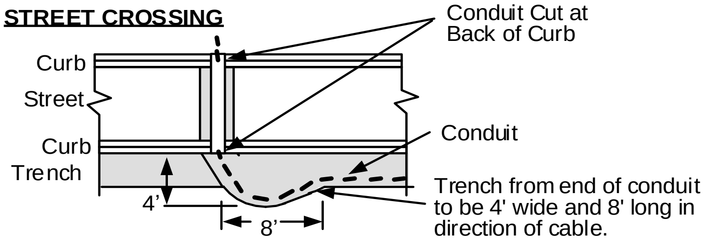
1. NVE will furnish and install a CIC service and connect to the customer's service entrance. It will also furnish and install the meter.
2. The customer shall install the meter/service equipment on the building in accordance with the applicable City or County requirements prior to the excavation of the trench.
3. The trench shall be installed in accordance with RT-1 and RT-8.
4. The customer is required to notify the company at least 48 hours in advance when the trench is ready for inspection. Under no circumstances will the service be installed prior to the Inspection of the meter/service equipment.
5. The trenching and select backfill is provided by the customer.
6. The vinyl marking tape will be provided by NVE and installed by the customer per RT-G.
7. The preferred location of the subdivision trench is left of the property line looking from the street. One exception is if there is a slope, then refer to the slope trench detail by the Designer.
8. The vinyl marking tape will be provided by NVE and installed by the customer per RT-G.

THIS PAGE INTENTIONALLY LEFT BLANK

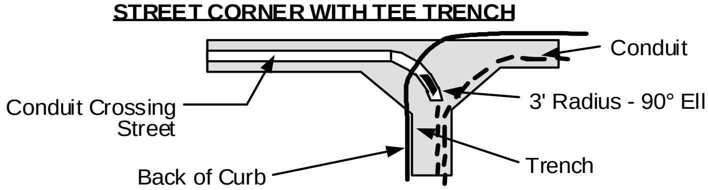
THESE DETAILS MUST BE PLACED ON ALL WORK REQUEST DRAWINGS



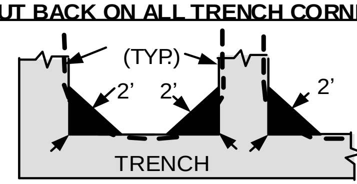
STREET CROSSING



STREET CORNER WITH TEE TRENCH



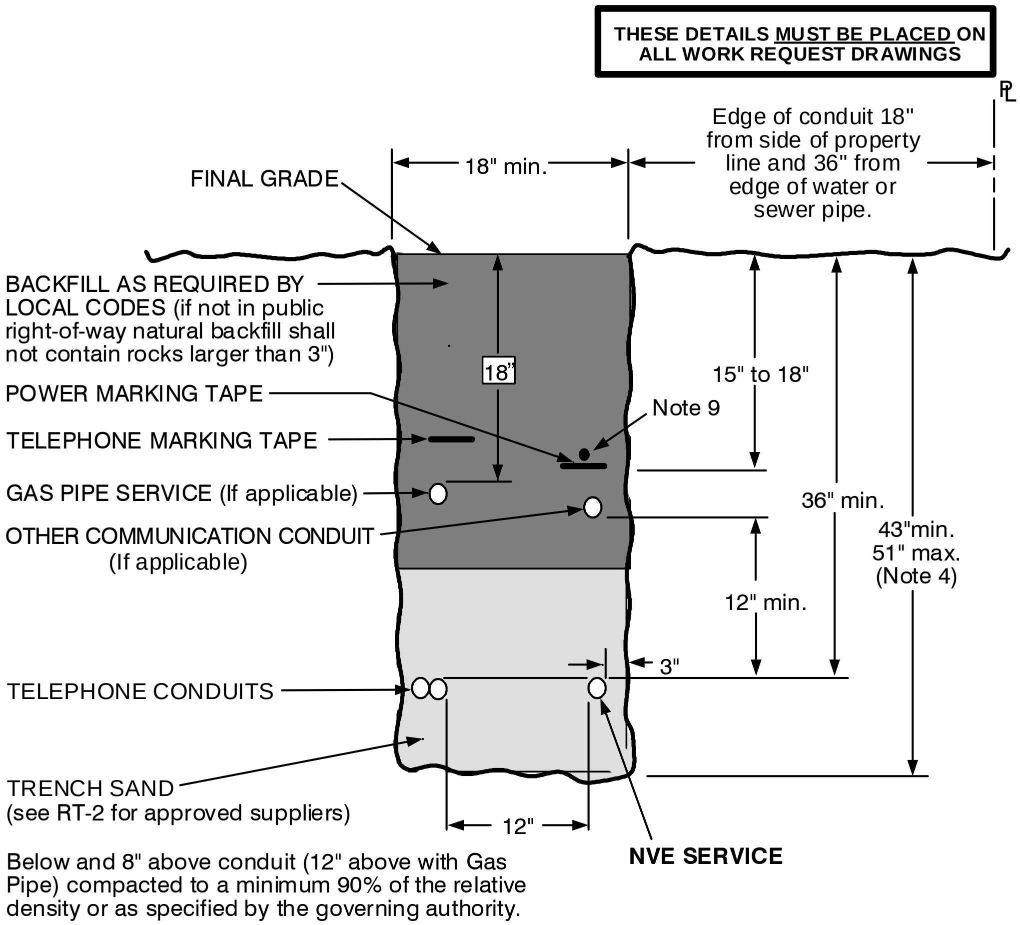
CUT BACK ON ALL TRENCH CORNERS



NOTES:

1. See RT-G for general trenching requirements.
2. The edge of an NVE trench shall not be less than 36” from the edge of water or gas pipe.
3. All clearances/separations from Sewer shall comply with the Clark County Water Reclamation Design and Construction Standards for Wastewater Collection Systems as last revised.
4. Intentionally left blank.

5. All non-NV Energy utility crossings shall maintain a minimum of 12” clearance from edge to edge. When running parallel with other Non-NV Energy utilities a minimum of 12” of horizontal separation from edge of conduit to edge of conduit shall be maintained.
6. Vinyl marking tape is provided as supplemental protection because NVE cannot control the final grade elevation due to possible future surface grade changes by the developer or owner.
7. Excavated material shall be placed a minimum of two feet from both edges of the trench to prevent material from falling into the open trench.
8. When all electric conduit in the trench is for future use (i.e. empty), install an approved tracer wire on top of the power marking tape for the entirety of the trench and terminate each end in an approved RS-10 handhole.

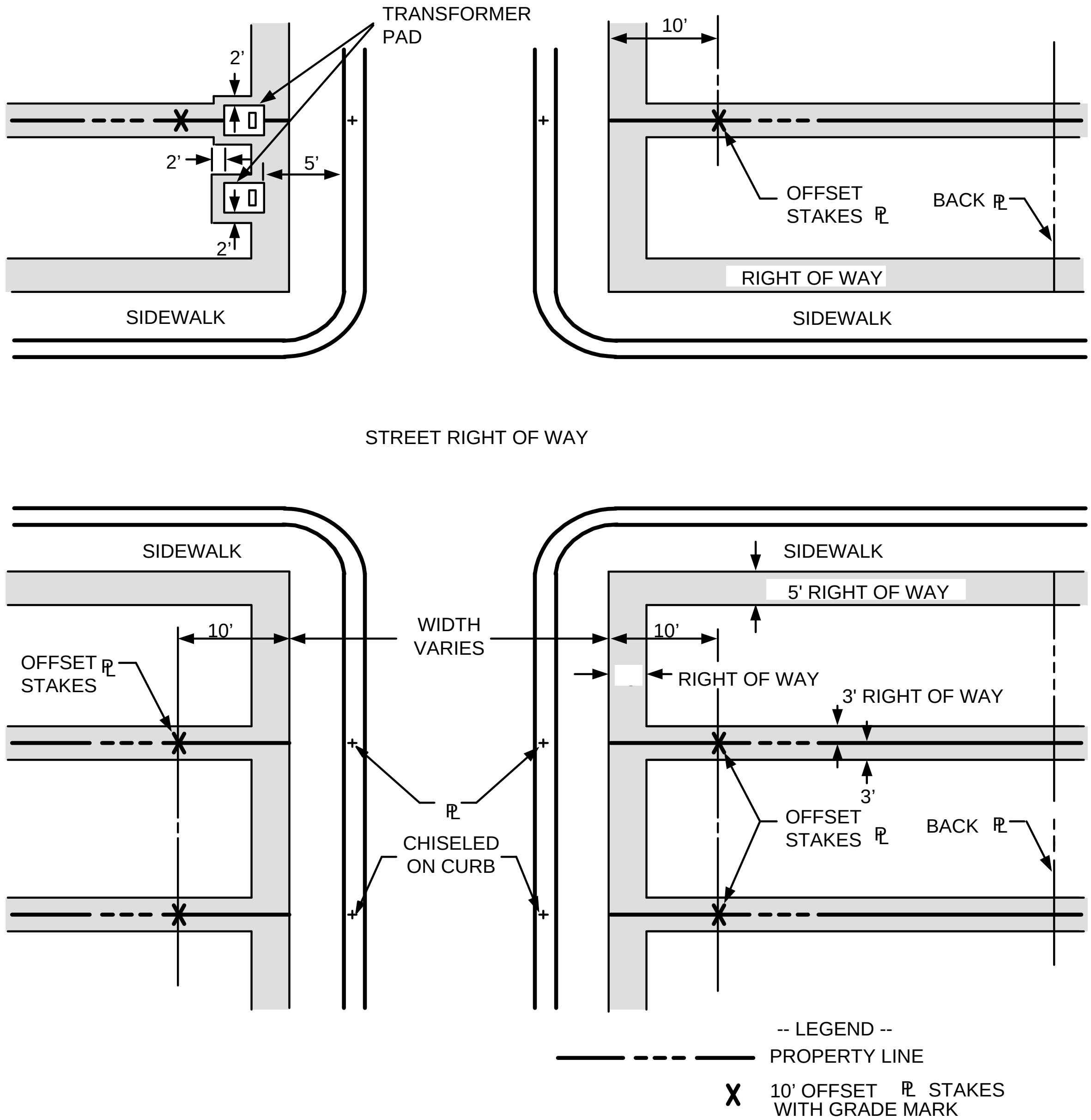


NOTES:

1. See RT-G for general requirements, RT-1 for trench, sand, and backfill requirements and RC-1 for conduit material requirements.
2. The edge of an NVE trench shall not be less than 36” from the edge of water or gas pipe.

   Exception: Gas Services allowed as shown in above drawing.
3. All clearances/separations from Sewer shall comply with the Clark County Water Reclamation Design and Construction Standards for Wastewater Collection Systems as last revised.
4. All non-NV Energy utility crossings shall maintain a minimum of 12” clearance from edge to edge. When running parallel with other Non-NV Energy utilities a minimum of 12” of horizontal separation from edge of conduit to edge of conduit shall be maintained.
6. Excavated material shall be placed a minimum of two feet from both edges of the trench to prevent material from falling into the open trench.
7. Service trench shall not be excavated in a slope parallel to the trench.
8. Where the final grade cannot be determined, the trench depth in an undeveloped area shall be determined by the NVE inspector with a minimum trench depth of 5’.
9. When all electric conduit in the trench is for future use (i.e. empty), install an approved tracer wire on top of the power marking tape for the entirety of the trench and terminate each end in an approved RS-10 handhole.

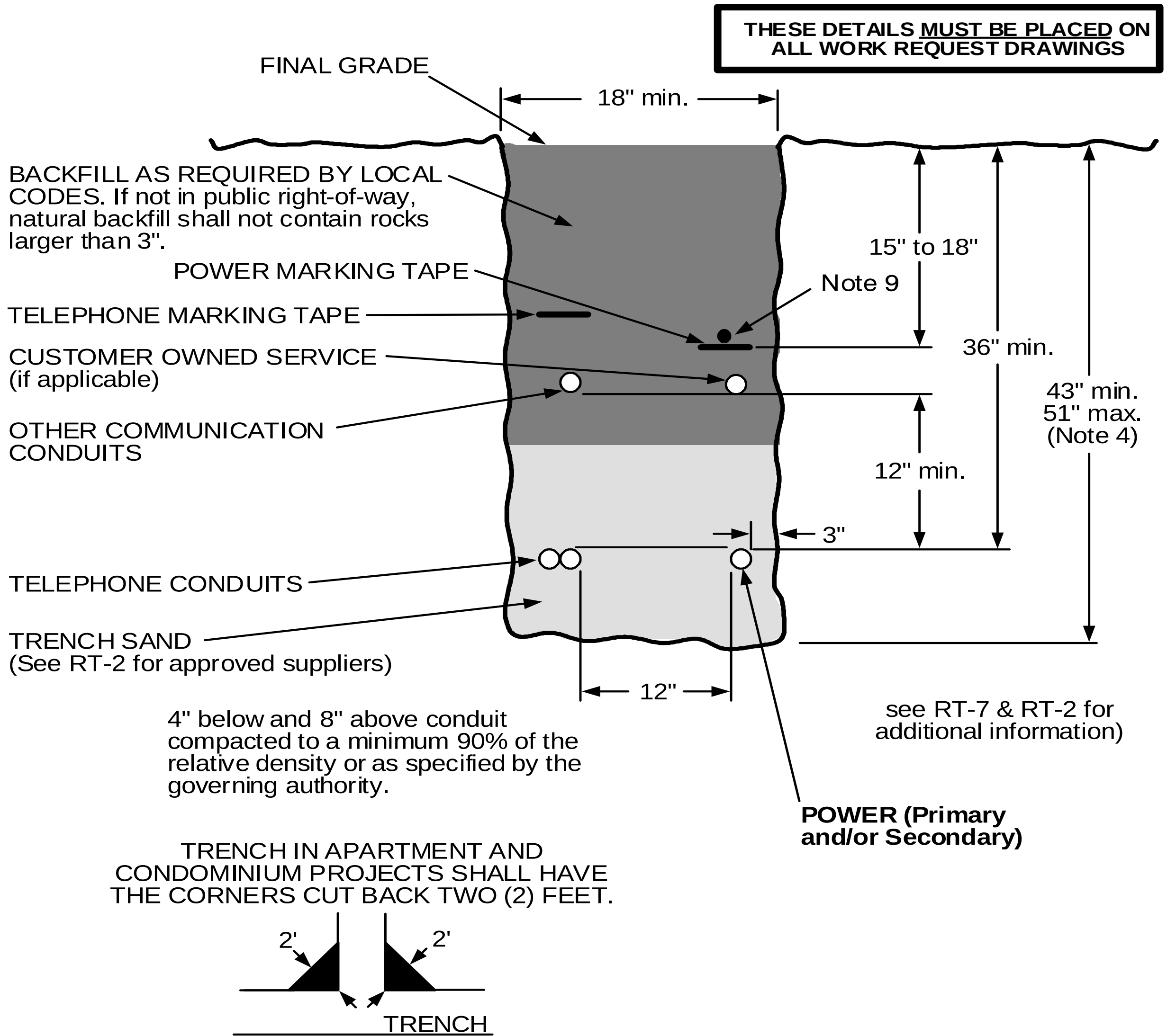
THIS PAGE INTENTIONALLY LEFT BLANK



NOTES:

1. Applicant shall furnish property lines chiseled on curb & offset stakes with final elevation.
2. Offset stakes shall be 10’ back of front property line for excavated material clearance.
3. Residential right-of-way requirements are 3’ on all side lot lines, 5’ on all front lot lines, 2’ surrounding all transformer pads and other structures as requested. The Right-of-Way shall be in NV Energy’s name and shown on the plat or Right-of-Way document.

THIS PAGE INTENTIONALLY LEFT BLANK



NOTES:

1. See RT-G for general requirements, RT-1 for trench, sand and backfill requirements and RC-1 for conduit material requirements.
2. The edge of an NVE trench shall not be less than 36” from the edge of water or gas pipe.
3. All clearances/separations for Sewer shall comply with the Clark County Water Reclamation Design and Construction Standards for Wastewater Collection Systems as last revised.
4. All non-NV Energy utility crossings shall maintain a minimum of 12” clearance from edge to edge. When running parallel with other Non-NV Energy utilities a minimum of 12” of horizontal separation from edge of conduit to edge of conduit shall be maintained.
5. Vinyl marking tape is provided as supplemental protection because NVE cannot control the final grade elevation due to possible future surface grade changes by the developer or owner.

6. Excavated material shall be placed a minimum of 2’ from both edges of the trench to prevent material from falling into open trench.
7. Where the final grade cannot be determined, the trench depth in an undeveloped area shall be determined by the NVE Inspector with a minimum trench depth of 5”.
8. For a “sole – use” trench with one conduit only, the trench width may be reduced to two times the nominal diameter of the conduit, but in no case less than 6”.
9. When all electric conduit in the trench is for future use (i.e. empty), install an approved tracer wire on top of the power marking tape for the entirety of the trench and terminate each end in an approved RS-10 handhole.

1. Table of Contents

2. Purpose

The purpose of this document is to define the design requirements for Steel Sleeve Encased Boring in cases where it is not possible or practical to utilize traditional trenching methods for installation of conduit. This type of installation method utilizes a steel sleeve to encase a conduit bank in which the individual conduits are installed using appropriate spacers. The steel sleeve is filled with grout for strength and to stabilize and protect the conduits within.

The size and number of conduits for any particular bore may vary, and a wide variety of both predesigned as well as custom made spacers are available to accommodate any desired configuration of conduits. This specification addresses the general requirements applicable to all installations. All spacers shall be designed to accommodate Schedule 80 PCV conduit.

3. Sleeve Requirements

Steel sleeves used to encase conduits may be 18”, 24”, 30”, or 36” in diameter. Sleeves having a diameter of 18” to 24” must have a minimum, wall thickness of 0.375”. Sleeves having a diameter of 30” must have a minimum wall thickness of 0.500”. Sleeves having a diameter of 36” must have a minimum wall thickness of 0.532”.

4. Conduit Spacer Material and Design Requirements

Conduit spacers shall conform to the requirements below and **BIDDER** shall verify that spacers meet the following specifications:

1. **MATERIAL:** 0.750” ± 0.075” thick high-density polyethylene (HDPE) stress relieved sheets.
2. **COLOR:** Natural white.
3. **TENSILE STRENGTH:** 4600 PSI.
4. **ELONGATION:** 900%
5. **COMPRESSIVE STRENGTH:** 2700 to 3600 PSI.
6. Factory installed polyolefin, compact wheel assemblies on conduit spacers sized according to Table 1 (2 required).
7. Opening for optional ½” cable to stabilize conduit bank during installation. (2 required)
8. Float stop (2 required).
9. A 0.875” clearance between the conduit spacer O.D. and casing I.D.
10. The perimeter of conduit spacer is scalloped for maximum grout flow area.

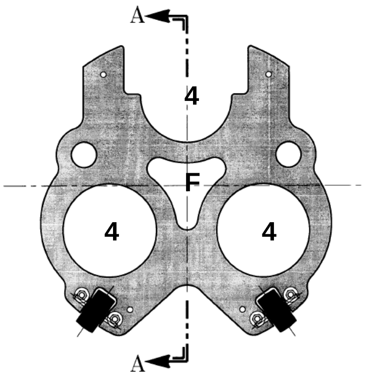
11. The minimum distance between conduits shall be 3.0”.
12. All conduits shall be Schedule 80.
13. The minimum distance between spacers shall be **5 feet**.
14. The conduit spacers shall have maximum float measurements specific to each individual conduit spacer design. Maximum float is defined as the amount of space between the casing wall and the (float stop) top of the conduit spacer.
    A. Figure 1 Conduit Spacer, **1.116”** maximum float.
    B. Figure 2 Conduit Spacer, **1.292”** maximum float.
    C. Figure 3 Conduit Spacer, **1.106”** maximum float.
    D. Figure 4 Conduit Spacer, **1.261”** maximum float.
    E. Figure 5 Conduit Spacer, **1.578”** maximum float.

5. Conduit Spacer Configurations

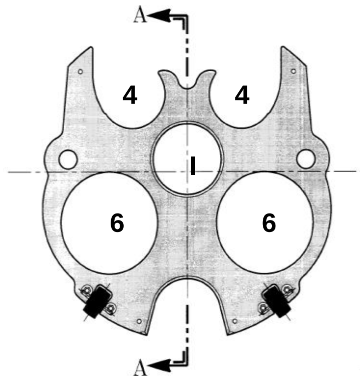
A list of typical casings and conduit spacers is shown in Table 1. The conduit spacers that are specified for any particular project will depend on the number and size of conduits that are required to be installed. Hence, spacers may be selected from the variety of predesigned and cataloged types (shown below) or custom designed and ordered if a predesigned spacer for the required conduit configuration is not available. **NVE T&D Standards must pre-approve all conduit spacer combinations and manufacturers that are not listed in Table 1 of this standard.** Details of the approved configurations are shown in Figures 1 thru 5.

Casing O.D. (inches)	Casing Wall Thickness (inches)	Number of Conduits and Size *Min. Schedule 40 PVC Pipe to be Used	Wheel Size (inches)	Underground Devices, Inc.
18 (Figure 1)	0.375	3 – 4”	2	BS3404W2
24 (Figure 2)	0.375	2 – 6” & 2 – 4”	2	BS3406W2
24 (Figure 3)	0.375	3 – 6” & 2 – 4”	2	BS3405W2
30 (Figure 4)	0.500	5 – 6” & 2 – 4”	2	BS3407W2
36 (Figure 5)	0.532	7 – 6” & 2 – 4”	3	BS3382W2

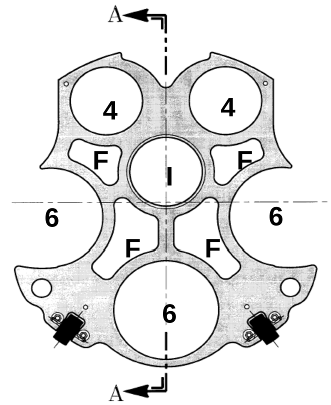
Table 1. Typical Casings and Conduit Spacers



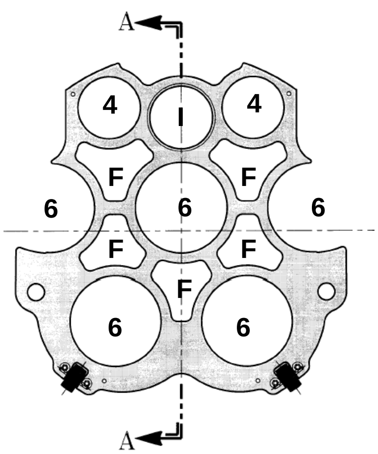
3-4" Conduits
Figure 1



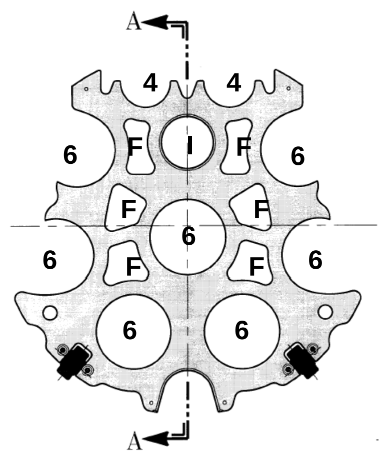
2-6" & 2-4" Conduits
Figure 2



3-6" & 2-4" Conduits
Figure 3



5-6" & 2-4" Conduits
Figure 4



7-6" & 2-4" Conduits
Figure 5

NOTE:
4 = A 4" conduit
6 = A 6" conduit
F = Flow hole for grout
I = Grout Injection pipe hole
Use a minimum of Sch. 40 PVC pipe.
Minimum distance between conduits is 3.0 inches.

6. Thermal Grout Mix

The grout mix used to fill the steel casing must have an adequately high fluidity (low viscosity) to be pumped into the casing without leaving voids, have an adequately low thermal resistivity, and must support the conduits within the conduit bank once hardened. Tables 2 and 3 show two acceptable grout mix formulas that meet NV Energy requirements. Due to variability in materials from different sources, it is the responsibility of the contractor to test and verify that the mix has adequate fluidity, thermal resistivity, and strength.

It is the responsibility of the contractor performing the work to verify that the total volume of grout pumped into the casing equals the calculated volume to ensure the casing is completely filled. Additionally, after filling the casing, some settlement of the grout will occur and water will bleed out causing a reduction of the total volume. After a 24 hour period, an additional amount of grout should be pumped in to fill the void caused by shrinkage of the grout. The contractor shall keep a record of the total volume of grout installed.

Once filled with grout, the open ends of the casing shall be capped (plugged) with high strength non-shrinking concrete to prevent moisture loss over time. Once capped, the percent moisture content and the thermal resistivity should remain constant. **An NV Energy Inspector shall review and approve all grout mixes.**

Component Material	Amount
Bag House Fines	1475 lb/yd3
Cement	100 lb/yd3
Flyash	545 lb/yd3
Water	860 lb/yd3
Slurry Density	78 lb/ft3
Time of Efflux	30 sec.
Thermal Resistivity (set/hardened condition)	71 °C-cm/W

Table 2. Grout Mix Option 1

Component Material	Amount
Bag House Fines	1630 lb/yd3
Cement	75 lb/yd3
Flyash	400 lb/yd3
Water	875 lb/yd3
Slurry Density	78 lb/ft3
Time of Efflux	30 sec.
Thermal Resistivity (set/hardened condition)	71 °C-cm/W

Table 3. Grout Mix Option 2

Table of Contents

THIS PAGE INTENTIONALLY LEFT BLANK

1. Purpose

This specification covers plastic utility duct requirements per the latest revision of NEMA Publication No. TC6 & 8, unless otherwise specified, for polyvinylchloride (PVC) plastic conduit used for underground installations.

2. Terminology

The terminology used in this specification is in accordance with the definitions given in ASTM D883 and/or ASTM F412, Relating to Plastics, unless otherwise specified.

3. Materials

1. Plastic utility ducts shall comply with the NEMA TC6-1.02A material requirements. PVC conduits and fittings shall be manufactured from a virgin homopolymer PVC compound which meets the minimum cell classification of PVC 12254-A,B, or C as defined in ASTM D 1784.
2. Other PVC compounds, which have a different cell classification because one or more properties are superior to those of the compounds specified above, may be used.
3. Reworked material may be used provided the duct produced meets all of the requirements of these standards.

4. Workmanship

All conduits and fittings shall be homogeneous throughout and free from visible cracks, holes, burrs, foreign inclusions or other defects which could damage conductors or cables. The conduit shall be as uniform as commercially practicable in color, opacity, density and other physical properties.

5. Packaging and Marking

1. The conduit shall be bundled, packed or racked in packages so constructed as to insure acceptance by common or other carriers at the lowest rate to the point of delivery unless otherwise specified.
2. All ducts shall be marked per NEMA Standard Publication No. TC6 & 8 or ASTM F512.

6. Belled Ends

Plastic ducts with belled ends shall be manufactured per the latest revision of NEMA Standard Publication No. TC6 & 8. Plastic ducts without belled ends shall be supplied with a coupling cemented to one end.

7. Fittings

Fittings for PVC plastic conduits shall be manufactured per NEMA Standard Publication No. TC9.

8. Conduits

1. Direct bury conduit shall be a minimum rating of DB-120 for 2” and 3” conduit, DB-60 for 4” and 6” conduits.
2. Encasement bury conduit shall be a minimum rating of EB-35 for 2” and 3” conduit, EB-20 for 4” and 6” conduits. DB type conduit may substitute EB type for encasements.
3. All conduits shall be rated for 90° C cable and come in 20’ sections.

TABLE OF CONTENTS

1. Purpose

This standard provides the minimum placement instructions for direct burial and concrete encased plastic conduits and fittings. All conduits and fittings used shall conform to standard RC-1.

2. Damage Minimization

1. Conduit should not be left exposed in an open trench longer than absolutely necessary.
2. Provide support for the full length of conduit when transporting long lengths.
3. Do not permit unsupported overhangs.
4. Conduit stored for periods of longer than 30 days should be protected from sunlight according to the manufacturer's recommendations.
5. Exposure to sunlight during normal construction is not harmful.

3. Temperature

1. All plastic conduit and fittings to be joined should be exposed to the same temperature conditions for a reasonable length of time before assembly.
2. Due to an expansion and contraction of plastic duct of 1 –1/2" per 100' for every 20 degrees F change in temperature, the following precautions should be taken:
   - A. Allow extra conduit footage at each tie – in for contraction when duct temperature is higher than that of earth; or extra room for expansion, if the reverse condition exists.
   - B. Backfill from center of ditch towards ends or from tie – in point toward other end of duct run.
   - C. After trench is backfilled and compacted and duct temperature is the same as that of surrounding soil, duct may be cut off and matched up for connection with tie – ins. All conduit tie – ins entering manhole, vault or handhole walls shall be grouted into the walls.

4. Preparation for Making a PVC Joint

1. Make certain that all foreign matter has been wiped from both the conduit and fittings at joints.
2. The conduit should be dry before inserting into the fitting. It must bottom to make a good cement weld.

3. Change in conduit sizes must be done at manholes, splice boxes, pullboxes, etc. Reducers must not be used in the conduit line.

5. Cutting PVC Conduit

1. Use a fine tooth wood saw to cut conduit from ½” to 1 ½” diameter, or crosscut wood saw on sizes over 1 ½” diameter. A hacksaw can be used on all sizes. The conduit must be cut straight. Clean off burrs.

6. Cement and Thinner

1. Use only the manufacturer’s recommended cement for PVC conduit fabrication.
2. Use only the manufacturers recommended thinner for PVC conduit fabrication.
3. Use thinner to cut consistency when cement thickens.
4. Do not use thinner on PVC conduit.

7. Cementing PVC Conduit

1. Apply a liberal and uniform coat of cement to the conduit for the full length of the depth of the socket and apply a uniform coat to sufficiently wet the socket of the fitting. Excess cement on the fitting should be avoided as it is wiped into the joint and tends to weaken the pipe.
2. Work fast enough to insure a good and uniformly – cemented joint.
3. Slip conduit straight into the fitting with a slight twist until it bottoms. Hold the joint for about 15 seconds. (1 minute in extreme cold weather), so the conduit does not push out of the fitting. Do not twist or drive pipe after insertion is completed.
4. The joined members shall be cured, undisturbed, for five (5) minutes or more before they are handled. After this initial cure, care must be exercised in handling to prevent twisting or pulling the joint. (In cold or damp weather, this interval should be increased to allow for the slower evaporation of the cement). All duct should be assembled above ground and allowed to lay undisturbed for the weld cure before being lowered into the ditch.
5. Be sure to wipe off the excess cement that is left on the outer shoulder of the fitting. Plastic bristle brushes should not be used. On larger diameter conduit the brush should be 1” wide minimum.
6. Use only small cans of cement since it dries rapidly. Keep covered when not in use and away from heat and flames. Cement thinner may be used for thinning cement, which has thickened.
7. Another fitting or duct section can be added to the opposite end within two or three minutes, if care is exercised in handling, so the strain is not placed on the previous assembly.
8. Any joint included in the section of conduit to be bent in the ditch, shall be made up above ground and allowed to lay undisturbed for 12 hours or more before installation.
9. The plastic joint must be held rigid during the curing period in cases where a plastic connection is made with the union under stress due to misalignment or other factors. This will relieve stress on the joint until the conduit is backfilled or encased.

8. Conduit Fittings

Use only approved adapter coupling to convert to other types of conduit.

9. Conduit Termination

1. Cap free end of conduit with a plastic cap.

2. Terminated ends of conduit must be free of support from the manhole for at least 10' to permit alignment of the conduit and the knockout opening. The conduit will be supported inside the manhole with proper spacing and will be cut to length after the concrete has cured.
3. Install end bells that meet ASTM F-512 and NEMA TC-9 to all conduit terminations except pre-installed terminations in concrete structures. A list of pre-approved end bells can be found in MC-39.

10. Conduit Spacers

1. For a single-tier conduit bank, only base spacers are to be used. In multiple – tier conduit banks, intermediate spacers must be used between tiers. When the required number of ducts are built up, securely tie the entire assembly together.
2. The maximum distance between spacers must be as follows:

Duct Size	Maximum Spacing
0" to 2"	6 Feet
3" to 3-1/2"	8 Feet
4" to 6"	10 Feet

3. Approved spacers are as follows:

Spacer Size	Spacer Type	Manufacturer & Catalog Number	
		Carlon	JM Eagle
2 x 3"	Base	-	6266020030
	Intermediate	-	6266030030
	Combo	SP2W30-2	-
3 x 3"	Base	-	6266040030
	Intermediate	-	6266060030
	Combo	SP3W30-2	-
4 x 3"	Base	-	6268020030
	Intermediate	-	6268040030
	Combo	SP4W30-2	-
6 x 3"	Base	-	6268040030
	Intermediate	-	6268060030
	Combo	SP6W30-2	-

4. Intermediate spacers should not be located at the center of a bend.
   A. On fabricated bends, locate the spacer in the tangent.
   B. On the trench formed sweeps, locate spacers midway between the tangent and center of bend.

11. Trench and Backfill

1. The trench must be uniformly graded with the bottom, rock-free and covered with select material. The backfill shall be:
   A. Select fill surrounding direct buried conduit or cable and grounding. Refer to ESR Standard: RT-1 for general trench and backfill requirements.
   B. Select natural fill for the remainder of the backfill, refer to ESR Standard: RT-1.
   C. Vinyl warning markers shall be placed above ducts at 15-18" below the ground surface.
2. Backfill shall be made 6" layers and tamped or flooded after each layer is in place. It shall be dense and compacted sufficiently to prevent future settling. It must meet local ordinances.

3. Flooding is not accepted by all governing entities.

12. Concrete Encasement

1. A trench containing 3 or more conduits (for installation of primary conductors) shall be encased in concrete as per ESR Standard: RC-3.
2. Tie and fasten all conduits to prevent floating.
3. Spacers shall be placed as specified in section 10 of this specification.
4. Minimum spacing of 3” between conduits is required.
5. Minimum concrete coverage shall be 3” on the top, bottom, and sides of the conduits.
6. Backfill will be as specified section 11 after the concrete has cured.
7. Conduit is subject to temperature rise as the concrete cures. Therefore, allow the free end to expand by pouring the concrete from the center of the run or from one tie-in point.

13. Finish Requirements

1. All conduits shall be proven free and clear of dirt and debris by use of an appropriately sized metal mandrel no less than ½” smaller than the inside diameter of the conduit. Conduit must be re-mandrelled, if more than 6 months has elapsed without wire being pulled into it.
2. An approved polyester pull tape having continuous durable footage markings, with a minimum 2500 lbs of pull strength shall be installed in each completed conduit run. The pull tape must be continuous; no knots or splices.
3. Approved pull tape manufacturers include: Arnco, Herculine, Neptco, Duraline, and Canada Cordage, for NVE Stock Code #957308. Refer to NVE Standard MT-15 Pulling Tape.
4. No service conduit is allowed under one building to serve another building.

14. Conduit Debris Seals

1. For 1-1/2 inch and 2 inch CIC/conduit(s) installed in RS-1 handholes and to RS- transformer pads, the raceway(s) shall be sealed with a NVE MC-16 stock number 255050 cold shrink cover.
2. For 3 inch conduit(s) installed in RS-1 handholes and to RS-transformer pads, the raceway(s) shall be sealed with NVE MC-39 stock number 240442 debris shield.
3. For 4 inch conduit(s) installed in NVE RS-1 handholes and to RS- transformer pads, the raceway(s) shall be sealed with a NVE MC-39 stock number 240444 debris shield.

15. Conduit Applications

1. **Underground Straight Lengths**

   A minimum rating of DB-120 for 2” and 3” conduits and DB-60 for 4” and 6” conduits shall be the preferred conduit for buried conduit applications. No portion of a PVC conduit/sweep may be exposed above ground. Each conduit shall be one size conduit continuously, no reducers allowed.

2. **Radius of Conduit Sweeps:**

   Straight sections may be used to change direction of the run using the natural curvature of the conduit only with the listed minimum radii. When a smaller radius is needed, a preformed bend from Table 1 shall be used.

   A. 35’ for 2” conduit with max total bends of 360Deg.

   B. 50’ for 3” conduit with max total bends of 360Deg

   C. 70’ for 4” conduit with max total bends of 360Deg

   D. 100’ for 6” conduit with max total bends of 270Deg.

   E. Both straight section sweeps and preformed bends shall be included in the appropriate bend maximum. **Note:** The larger the radius sweep, the better for cable pulling.

3. **Selection criteria for 2”, 90° Elbows:**

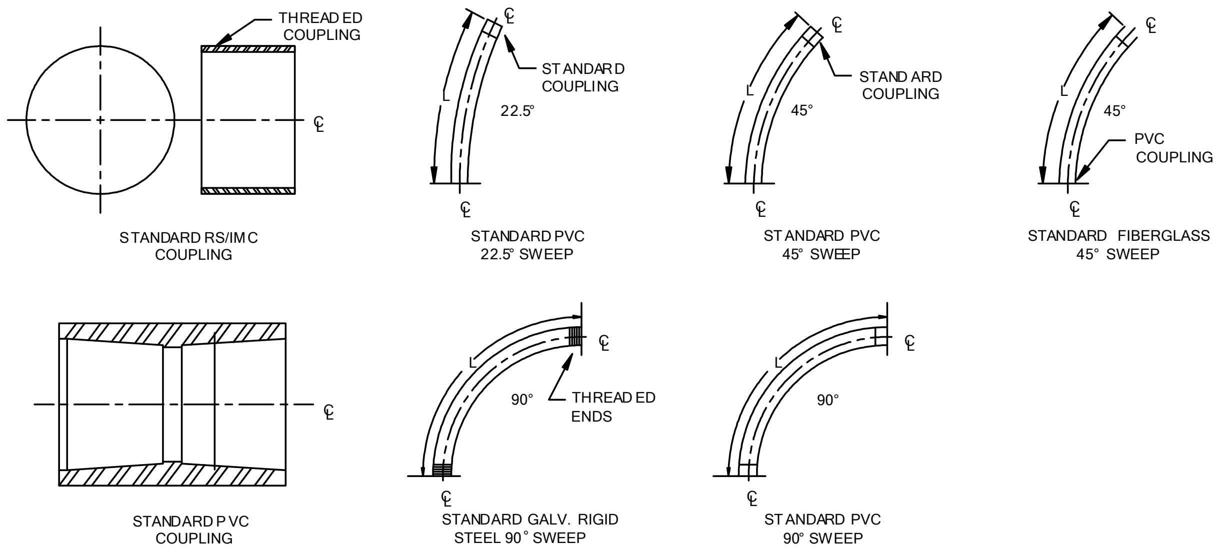
   A. For conduit lengths of less than 500’, schedule 40 elbows shall be utilized.

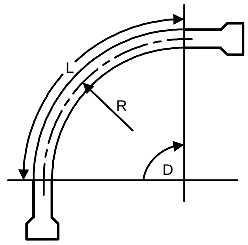
   B. For conduit lengths greater than or equal to 500’, fiberglass elbows shall be utilized.

4. **Selection criteria for 3”, 4” and 6” 90° Elbows:**

   A. For conduit lengths of less than 100’, schedule 40 elbows shall be utilized except in instances NVE determines galvanized rigid steel is required.

   B. For conduit lengths greater than or equal to 100’, galvanized rigid steel elbows shall be utilized.





Conduit Sweeps and Bends

Table 1. Conduit Sweeps and Bends

Conduit Size	Degree Bend	Radius (Inches)	Length* (Inches)	Stock No.		
				Galv. Steel	Schedule 40	Fiberglass
2"	22.5°	36	14 1/8			
		48	18 7/8			
	45°	36	28 1/4			243335
		48	37 11/16		240915	243336
	90°	36	56 9/16	243304 / 240350	240837	243334
		48	75 3/8		243309	243337
3"	22.5°	36	14 1/8			
		48	18 7/8			
	45°	36	28 1/4			
		48	37 11/16			
	90°	36	56 9/16	240360	243311	
		48	75 3/8	240370	243312	
4"	22.5°	36	14 1/8			
		48	18 7/8			
	45°	36	28 1/4			240351
		48	37 11/16			240352
	90°	36	56 9/16	243326 / 240380	243313	
		48	75 3/8	240390	243327	240354
6"	11.25°	150	29 7/16		243332	
	22.5°	36	14 1/8			
		48	18 7/8			
	30°	48	25 1/8		243331	
	45°	48	37 11/16	243325	243330	
		60	47 1/8		240355	
	90°	48	75 3/8	240400	243314	
		60	94 1/4		240356	

*Length = Bend angle (converted to radians) multiplied by the radius.

NOTES:

1. Do not use stock number 240360 or 240370 with primary cable.
2. Length does not include tangent ends which vary in type and length per manufacturer.

Table 2. Service Conductors

# of Runs	Conductor Size	Ampacity				Conduit	
		100% LF	Total	50% LF	Total	Size	Qty.
1	4-#2/0	172		191		2”	1 ea
	4-#4/0	226		255		4”	1 ea
	4-350 MCM	304		346		4”	1 ea
	4-500 MCM	372		429		4”	1 ea
	3-500 MCM	340		381		4”	1 ea
	3-750 MCM	426		483		4”	1 ea
2	4-#2/0	167	334	190	379	2”	2 ea
	4-#4/0	219	437	253	506	4”	2 ea
	4-350 MCM	293	585	343	685	4”	2 ea
	4-500 MCM	357	714	424	848	4”	2 ea
	3-500 MCM	329	659	378	756	4”	2 ea
	3-750 MCM	411	823	479	957	4”	2 ea
3	4-#2/0	143	429	175	525	2”	3 ea
	4-#4/0	185	555	232	696	4”	3 ea
	4-350 MCM	245	735	312	936	4”	3 ea
	4-500 MCM	297	891	383	1149	4”	3 ea
	3-500 MCM	280	840	348	1044	4”	3 ea
	3-750 MCM	347	1041	437	1311	4”	3 ea
4	4-#2/0	138	553	173	693	2”	4 ea
	4-#4/0	179	715	229	916	4”	4 ea
	4-350 MCM	236	942	308	1230	4”	4 ea
	4-500 MCM	285	1141	377	1580	4”	4 ea
	3-500 MCM	270	1081	344	1375	4”	4 ea
	3-750 MCM	334	1338	431	1725	4”	4 ea
6	4-#2/0	117	702	158	948	2”	6 ea
	4-#4/0	151	906	206	1236	4”	6 ea
	4-350 MCM	197	1182	275	1650	4”	6 ea
	4-500 MCM	238	1428	335	2010	4”	6 ea
	3-500 MCM	228	1368	310	1860	4”	6 ea
	3-750 MCM	281	1686	387	2322	4”	6 ea
9	4-#2/0	107	963	149	1341	2”	8 ea
	4-#4/0	137	1233	194	1746	4”	8 ea
	4-350 MCM	179	1611	257	2313	4”	8 ea
	4-500 MCM	215	1935	313	2817	4”	8 ea
	3-500 MCM	208	1872	293	2637	4”	8 ea
	3-750 MCM	255	2295	364	3276	4”	8 ea

1. GENERAL

1. All concrete shall be manufactured per Section 501: Portland Cement Concrete, of the current edition of the “Uniform Standard Specifications for Public Works Construction, Off –Site Construction” for the Clark County, Nevada area.
2. The mixes are designed to provide low thermal resistivity concrete (low rho, low void ratio, high density) for transferring heat away from electrical cables.
3. All Portland Cement used shall be high sulfate resistant, Type V.
4. All fly ash used shall be Class “F” per ASTM C618.
5. The course aggregate, sand and fly ash shall be weighted separately when the batch is one cubic yard or more. For jobs requiring less than one cubic yard of concrete, these materials may be measured by either weight or volume. When proportioned by volume, measuring boxes of known capacity shall be furnished and used to measure each size of material.
6. All concrete shall be manufactured in plants that are certified by the National Ready Mix Concrete Association’s Plant Certification Program. Approved certificates shall be posted prominently in the plant and shall be available upon request.
7. The numbered mix design from the concrete supplier shall be approved by an NVE inspector prior to the start of construction. For new suppliers, the mix design with stamped review by a registered professional engineer experienced with concrete mix design shall be mailed (or faxed) to:

   NV Energy, T & D Standards Department

   7155 Lindell Rd., M/S B19AM

   Las Vegas, NV. 89118

   Email: tdstandards@nvenergy.com
8. Each load of concrete shall be accompanied by a delivery certificate that clearly shows actual weights and measures of individual components accomplished through the use of certified scales and metering devices.
9. Concrete furnished by ready mix trucks shall have a manufacturer’s mix design number which will be shown on the delivery ticket. The delivery ticket will be shown to the NVE inspector at the job site. If requested by the NVE Inspector, a copy of the delivery ticket will be given to the inspector.

Mix Designation	Hi-Strength Thermal Backfill	Low-Strength Thermal Backfill	Low-Strength Thermal Backfill (alternate)
Compressive Strength at 28 days	2,000 psi – min	150 psi	150 PSI
Compressive Strength at 56 days	3,000 psi – min	300 psi	300 PSI

Component Material Weights	lbs/cu yd	lbs/cu yd	lbs/cu yd
Course aggregate: size #8 (3/8" nom, 1/2" max)	1620 +/- (54% of aggregates)	1620 +/- (54% of aggregates)	-
Fine aggregate: #4 sieve (3/16" nom, 3/8" max)	1380 +/- (46% of aggregates)	1380 +/- (46% of aggregates)	-
Chat	-	-	3,228 +/-
Cement: Portland – Type V	376 (4.0 Sacks)	As Required	As Required
Fly Ash: Class "F"	150 (1.33 Sacks Equiv)	150 (1.33 Sacks Equiv)	150 (1.33 Sacks Equiv)
Water: (see Note 1)	335 +/-	416 +/-	416 +/-
Slump (see Note 1)	5" +/- 1	5" +/- 1	5" +/- 1
Air Entraining Agents	None	None	None

NOTES:

1. If the mix is too wet, it will be rejected. The mix may be ordered slightly drier than required (4"± slump for "spot loading" on the conduits) with additional water added at the job site. If water is added at the site, the mixer drum shall be revolved not less than thirty (30) revolutions at mixing speed before discharge is commenced (Ref: Section 501.03.06 (c) of Clark County Specifications).

FOR MAINTENANCE ONLY

1. Purpose

1. This specification covers the requirements for replacing an underground cable with CIC (Cable in Conduit) using trenchless guided boring technology.

2. Customers

1. NV Energy (NVE) places a very high priority on the good will of its customers.
2. Prior to beginning any work for the company, the contractor shall first make a reasonable effort to explain to the customer the company he represents, the planned work, and the completion date.
3. Any repair of damages to property caused by the contractor's activities shall be the entire responsibility of the contractor.
4. Whenever a customer complaint or claim is received by the Contractor, the Contractor shall immediately notify the designated Representative of NVE.
5. Contractors Supervisor shall investigate and resolve complaints or claims immediately upon receipt
6. The Contractor shall keep NVE informed as to the status of all complaints or claims on a current basis and confirm the final resolution in writing.

3. Safety

1. The contractor shall abide by all Federal, State and local Safety Regulations.
2. The Contractor shall at all times conduct the work in a safe manner so as to safeguard the public from injury to persons and/or property.
3. The Contractor is to use all necessary protection for its employees and to guard against interference with normal operation of power circuits.
4. All crossed utilities must be located before boring.
5. Should the Contractor damage NVE facilities or be involved in an accident involving NVE facilities or the public while performing work for NVE, the designated Representative of NVE shall be notified as soon as possible.
6. All drilling equipment shall have a permanent inherent alarm system capable of detecting electric current. The system shall be equipped with an audible alarm to warn the operator when the drill head nears an electric cable.

4. Purchase Order Changes

1. Any deviations from planned work must be approved by the Representative of NVE.
2. A Change Order in the Purchase Order will be initiated by the designated Representative of NVE for revisions in the field involving a change in the Purchase Order cost.

5. Extent of Work

1. The contractor is to provide all equipment, labor, and materials needed to replace existing direct buried cables shown on the construction drawings using the guided boring technology.
2. Tunneling shall be performed by a fluid cutting process (high pressure/low volume), utilizing a liquid clay, such as bentonite. The clay lining will maintain tunnel stability and provide lubrication in order to reduce

frictional drag while the CIC is being installed. In addition, the clay fluid shall be totally inert and contain no environmental risk.

3. Installation shall be in a trench less manner producing continuous bores.
4. The tunneling system shall be remotely steerable and permit electronic monitoring of tunnel depth and location. Accurate placement of CIC within a +/-2” window is required. The turning capability of 90 degrees in a radius of 35’ is required.
5. Mechanical, pneumatic, or water jetting methods of tunneling will be considered unacceptable due to the possibility of surface subsidence.
6. The contractor is to provide all required access pits, the hauling away and proper disposal of spoils, backfilling with approved soils, compaction to the NVE specifications as well as City, County or State specifications, and any sod required to restore the area to the original condition.
7. The contractor is responsible for any repair to the customer’s satisfaction and all applicable City, County, and State codes.
8. A minimum of 36 inches of cover over the CIC shall be maintained.
9. All trenches and pits shall be compacted to meet NVE specifications as well as City, County, and State codes
10. All cable ends shall be capped watertight.
11. Installation records shall be kept and shall accurately show changes in cable routes or other deviations from the original construction drawing(s).
12. The CIC is to be installed to transformer troughs, pullboxes, riser pole assemblies or switchboxes.
13. During installation, all stress shall be placed on the duct and no stress shall be placed on the cable. Pulling stress on the duct shall be limited to the following manufacturer recommended working loads, 1,700# for 1 ½” duct and 2,160# for 2” duct. Duct that has necked down due to excessive installation stress shall be rejected.
14. Sufficient cable shall be provided at each end of each CIC run to allow for cable training and termination. NVE will terminate the cable.

1. Purpose

For safe and fast maintenance operation of the 600 volt system, of the 600 volt system, all cables are identified by rings of red and green electrical grade tape. Rings shall start at about 6 inches from the cable set screw connector.

All 600 volt cables at transformers and handholes will be marked.

Cables at service panels will not be marked.

2. Terminology

Secondary Cables: 600 volt cables that connect a handhole to a transformer, or one handhole to another.

Service Cables: 600 volt cable that connect a service panel to a transformer or a handhole.

3. Rules

Rules for the use of red (R) and green (G) electrical grade tape:

A. When facing a transformer or handhole with the street to your back, the cables that terminate in a service panel or handhole located to your right are marked with red tape. Those cables that terminate to your left side are marked with green tape.

B. Service cables are usually marked with one ring of tape and secondary cables are usually marked with two rings of tape.

C. When two service cables go in the same direction to your right (red) or left (green), the cable going to the closest service panel has one ring of tape and the farthest service panel has two rings of the same color.

D. When a cable crosses under the street, it is marked with two rings of tape. The first ring closest to the connector, is red with the second ring being green.

   i. Diagonal cable runs resulting from property line offsets of less than half a lot width shall be marked as if they are straight runs.

   ii. If the cable goes to a location directly in back of you, it is marked with one red and one green ring only.

   iii. For multi-direction marking, use a single tape for right or left directions.

   iv. The 1 or 2 tapes closest to the connector indicate the initial direction of the cable run. The other tapes indicate the termination point to the side or behind you, i.e.:

      a. R,RG – cable runs to the right and then crosses the street.

      b. RG,R – cable runs across the street and then proceeds to the right.

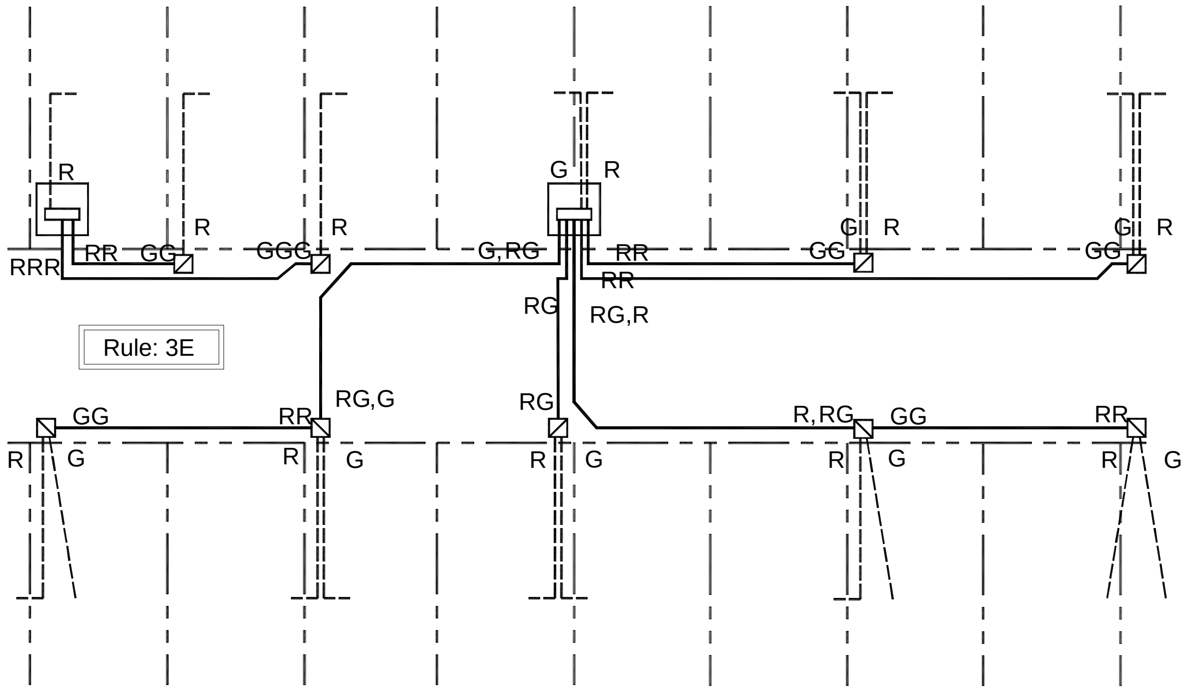
E. When two secondary cables of the same wire size go in the same direction to your right (red) or left (green), the cable going to the closest handhole has two rings of tape of the same color. The cable going to the farthest handhole has the three rings of the same color.

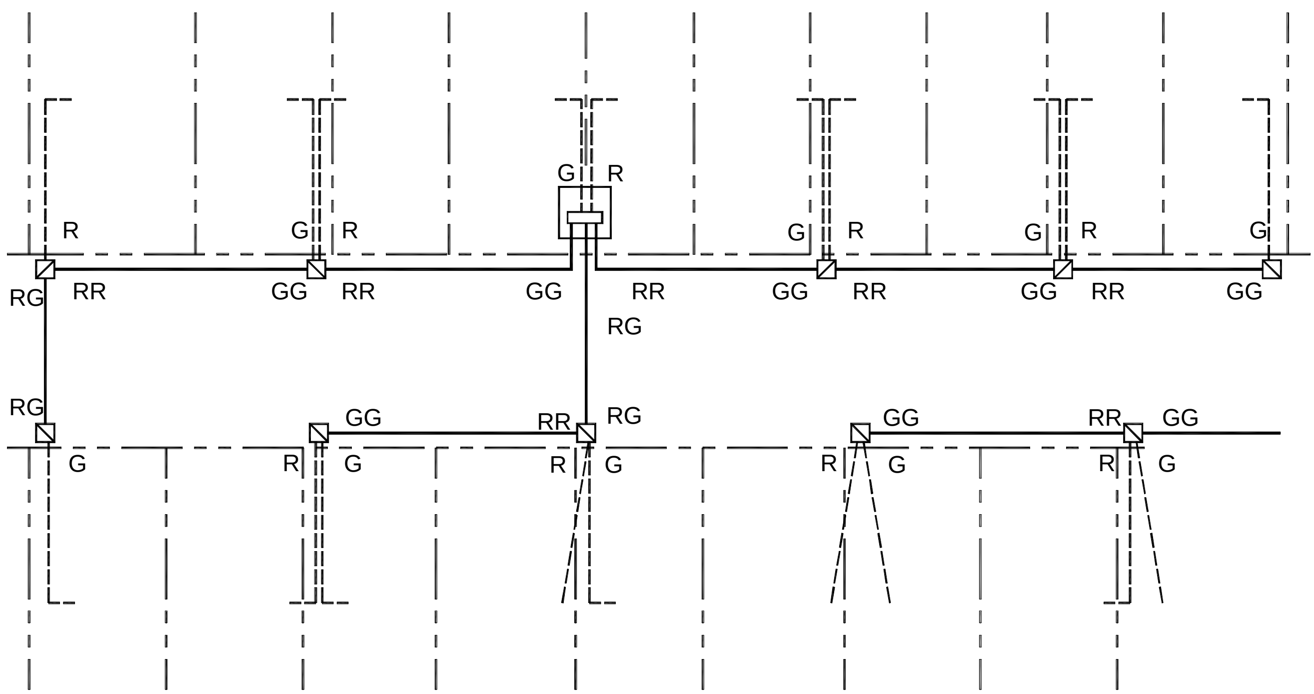
   Secondary cables of different wire sizes going in the same direction only need two rings of the same color.

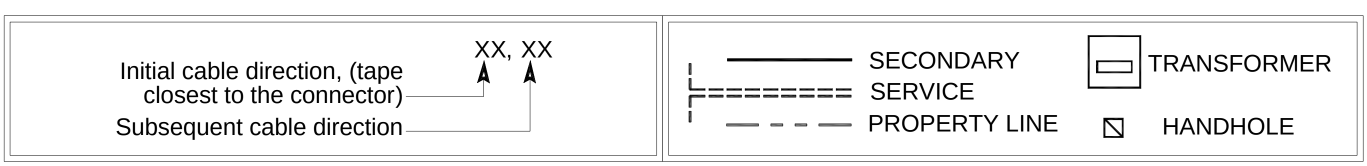
F. In the few cases where red and green markings are not adequate, use:

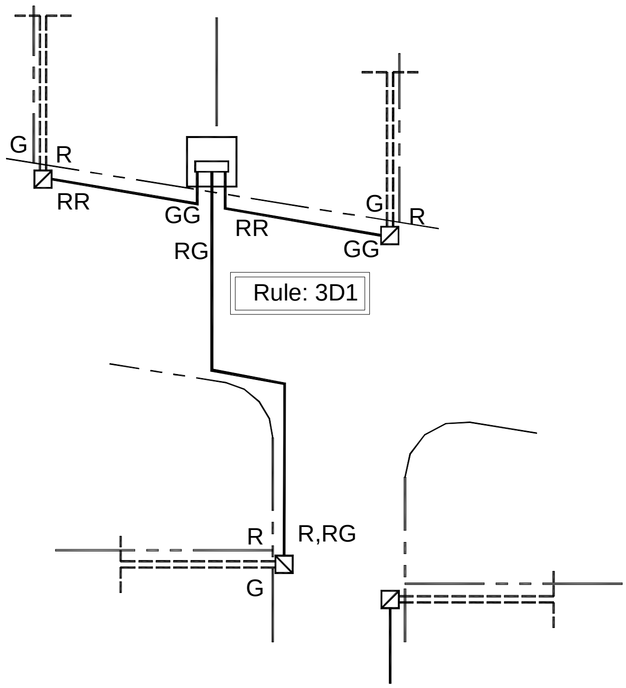
   i. Yellow (y) for a termination point in front of you.

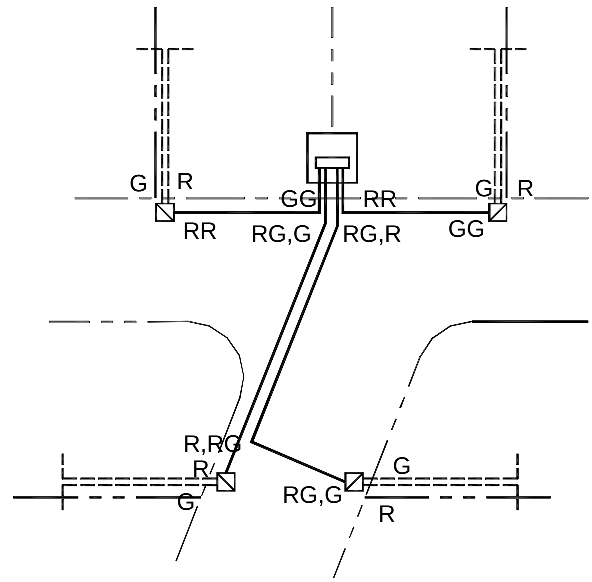
   ii. Brown (b) for a termination point in back of you.

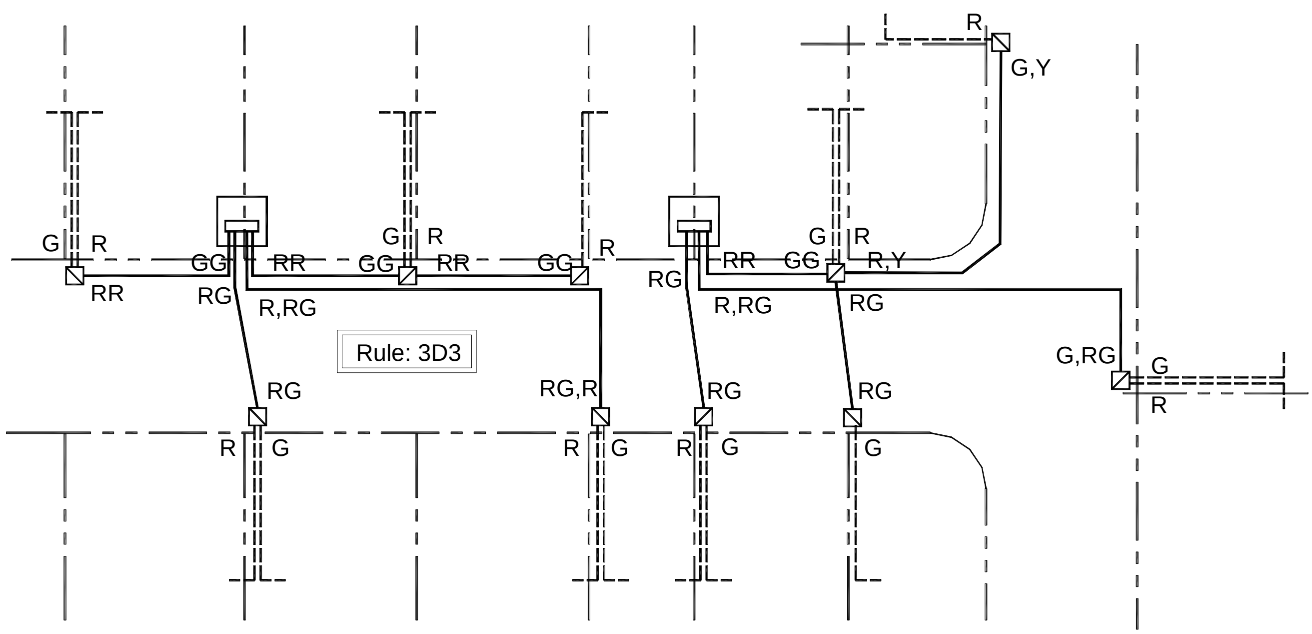

R
R
R
G
R
G
R
G
R
RRR
RR
GG
GGG
G,RG
RR
RR
GG
GG
RG
RG,R
Rule: 3E
RG,G
RG
GG
RR
R,RG
GG
RR
R
G
R
G
R
G
R
G
R
G


G
R
R
G
R
G
R
G
R
G
RG
RR
GG
RR
GG
RR
GG
RR
GG
RR
GG
RG
RG
GG
RR
RG
GG
RR
GG
G
R
G
R
G
R
G
R
G


Initial cable direction, (tape closest to the connector)
Subsequent cable direction
XX, XX
SECONDARY
SERVICE
PROPERTY LINE
TRANSFORMER
HANDHOLE







XX, XX

Initial cable direction, (tape closest to the connector)

Subsequent cable direction

SECONDARY

SERVICE

PROPERTY LINE

TRANSFORMER

HANDHOLE

NV Energy	Electric Service Requirements	RC-10
	Cable Marking Requirements	
Drawn: DH / Eng: DA / Appr: DA / Date: 8/07		Revision: 1
		Page 3 of 4

THIS PAGE INTENTIONALLY LEFT BLANK

Table of Contents

THIS PAGE INTENTIONALLY LEFT BLANK

1. PURPOSE

This specification covers the structural requirements for 17”(W) X 30”(L) X 18”(H) non-concrete handholes.

2. GENERAL

1. The handhole shall be constructed per the latest edition of the Western Underground Committee Guide 3.6 (WUCG 3.6) for non-concrete enclosures, except as modified herein.
2. All construction work is subject to inspection and testing by NVE. If the handhole does not meet all the requirements or exhibits poor workmanship, the NVE field inspector shall reject it.
3. All parts exposed to the sun shall be made from an ultraviolet (UV) resistant material or have a (UV) coating.
4. Handholes shall be stackable for extra depth.
5. Handholes shall have two ½” – 13 UNC inserts in the frame of the box (per standard drawing RS-1) for mounting a power meter pedestal.
6. Cover shall not be concave or have stiffeners (ribs) at the bottom and shall weigh 60 to 75lbs.
7. Under normal backfilling and tamping around the handhole, the enclosure shall not become concave or bowed.
8. Points 2.6 and 2.10 from WUCG 3.6 change context to: “Covers and boxes shall conform to the dimensions shown on the drawings RS-1, page 1 and be interchangeable with all other approved covers and boxes”.
9. Points 2.7, 2.14 and 2.15 from WUCG 3.6 do not apply to handholes manufactured under this specification

3. TESTING

1. New supplier shall provide a test report performed by independent laboratory. The tested j-box (handhole) shall meet or exceed all requirements from latest edition of the WUCG 3.6 and NVE Appendix to Section 4 of the WUCG 3.6.
2. Two handholes shall be selected randomly and tested annually for the structural requirements according to NVE Appendix to Section 4 of the WUCG 3.6 by a Nevada State Certified Laboratory. The supplier is responsible for finding a testing laboratory and covering all expenses. The test shall be performed in the first quarter of each year. NVE T&D Standards personnel may observe these tests.
3. A copy of the certified test shall be sent no later than April 1 each year to:

NV Energy
Manager, T&D Standards, M/S B19AM
7155 S Lindell Rd.
Las Vegas, Nevada 89118

4. FINISH

1. The handhole box wall shall be straight, free of depressions, bumps or other irregularities and have an inward flange at the base. The handhole shall be free of cracks, chips, etc.
2. The top of the cover shall be true, even, and level with a non-skid surface with 1/8” radius. Finished surface variations shall not exceed 1/8” in 2 feet measured with a straight edge in any direction. Also, the cover shall have two slots, each with a lifting bar, free of any manufacturer pouring remains.
3. The supplier logo, TIER-22, and the word ‘ELECTRIC’ shall be embossed in the top of the cover.
4. The manufacturing date (month, day and year) shall be marked with paint on the bottom surface of the cover and on the inside of the box.
5. The vertical gap between the top of the box and the top of the cover shall not exceed 1/8” in any point.
6. The cover and exposed portions of the box shall be the same color, and both shall be similar in color to concrete used for sidewalks.

5. WARRANTY

1. For the first five years and within 14 days of notification, the supplier shall correct any product defect, at the expense of the supplier. When notified to repair 10 units or more, the supplier shall be granted 14 days per 10 units of repair time.
2. NVE reserves the right to require immediate repairs when, in NVE’s opinion, there is a danger to the public.
3. If a material defect within the five-year period necessitates the item’s replacement, the supplier shall be responsible for all labor and material costs incurred. These costs shall include but are not limited to the following; de-energize (if applicable), remove electrical apparatus/equipment, remove the defective item, re- excavate, deliver and place the new item, level, grout, backfill, restore site, replace the electrical apparatus/equipment, terminate the cables, and energize.

   NVE reserves the right to designate a qualified contractor, to perform the work described above, to best meet scheduling requirements.

1. Purpose

This standard describes the requirements pertaining to precast concrete structures.

2. Table of Contents

3. General

1. The manufacturer shall provide all materials, equipment and labor to produce precast concrete structures that are further detailed on RS-G3 and RS-G4.
2. All concrete shall be supplied and placed according to the applicable sections of American Concrete Institute (ACI), American Society for Testing and Materials (ASTM) and the Clark County Standard Specifications (CCSS), latest editions.
3. All structures shall be designed to withstand lifting loads without exceeding the first crack rating of the structure.
4. All structures shall be marked immediately after withdrawal from the pouring forms with the month and day of manufacture. The mark shall be placed inside the cable slot for pads and inside each section for other structures
5. Structures with cracks above .060” shall be discarded. All cracks from .016” to .060” must be repaired per Sika Corporation, SIKADUR 55 SLV or any other method approved by NVE before installation in the NVE system.

4. Materials

1. **PORTLAND CEMENT:** Shall be ASTM C150 Type V. LOW ALKALI only.
2. **AGGREGATES:** Shall meet the requirements of ASTM C33.
   A. Coarse and fine aggregate shall be treated and tested as separate ingredients.
   B. The coarse aggregate shall be Size No. 67 (3/4” maximum).
   C. Deleterious substances of coarse aggregate shall be limited to the values of Class 4M.

D. All aggregate supplied shall be NON-REACTIVE. The aggregate shall be tested annually for potential alkali – silica reactivity per ASTM 1260:

i. Mortar bar expansion less than 0.10%: aggregate is acceptable for NVE

ii. Mortar bar expansion more than 0.20%: aggregate is not acceptable for NVE.

iii. Mortar bar expansion between 0.10 and 0.20%: additional tests are required at the supplier's option:

a. Comparator readings shall be continued until 28 days after casting.

b. Petrographic examination of the mortar bar test sample per ASTM C-856 (preferred) or petrographic examination of the aggregate samples per ASTM C-295.

E. A copy of the test reports shall be sent to:

NV Energy
Supervisor T & D Standards Department
P.O.Box 98910, M/S19
Las Vegas, Nevada 89151-0001
Phone: (702)402-6541
Fax: (702)402-6575

F. Approval of an aggregate source and supplier is effective for a period of one (1) year and contingent upon continued compliance with NVE T & D Standards. If at any time, the aggregate does not meet NVE T & D Standards, the aggregate will be rejected and the supplier may have to re-qualify the source of the non-conforming aggregates.

G. Precast Companies and NVE contractors may order and use only NVE specified approved suppliers for fine and course aggregates.

H. Approved Suppliers for fine and coarse aggregates:

Supplier	Source / Location	Aggregate		Date Approved	Re-test & Approval Deadline
		Fine	Course		
CSR Sand & Gravel	Buffalo Pit	X	X	3/95	11/03
Silver State Bldg. Material	Eldorado Pit	X	X	3/95	11/03
Nevada Ready Mix	Lone Mountain Pit	X	X	3/95	11/03
Leavitt Ready Mix	Glendale Ranch Pit	X	X	3/95	11/03
Hanson Granite	Eldorado Pit	X	X	8/95	11/03
American Sand & Gravel	NLV Blvd & Speedway	X	X	6/96	11/03
Matthew Roylance Co.	Alamo Pit	X	X	2/02	11/03
ISN Aggregates LLC	187 Quarry	X	X	11/03	10/04
Blue Point Materials	Logandale Pit	X	X	7/06	6/07

3. **WATER:** Fresh, clean potable (without any reactive mineral) to be used in the mixing process.

4. **APPROVED ADMIXTURES:**

A. Mineral Admixtures:

i. Fly ash: ASTM C618, Type F material may be used at a rate 18% to 20% by weight of total required cementitious material.

ii. Microsilica: ASTM C1240, material may be used at a rate 18% to 20% by weight of total required cementitious material.

B. Chemical Admixtures:

NOTE: Admixture containing more than 0.15% per weight of chloride is not permitted. All admixture shall be from a single source unless otherwise approved by NVE.

i. **Air Entrainment:** ASTM C260 may be used by the concrete precaster. Airentrainment is not required except with special notice

ii. **Water Reducer:** ASTM C494 Type-A shall be used (when required) by the concrete precaster. Product shall be from Sika Corporation, Plastocrete series of materials or other materials approved by NVE.

iii. **Water Reducing Retardant:** ASTM C494 Type-D shall be used (when required) by the concrete precaster. Product shall be from Sika Corp., Plastocrete or Plastocrete series of materials. Pozzolith N Type 82 or other materials approved by NVE

iv. **High-Range Water Reducer:** ASTM C494 Type F, shall be used(when required) by the concrete precaster. Product shall be from Sika Corp., Sikament series of materials or other materials approved by NVE

v. **Superfluidifying High Range Water Reducer:** ASTM C494 Type and ASTM C494 Type F and ASTM C1117, shall be used (when required) by the concrete precaster. Product shall be from Sika Corporation, ViscoCrete series of materials approved by NVE.

vi. **Set Accelerator:** ASTM C494 Type C or E, shall be used (when required) by the concrete precaster. Product shall be from Sika Corporation, Plastocrete 161FL, Sika Set NC or other materials approved by NVE.

vii. **Strength Accelerator:** ASTM C494 Type C or E, shall be used (when required) by the concrete precaster. Product shall be Sika Corporation, Sika Rapid-1, Sikament 200 or other materials approved by NVE.

viii. **Corrosion Inhibitor:** shall be used by concrete precaster. Product shall be Sika Corporation, Ferroguard series of material or other materials approved by NVE.

NOTE: Corrosion inhibitor must have dual protection system (both anodic and cathodic reaction suppression mechanisms) and must have satisfactory history of use in concrete (nondeleterious) of minimum 5 years.

5. Reinforcing steel bars shall be ASTM Grade 60, formed per ASTM A615.

6. No concrete structures shall be installed in NVE system before the minimum of 3,600 psi compressive strength is attained.

5. Weather Conditions

1. **Rain, Sleet or Snow:** Concrete shall only be poured in a protected environment – one that prevents water dilution of the concrete, e.g.: under the canopy or inside a shed or building.

2. **Cold Weather:** If the mean daily temperature falls below 40 degrees F, the minimum temperature of the concrete as placed shall be 50 degrees F.

   NOTE: The use of calcium chloride accelerators shall be strictly forbidden.

3. **Hot Weather:** All placements during hot weather shall be per ACI 305.

   A. The maximum temperature of concrete containing 20% fly ash during placement shall be 85 degrees F. Concrete with temperatures over a 85 degrees F. shall contain a water retarder such as Sika Plastiment, Sika Plastocrete 161 MR or other materials approved by NVE. Concrete with temperatures over 100 degrees F. shall not be poured.

   B. Any cooling (ice) required to control the concrete temperature during hot weather placement shall be at the suppliers expense. The water to cement ratio shall be adjusted to consider the addition of any ice.

   C. Concrete poured during hot weather shall not have the loss of slump, flash set or cold joints.

D. All reinforcing steel, forms, coarse aggregate and fine aggregate exposed to the direct rays of the sun shall be cooled by sprinkling during hot weather concrete placement.

6. Reinforcement

1. Reinforcement shall be placed per ACI 318 and ACI 315.
2. All reinforcing steel shall have a minimum concrete cover of 3", except structures thinner than 6" where all steel must be centered.
3. Splicing of reinforcing steel shall be according to ACI requirements.
4. Welding of reinforcing steel is strictly prohibited.
5. Reinforcing bars shall be supported and wired together to prevent displacement. All tie wires and chairs shall be of non-rusting type.

7. Concrete

1. The concrete shall develop a compressive strength of 3,000 psi (-10%) at 7 days and 4,000 psi (-10%) at 28 days.
2. The concrete shall contain:
   A. Minimum 665# and maximum of 755# of cement (per cubic yard of concrete) shall be used.
   B. Minimum of 80% and maximum 82% of cementitious material shall be Type V, Portland cement.
   C. Minimum 18% and maximum of 20% of all cementitious material will be Type F, fly ash.
   D. Maximum water/cement ratio shall be of 0.45 by weight.
3. Concrete Workability
   A. All wet cast concrete shall have a minimum 2" slump unless approved as an exception by the engineer.
   B. Concrete not containing high range water reducer or superfluidifying agent shall have maximum 4" slump and shall not exceed the maximum slump as indicated in submitted concrete mix design to NVE.
   C. Concrete containing high range water reducer may be placed up to 8" slump but shall not exceed the maximum slump as indicated in submitted concrete mix design to NVE.
   D. Concrete containing Superfluidifying admixture (Sika ViscoCrete) shall be judged by the slump cone "flow test". The minimum flow shall be an average of 25" diameter. The maximum flow shall be an average 32" diameter. In no case will there be evidence of paste/aggregate separation during the "flow test" of the concrete.

D. All precast structures to be on/in ground shall contain steel corrosion inhibitor (Sika Ferroguard 901, at a dosage of 2 gallons per cubic yard of concrete mix) or other materials approved by NVE.

E. A copy of the proposed mix design shall be provided to NVE prior to providing products to NVE using the proposed design mix.

8. Placing Concrete

1. Before concrete placement, the formwork shall be completed, excess water removed and the reinforcing steel shall be secured.
2. Concrete placement shall be such that the concrete that is being integrated with fresh concrete is still plastic. No placement shall be started if the previously placed section is no longer plastic.
3. Concrete shall not be subjected to any placement procedure that causes segregation of materials.

4. Concrete shall be consolidated by vibration for 5 to 15 seconds to eliminate air or stone pockets. Mechanical vibrators shall have a minimum frequency of 7,000 revolutions per minute. A vibrator shall not be used to transport concrete within the forms
5. Upon request, the supplier shall provide a batch ticket for all concrete placed. This ticket shall be prepared per ASTM C94 and shall contain the proportions of materials, additives and water added during mixes, etc. When superfluidying admixture is used in the concrete production, vibration may be eliminated but evidence of satisfactory concrete performance will have to be shown. When vibration is suspended in the production of the concrete, it will not be used in the fabrication of the compression test cylinders.

9. Testing

1. A slump test shall be made according to ASTM C143 or a “flow test” shall be performed for each day of concrete production as a minimum. The appropriate test of concrete workability shall be performed on all concrete samples used for fabricating strength test samples.
2. Strength test cylinders shall be prepared per ASTM C31. At least three (3) tests shall be performed for every 50 cubic yards of poured concrete. Cylinders shall be stored and cured the same way as the structure.
3. Strength of concrete will be considered acceptable, if the average of any of three consecutive tests (of the cylinders) reach or exceed the required strength of 3,000 psi (-10%) at 7 days and 4,000psi (-10%) at 28 days. Concrete structures with developed strength less than 4,000 psi (-10%) of the required 28 – day strength will be rejected.
4. If test results fail to meet design requirements, test cores by ASTM C42 may be taken. Costs of coring and testing of the cores will be the responsibility of the manufacturer.
5. If the core specimens fail to meet the minimum 4,000 psi (-10%) of compression strength, the concrete will be considered defective and will be rejected by NVE.
6. If the concrete doesn’t attain minimum 3,000 psi (-10%) of required compressive strength within 7 days and structured built from this concrete must be kept in the manufacturer’s stock, awaiting NVE decision.
7. If any test indicates that the concrete has reached a compressive strength of 4,000 psi no further testing is required.
8. Rejected structures may not be re-used in NVE distribution system.

10. Quality Control

1. The manufacturer shall develop and submit a QA/QC program satisfactory to NVE. This QA/QC program will be approved in writing by NVE. The manufacturer shall implement the QA/QC program only after receipt of written approval from NVE.
2. The manufacturer shall provide NVE with all QA/QC reports set forth by the manufacturers QA/QC program weekly.
3. The manufacturer shall make available to NVE all batch tickets and comprehensive strength test results. The batch ticket(s) information shall include a list of quantities and structure types manufactured.
4. As a minimum the manufacturers QA/QC program shall document and include the following Items:
   - A. Verify compliance with the specifications of all materials used (cement, rebar, aggregate admixtures, etc) including the aggregate supplier.
   - B. Provide batch tickets for all concrete per ASTM C94.
   - C. Date, time of concrete pour and numbers of cubic yards poured.
   - D. Design mix, including any admixtures.
   - E. Verification of reinforcing steel placement and cover provided.

F. Results of any slump tests performed.
G. Reference to any strength test cylinders made. Strength test results at 7 and 28 days.
H. Any hot weather or cold weather measures used (e.g., ice, moistening of aggregates, etc.)
I. Verification of vibration of the concrete.
J. Method of curing and length of time of curing.
K. Concrete temperature at pouring.
L. Number of day's concrete is allowed to set before being moved off – site.
M. Placement method of identification on the concrete.
N. A sample format of all QA/QC tests and reports.

11. Shop Drawings and Certificates

1. The manufacturer shall furnish NVE with shop drawings of each structure, showing all dimensions needed for the placement of the reinforcing steel.
2. The manufacturer shall obtain and keep on the site, available to NVE, certificates of compliance for all reinforcing steel and Portland Cement used for precast fabrication.

12. Warranty

1. Each precast company shall design and manufacturer long lasting concrete structures that will be installed into the NVE Underground System. The structure shall have a minimum design life of 50 years.
2. If a material defect within the five-year period necessitates the item's replacement, the supplier shall be responsible for all labor and material costs incurred. These costs shall include but not be limited to the following; de-energize (if applicable), remove electrical apparatus/equipment, remove the defective item, re-excavate, deliver and place the new item, level, grout, backfill, restore site, replace the electrical apparatus/equipment, terminate the cables and energize. NV Energy reserves the right to designate a qualified contractor, to perform the work described above to best meet scheduling requirements.
3. Precast Company shall correct ant concrete structure defect, within 14 days of notification. When notified to repair 10 units or more, the supplier shall be granted 14 days per 10 units of repair time.

NOTE: NVE reserves the right to require immediate repairs when, in NVE's opinion there is a danger to the public.

13. Repairing or Patching

1. Final decisions about repair or replacement of a damaged concrete structure belongs to NVE
2. All defective structures shall be repaired within the time specified in 12.A.
3. All honey combing or other defective concrete shall be removed to sound concrete (a minimum of 1" deep). Before placement of patching materials, an area at least 6" wide surrounding the area to be patched shall be dampened to prevent absorption of water from the patching material.
4. After the surface water has evaporated from the area to be patched, a bond coat of Type V Portland cement, Type F fly ash and fine mortar sand (1:1:1 ratio) shall be mixed to the consistency of thick cream and then well brushed onto the surface to be repaired.
5. When this bond coat begins to lose the water sheen, the premixed patching material shall be applied. The patching material shall be made of fine concrete aggregate (3/8" max.). Type V Portland cement and Type F fly ash in the same proportions as specified in the Section 5.2. The patched area shall be "struck off" to leave the patch slightly higher than the surrounding surface. The surface finish of the patch shall closely match the surface finish of the existing concrete.

6. Concrete shall be curried by using curing compound(s) (per ASTM), wet burlap bags, cotton absorptive mats or by sprinkling with vapor mist.
7. All repaired concrete structures shall be identified with a metal tag. The tag shall have the month, day and year of repair. The tag shall be permanently attached to the repaired concrete structures.

THIS PAGE INTENTIONALLY LEFT BLANK

1. Purpose

This specification contains structure requirements for precast and cast-in-place concrete pads.

2. General

1. All construction work is subject to inspection and testing. If the pad does not meet all requirements or exhibits poor workmanship, it shall be rejected by the NVE plant and/or field inspector.

   NOTE: All references to Clark County (C.C.) pertain to "Uniform Standards Specification for Public Works' Construction Off–Site Improvements" – Clark County Standard Specifications (latest edition).
2. All pads shall meet the requirements for Precast Concrete Structures (RS-G2) unless otherwise stated in this specification.

3. Steel Reinforcement

1. All steel reinforcement shall conform to C.C. Section 505, "Reinforcing Steel", ASTM615, RS-G2, and RS-13 to RS-58 specifications.
2. All reinforcement shall be furnished in the full lengths and sizes. Rebar splicing will not be permitted.
3. Before the reinforcement is placed into the pouring form, the surfaces of the rebar shall be cleaned of all rust and loose mill scale, dirt, grease and any other foreign substances.
4. Rebar shall be tied with wire at least three times in any rebar length. Welding of reinforcement is not permitted. All reinforcements shall be placed on distance chairs and covered with minimum of 3" of concrete (see RS-13 to RS-58 design requirements). Manufacturers must submit any changes to the rebar designs shown on RS-13 to RS-58, to NVE T&D Standards for review and approval. Submittals shall include NVE R-SB ESR Change Recommendation Form, an AutoCAD drawing(s), appropriate engineering and certified test results.
5. Manufacturer shall design the steel reinforcement(s) for each precast pad to support the anticipated structural load(s) and to allow the pad to be handled and set without exceeding the first crack rating of the structure.
6. Prior to supplying any pad(s) to NVE, copies of the pad detail drawing(s) with the manufactures calculations, shall be provided to and approved by the NV Energy, Supervisor T&D Standards:

NV Energy
T & D Standards Department
P.O. Box 98910, M/S 19
Las Vegas, Nevada 89151-0001
Phone: (702)402-6541
Fax: (702)402-6575

4. Concrete

1. All concrete must conform to C.C. Section 501 "Portland Cement Concrete", C.C. Section 502 "Concrete Structures" and C.C. Section 702 "Concrete Curing Materials and Admixtures" and the RS-G2 specification.
2. Concrete structures shall attain a compressive strength of 3,000 psi prior to shipment and installation. Any structure not meeting this requirement shall be rejected by NVE.

5. Finish

1. The top and all side surfaces of the pad shall have a steel trowl smooth finish and shall be true even and level (only wet mix is permitted). The finish shall be free from the following:
   A. Air cavities 0.125" wide by 0.125" deep (for RS-13) and .25" wide by .25" deep (for RS-14 through RS-58)
   B. Projections beyond surfaces
   C. Depressions, bumps and other irregularities.
2. The top surface of the pad must be true, even and level. The maximum deviation allowed is .0625" per 3" measured with straight edge in any direction. The top and side edges shall have a smooth 0.5" to 1" bevel or radius.
3. The manufacturer logo and manufacturing date shall be embossed on the top according to RS-G5. Other markings shall conform to RS-G2.
4. Pads shall be free of chips. Cracks or splits may not exceed .032". Cracks exceeding .008" in width shall be repaired with epoxy injection.
5. Pads shall meet the dimensional and tolerance requirements of the RS-13 to RS-58 drawings.

6. Dimension

As set forth in the NVE drawings, dimensions must be measured at the top of the structure. However, the bottom edges (each side) of the pad may be increased in size by 3".

1. Purpose

This specification contains structure requirements for splice boxes, pullboxes, and manholes.

2. General

1. All construction work is subject to inspection and testing. If the splice box, pull box or manhole does not meet all requirements or exhibits poor workmanship; it shall be rejected by the NVE plant and/or field inspector.

   NOTE: All references to Clark County (C.C.) pertain to "Uniform Standards Specification for Public Works, Construction Off – Site Improvements" – Clark County Standard Specifications and ANSI standards requirements (latest edition).

2. All structures must be designed for H-20-44 loading. The top pad section for the RS-97 manhole shall be designed for 5,000 lb static load with a 30% impact load. The design drawings and calculations for boxes and top lid sections shall be signed and sealed by a registered professional engineer in the State of Nevada.

   Prior to approval, these drawings and calculations shall be provided to the NV Energy Regional Standards Department:

   NV Energy
   Distribution Standards Department
   P.O. Box 98910, M/S19
   Las Vegas, Nevada 89151-0001
   Phone: (702)402-6541
   Fax: (702)402-6575

3. The seam between pad, middle section and bottom section of the manholes shall be sealed with a suitable mastic material.
4. All splice boxes, pull boxes and manholes shall meet the specification for Precast Concrete Structures (RS-G2) unless otherwise stated in this specification.

3. Steel Reinforcement

1. All steel reinforcement shall conform to C.C. Section 505 "Reinforcing Steel", ASTM615 and the RS-G2 specifications.
2. The reinforcement shall be furnished in the full lengths and sizes. Splicing of rebar's will not be permitted unless specified on the job drawing or specification.
3. Before the reinforcement is placed into the pouring form, surfaces of the rebar shall be cleaned of all rust, loose mill scale, dirt, grease and any other foreign substances.
4. Reinforcement shall be tied with wire three times in any rebar length. Welding of reinforcement is not permitted. Reinforcements during the manufacturing process shall be accurately placed and secured into position on distance chairs (to prevent shifting) and covered with an equal distance of concrete.

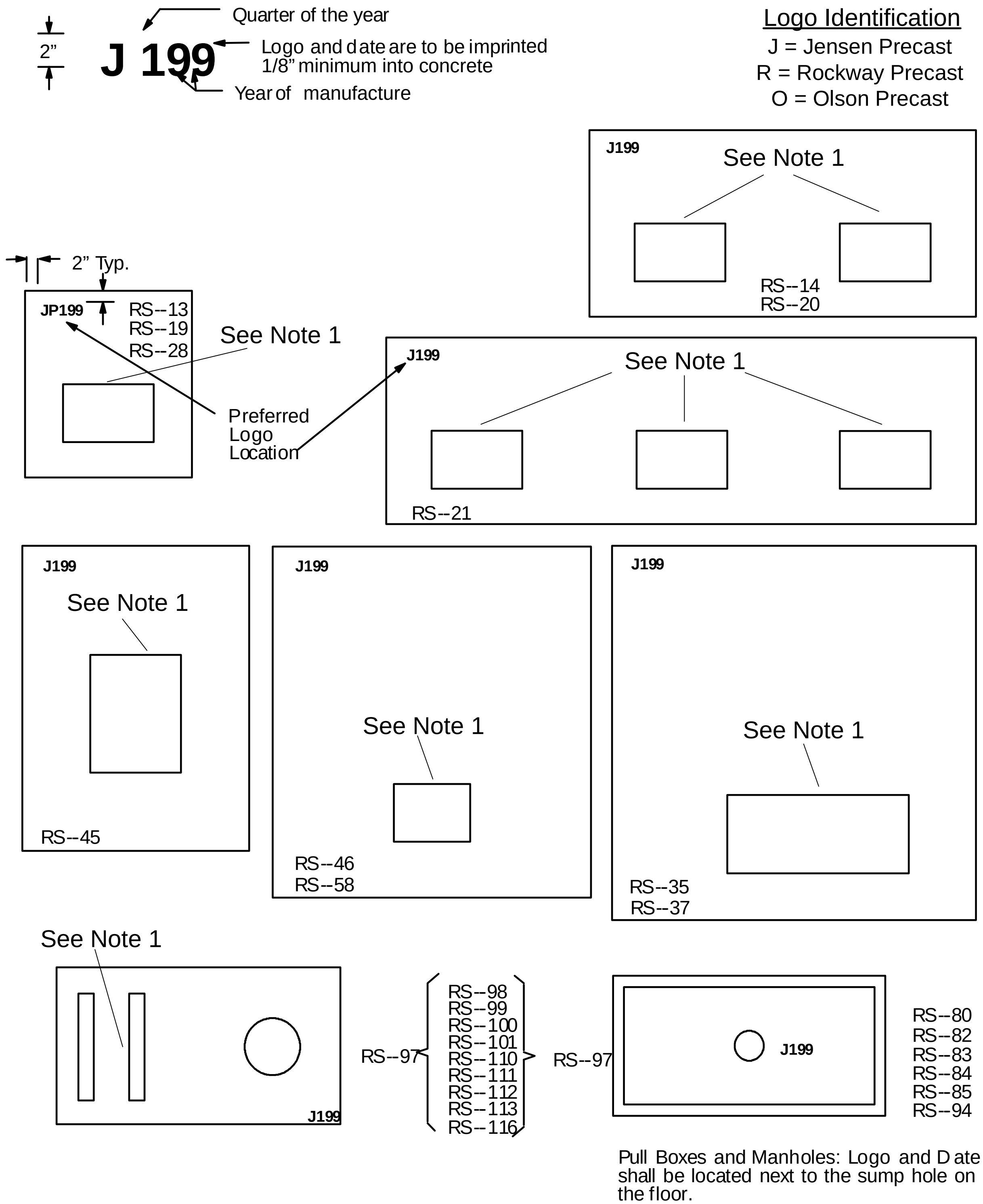
4. Concrete

1. All concrete must conform to C.C. Section 501 "Portland Cement Concrete", C.C. Section 502 "Concrete Structures" and C.C. Section 702 "Concrete Curing Materials and Admixtures" and the RS-G2 specification.

2. Concrete structures shall attain a compressive strength of 3,000 psi prior to shipment and installation. Any structure net meeting this requirement shall be rejected by NVE.

5. Finish

1. The walls shall be straight, parallel to each other and perpendicular to the bottom, and shall be free of depressions, bumps and other irregularities.
2. The top surface of the RS-97 pad shall be smooth, true, even and level. The finish shall be free of air cavities larger than .25” wide and .25” deep, free of projections beyond surfaces and free of depressions, bumps and other irregularities. The maximum deviation allowed is .0625” per 3’ measured with straight edge in any direction. The top and side edges shall have a smooth .5” bevel or radius.
3. The manufacturer’s logo and manufacturing date shall be embossed in the bottom of all structures and in the top of the RS-97 according to RS-G5. Other markings shall conform to RS-G2.
4. The top pad section of the RS-97 shall be free of chips. Cracks or splits may not exceed .032”. Cracks exceeding .008” in width shall be repaired with epoxy injection. All other concrete structures shall conform to the RS-G2.
5. All conduit terminators, ground wire conduits, pulling eyes, unistruts, insert nuts etc. shall be free of concrete.
6. Splice boxes, pull boxes and manholes shall meet the basic dimensional and tolerance requirements per RS-80 to RS-97, as applicable.



Note 1: This is the preferred location for each of the pads' stenciled weight.

THIS PAGE INTENTIONALLY LEFT BLANK

1. Purpose

This specification covers construction requirements for cast-in-place concrete slabs used in areas where two separate pads (such as a capacitor pad and a manhole pad) share a common area.

2. General

1. All construction work is subject to inspection and testing. If the slab does not meet all Requirements or exhibits poor workmanship, the NVE inspector shall reject it.
2. All references to Clark County (CC) pertain to “Uniform Standards Specifications for Public Works Construction Off-Site Improvements,“ Clark County Standard Specifications, latest edition.
3. Base Preparation:
   A. All aggregate base and sub–base preparation must conform to CC Section 302, “Aggregate Base Courses”.
   B. The pad shall be placed on a minimum 4” type II gravel base, 90% compacted. The base material shall be placed on soil compacted to 95% density.

3. Concrete

All concrete must conform to Clark County Section 501 “Portland Cement Concrete”. Only Class B concrete using Type V “low alkali” cement shall be used unless otherwise specified by NVE. The aggregate range size is 1.5 inch maximum through ¾ inch minus (1.5” – ¾”). It must have a minimum of 6 sacks of cement per cubic yard with a sump range of 4-5 inches and shall attain a 28 day minimum compressive strength of 3000 psi.

4. Reinforcement

1. The concrete slab for a precast structure shall be reinforced with:
   A. A welded wire fabric (mesh) 6x6 W1.4 for a slab wider than 10”.
   B. A #3 rebar centered in and paralleled to each side of the structure if the slab is less than 10” wide.
2. The concrete cover in all directions from the reinforcement shall be a minimum of 1-3/4”.

5. Control Joint

1. A weakened plane joint is required every 5 feet in the Long Opening direction (refer to the appropriate RS drawings’ plan view).
2. The joint shall be constructed as illustrated in Figure 1.

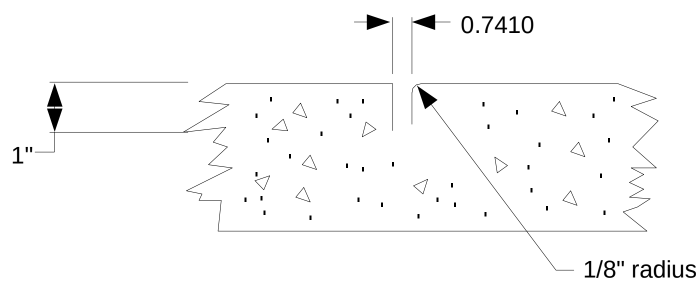


Figure 1 Weakened Plane Joint

6. Structure

1. The pad must conform to CC Section 502. “Concrete Structures”. The top surface of the must be true, even, and finished to final grade.
2. If a gap exists between the sidewalk and the pad, it must be filled in with concrete and finished as specified in Figure 2.

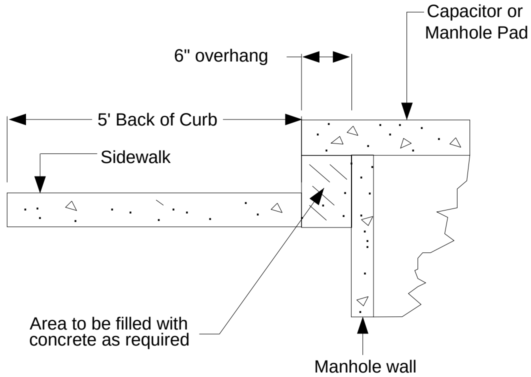


Figure 2 Detail of fill area

7. Finish

Exposed surfaces shall have a uniform steel trowel (or other suitable means) and light broomed finish. All outer edges must have a ½” bevel or radius. The finish must meet CC Section 501.03.17, “Ordinary Surface Finish” requirements.

1. PURPOSE

This specification covers the structural requirements for 30”(W) x 48”(L) x 18”(H) (nominal dimensions) **non-concrete** enclosures.

2. GENERAL

1. The enclosure shall be constructed per the latest edition of the Western Underground Committee Guide 3.6 (WUCG 3.6) for non-concrete enclosures, except as modified here within.
2. Enclosures must comply with all of the test provisions of the latest version of ANSI/SCTE 77 “Specification for Underground Integrity” for TIER 22 design and test loading.
3. All construction work is subject to inspection and testing by NVE. If the enclosure does not meet all of the requirements or exhibits poor workmanship, the NVE field inspector shall reject it.
4. All parts exposed to the sun shall be made from an ultraviolet resistant material.
5. Cover shall not be concave or have stiffeners (ribs) at the bottom.
6. Under normal backfilling and tamping around the enclosure, the box section shall not become deformed.
7. Points 2.6 and 2.10 from WUCG 3.6 change context to: “Covers and boxes shall conform to the dimensions shown on the drawings in NVE ESR Standard RS-80B”.
8. Points 2.14 and 2.15 from WUCG 3.6 do not apply to enclosures manufactured under this specification.

3. TESTING

1. New supplier shall provide a test report performed by independent laboratory. The tested enclosure and cover shall meet or exceed Tier 22 loadings set forth in the American National Standard Institute’s ANSI/SCTE 77 2007 “Specification for Underground Enclosure Integrity”.
2. Two enclosures shall be selected randomly and tested annually for the structural requirements by a Nevada State Certified Laboratory. The supplier is responsible for finding a testing laboratory and covering all expenses. The test shall be performed in the first quarter of each year. NVE T&D Standards personnel may observe these tests.
3. A copy of the certified test shall be sent no later than April 1 each year to:

NV Energy
T & D Standards Department
P.O. Box 98910, M/SB 19AM
Las Vegas, Nevada 89151-0001
Phone: (702) 402-6514
Fax: (702) 402-6575

4. FINISH

1. The enclosure wall shall be straight, free of depressions, bumps or other irregularities and have a flange at the base. The enclosure shall be free of cracks, chips, etc.
2. The top of the cover shall be true, even, and level with a non-skid surface. Finished surface variations shall not exceed 1/8” in 2 feet measured with a straight edge in any direction. Also, the cover shall have two slots, each with a lifting bar, free of any manufacturer pouring remains.
3. The supplier logo and the word ‘ELECTRIC’ shall be embossed in the top of the cover.
4. The manufacturing date (month, day and year) shall be marked with paint on the bottom surface of the cover and on the inside of the box.
5. The vertical gap between the top of the box and the top of the cover shall not exceed 1/8” in any point.
6. The cover and exposed portions of the box shall be the same color, and similar in color to concrete used for sidewalks.

5. WARRANTY

1. For the first five years and within 14 days of notification, the supplier shall correct any product defect, at the expense of the supplier. When notified to repair 10 units or more, the supplier shall be granted 14 days per 10 units of repair time.
2. NVE reserves the right to require immediate repairs when, in NVE’s opinion, there is a danger to the public.
3. If a material defect within the five-year period necessitates the item’s replacement, the supplier shall be responsible for all labor and material costs incurred. These costs shall include but are not limited to the following; de-energize (if applicable), remove electrical apparatus/equipment, remove the defective item, re- excavate, deliver and place the new item, level, grout, backfill, restore site, replace the electrical apparatus/equipment, terminate the cables, and energize.

NVE reserves the right to designate a qualified contractor, to perform the work described above, to best meet scheduling requirements.

1. Purpose

This specification covers the structural and installation requirements for poured-in-place vault replacement enclosures.

2. General

1. All construction work is subject to inspection and testing. If the splice box, pull box, vault or manhole does not meet all requirements or exhibits poor workmanship; it shall be rejected by the NVE regional engineer and/or field inspector.
2. The contracted company shall provide all materials, equipment and labor to produce poured-in-place concrete structures.
3. All concrete shall be supplied and placed according to the applicable sections of American Concrete Institute (ACI), American Society for Testing and Materials (ASTM) and the Clark County Standard Specifications (CCSS), latest editions.
4. All structures shall be designed to withstand lifting loads without exceeding the first crack rating of the structure.
5. All structures must be designed for H-20-44 loading. The top section for the manhole, vault, or pull box shall be designed for 5,000 lb static load with a 30% impact load. The design drawings and calculations for boxes and top lid sections shall be signed and sealed by a registered professional engineer in the State of Nevada.

   Prior to approval, these drawings and calculations shall be provided to the NV Energy Standards Department:

   NV Energy
   Manager, T&D Standards
   7155 S Lindell Rd. M/S B19AM, Las Vegas, Nevada 89118
   Phone: (702)402-6541 Fax: (702)402-6575

3. Materials

1. **PORTLAND CEMENT:** Shall be ASTM C150 Type V. LOW ALKALI only.
2. **AGGREGATES:** Shall meet the requirements of ASTM C33.

A. Coarse and fine aggregate shall be treated and tested as separate ingredients.

B. The coarse aggregate shall be Size No. 67 (3/4” maximum).

C. Deleterious substances of coarse aggregate shall be limited to the values of Class 4M.

D. All aggregate supplied shall be NON-REACTIVE. The aggregate shall be tested annually for potential alkali – silica reactivity per ASTM 1260:

i. Mortar bar expansion less than 0.10%: aggregate is acceptable for NVE

ii. Mortar bar expansion more than 0.20%: aggregate is not acceptable for NVE.

iii. Mortar bar expansion between 0.10 and 0.20%: additional tests are required at the supplier’s option:

a. Comparator readings shall be continued until 28 days after casting.

b. Petrographic examination of the mortar bar test sample per ASTM C-856 (preferred) or petrographic examination of the aggregate samples per ASTM C-295.

E. A copy of the test reports shall be sent to:

NV Energy
Manager, T&D Standards
7155 S Lindell Rd. M/S B19AM, Las Vegas, Nevada 89118
Phone: (702)402-6541 Fax: (702)402-6575

F. Approval of an aggregate source and supplier is effective for a period of one (1) year and contingent upon continued compliance with NVE T & D Standards. If at any time, the aggregate does not meet NVE T & D Standards, the aggregate will be rejected and the supplier may have to re-qualify the source of the non-conforming aggregates.

G. The contracted company may order and use only NVE specified approved suppliers for fine and course aggregates.

H. Approved Suppliers for fine and coarse aggregates:

Supplier	Source / Location	Aggregate		Date Approved	Re-test & Approval Deadline
		Fine	Course		
CSR Sand & Gravel	Buffalo Pit	X	X	3/95	11/03
Silver State Bldg. Material	Eldorado Pit	X	X	3/95	11/03
Nevada Ready Mix	Lone Mountain Pit	X	X	3/95	11/03
Leavitt Ready Mix	Glendale Ranch Pit	X	X	3/95	11/03
Hanson Granite	Eldorado Pit	X	X	8/95	11/03
American Sand & Gravel	NLV Blvd & Speedway	X	X	6/96	11/03
Matthew Roylance Co.	Alamo Pit	X	X	2/02	11/03
ISN Aggregates LLC	187 Quarry	X	X	11/03	10/04
Blue Point Materials	Logandale Pit	X	X	7/06	6/07

3. **WATER:** Fresh, clean potable (without any reactive mineral) to be used in the mixing process.

4. **APPROVED ADMIXTURES:**

A. Mineral Admixtures:

i. Fly ash: ASTM C618, Type F material may be used at a rate 18% to 20% by weight of total required cementitious material.

ii. Microsilica: ASTM C1240, material may be used at a rate 18% to 20% by weight of total required cementitious material.

B. Chemical Admixtures:

NOTE: Admixture containing more than 0.15% per weight of chloride is not permitted. All admixture shall be from a single source unless otherwise approved by NVE.

i. **Air Entrainment:** ASTM C260 may be used by the enclosure manufacturer. Airentrainment is not required except with special notice

ii. **Water Reducer:** ASTM C494 Type-A shall be used (when required) by the enclosure manufacturer. Product shall be from Sika Corporation, Plastocrete series of materials or other materials approved by NVE.

iii. **Water Reducing Retardant:** ASTM C494 Type-D shall be used (when required) by the enclosure manufacturer. Product shall be from Sika Corp., Plastocrete or Plastocrete series of materials. Pozzolith N Type 82 or other materials approved by NVE

iv. **High-Range Water Reducer:** ASTM C494 Type F, shall be used(when required) by the enclosure manufacturer. Product shall be from Sika Corp., Sikament series of materials or other materials approved by NVE

v. **Superfluidifying High Range Water Reducer:** ASTM C494 Type and ASTM C494 Type F and ASTM C1117, shall be used (when required) by the enclosure manufacturer. Product shall be from Sika Corporation, ViscoCrete series of materials approved by NVE.

vi. **Set Accelerator:** ASTM C494 Type C or E, shall be used (when required) by the enclosure manufacturer. Product shall be from Sika Corporation, Plastocrete 161FL, Sika Set NC or other materials approved by NVE.

vii. **Strength Accelerator:** ASTM C494 Type C or E, shall be used (when required) by the enclosure manufacturer. Product shall be Sika Corporation, Sika Rapid-1, Sikament 200 or other materials approved by NVE.

viii. **Corrosion Inhibitor:** shall be used by enclosure manufacturer. Product shall be Sika Corporation, Ferroguard series of material or other materials approved by NVE.

NOTE: Corrosion inhibitor must have dual protection system (both anodic and cathodic reaction suppression mechanisms) and must have satisfactory history of use in concrete (nondeleterious) of minimum 5 years.

6. Any seam between pads, middle sections, and bottom sections shall be sealed with a suitable mastic material.

4. Weather Conditions

1. **Rain, Sleet or Snow:** Concrete shall only be poured in a protected environment – one that prevents water dilution of the concrete, e.g.: under the canopy or inside a shed or building.

2. **Cold Weather:** If the mean daily temperature falls below 40 degrees F, the minimum temperature of the concrete as placed shall be 50 degrees F.

NOTE: The use of calcium chloride accelerators shall be strictly forbidden.

3. **Hot Weather:** All placements during hot weather shall be per ACI 305.

A. The maximum temperature of concrete containing 20% fly ash during placement shall be 85 degrees F. Concrete with temperatures over a 85 degrees F. shall contain a water retarder such as Sika Plastiment, Sika Plastocrete 161 MR or other materials approved by NVE. Concrete with temperatures over 100 degrees F. shall not be poured.

B. Any cooling (ice) required to control the concrete temperature during hot weather placement shall be at the enclosure manufacturer’s expense. The water to cement ratio shall be adjusted to consider the addition of any ice.

C. Concrete poured during hot weather shall not have the loss of slump, flash set or cold joints.

D. All reinforcing steel, forms, coarse aggregate and fine aggregate exposed to the direct rays of the sun shall be cooled by sprinkling during hot weather concrete placement.

5. Reinforcement

1. All steel reinforcement shall conform to the latest revision of Clark County's Uniform Standards Specification for Public Works, Construction Off – Site Improvements, Section 505, "Reinforcing Steel", and ASTM615 Grade 60.
2. Reinforcement shall be placed per ACI 318 and ACI 315.
3. All reinforcing steel shall have a minimum concrete cover of 3", except structures thinner than 6" where all steel must be centered.
4. Splicing of reinforcing steel shall be according to ACI requirements.
5. Welding of reinforcing steel is strictly prohibited.
6. Reinforcing bars shall be supported and wired together to prevent displacement. All tie wires and chairs shall be of non-rusting type.
7. The reinforcement shall be furnished in the full lengths and sizes. Splicing of rebars will not be permitted unless specified on the job drawing or specification.
8. Before the reinforcement is placed into the pouring form, surfaces of the rebar shall be cleaned of all rust, loose mill scale, dirt, grease and any other foreign substances.
9. Reinforcement shall be tied with wire three times in any rebar length. Welding of reinforcement is not permitted. Reinforcements during the manufacturing process shall be accurately placed and secured into position on distance chairs (to prevent shifting) and covered with an equal distance of concrete.

6. Concrete

1. The concrete shall develop a compressive strength of 3,000 psi (-10%) at 7 days and 4,000 psi (-10%) at 28 days.
2. The concrete shall contain:
   A. Minimum 665# and maximum of 755# of cement (per cubic yard of concrete) shall be used.
   B. Minimum of 80% and maximum 82% of cementitious material shall be Type V, Portland cement.
   C. Minimum 18% and maximum of 20% of all cementitious material will be Type F, fly ash.
   D. Maximum water/cement ratio shall be of 0.45 by weight.
3. Concrete Workability
   A. All wet cast concrete shall have a minimum 2" slump unless approved as an exception by the engineer.
   B. Concrete not containing high range water reducer or Superfluidifying agent shall have maximum 4" slump and shall not exceed the maximum slump as indicated in submitted concrete mix design to NVE.
   C. Concrete containing high range water reducer may be placed up to 8" slump but shall not exceed the maximum slump as indicated in submitted concrete mix design to NVE.
   D. Concrete containing Superfluidifying admixture (Sika ViscoCrete) shall be judged by the slump cone "flow test". The minimum flow shall be an average of 25" diameter. The maximum flow shall be an average 32" diameter. In no case will there be evidence of paste/aggregate separation during the "flow test" of the concrete.
4. All structures to be on/in ground shall contain steel corrosion inhibitor (Sika Ferroguard 901, at a dosage of 2 gallons per cubic yard of concrete mix) or other materials approved by NVE.

5. A copy of the proposed mix design shall be provided to NVE prior to providing products to NVE using the proposed design mix.

7. Testing

1. A slump test shall be made according to ASTM C143 or a “flow test” shall be performed for each day of concrete production as a minimum. The appropriate test of concrete workability shall be performed on all concrete samples used for fabricating strength test samples.
2. Strength test cylinders shall be prepared per ASTM C31. At least three (3) tests shall be performed for every 50 cubic yards of poured concrete. Cylinders shall be stored and cured the same way as the structure.
3. Strength of concrete will be considered acceptable, if the average of any of three consecutive tests (of the cylinders) reach or exceed the required strength of 3,000 psi (-10%) at 7 days and 4,000psi (-10%) at 28 days. Concrete structures with developed strength less than 4,000 psi (-10%) of the required 28 – day strength will be rejected.
4. If test results fail to meet design requirements, test cores by ASTM C42 may be taken. Costs of coring and testing of the cores will be the responsibility of the manufacturer.
5. If the core specimens fail to meet the minimum 4,000 psi (-10%) of compression strength, the concrete will be considered defective and will be rejected by NVE.
6. If the concrete doesn’t attain minimum 3,000 psi (-10%) of required compressive strength within 7 days and structured built from this concrete must be kept in the manufacturer’s stock, awaiting NVE decision.
7. If any test indicates that the concrete has reached a compressive strength of 4,000 psi no further testing is required.
8. Rejected structures may not be re-used in NVE distribution system.

8. Quality Control

1. The manufacturer shall develop and submit a QA/QC program satisfactory to NVE. This QA/QC program will be approved in writing by NVE. The manufacturer shall implement the QA/QC program only after receipt of written approval from NVE.
2. The manufacturer shall provide NVE with all QA/QC reports set forth by the manufacturers QA/QC program weekly.
3. The manufacturer shall make available to NVE all batch tickets and comprehensive strength test results. The batch ticket(s) information shall include a list of quantities and structure types manufactured.
4. As a minimum the manufacturers QA/QC program shall document and include the following Items:
   - A. Verify compliance with the specifications of all materials used (cement, rebar, aggregate admixtures, etc) including the aggregate supplier.
   - B. Provide batch tickets for all concrete per ASTM C94.
   - C. Date, time of concrete pour and numbers of cubic yards poured.
   - D. Design mix, including any admixtures.
   - E. Verification of reinforcing steel placement and cover provided.
   - F. Results of any slump tests performed.
   - G. Reference to any strength test cylinders made. Strength test results at 7 and 28 days.
   - H. Any hot weather or cold weather measures used (e.g., ice, moistening of aggregates, etc.)
   - I. Verification of vibration of the concrete.
   - J. Method of curing and length of time of curing.

K. Concrete temperature at pouring.
L. Number of day's concrete is allowed to set before being moved off – site.
M. Placement method of identification on the concrete.
N. A sample format of all QA/QC tests and reports.

9. Shop Drawings and Certificates

1. The contracted company shall furnish NVE with shop drawings of each structure, showing all dimensions needed for the placement of the reinforcing steel.
2. The contracted company and manufacturer shall obtain and keep on the site, available to NVE, certificates of compliance for all reinforcing steel and Portland Cement used for precast fabrication.

10. Finish

1. The enclosure walls shall be straight, parallel to each other, perpendicular to the bottom, free of depressions, bumps or other irregularities.
2. If the enclosure has a pad or cover, it shall be true, even, and level with a non-skid surface. Finished surface variations shall not exceed 1/8" in 2 feet measured with a straight edge in any direction.
3. The manufacturer logo and the word 'ELECTRIC' shall be embossed in the top of the cover.
4. The manufacturing date (month, day and year) shall be marked with paint on the bottom surface of the cover and on the inside of the box.
5. The manufacturer's logo and manufacturing date shall be embossed in the bottom of all structures and in the top of any precast pads according to RS-G5.
6. The vertical gap between the top of the box and the bottom of the cover shall not exceed 1/8" in any point.
7. The cover and exposed portions of the box shall be the same color, and similar in color to concrete used for sidewalks.
8. All conduit terminators, ground wire conduits, pulling eyes, unistruts, insert nuts etc. shall be free of concrete.
9. Structures with cracks above .060" shall be discarded. All cracks from .016" to .060" must be repaired per Sika Corporation, SIKADUR 55 SLV or any other method approved by NVE before installation in the NVE system.

11. Warranty

1. Each enclosure manufacturer shall design and manufacturer long lasting concrete structures that will be installed into the NVE Underground System. The structure shall have a minimum design life of 50 years.
2. If a material defect within the five-year period necessitates the item's replacement, the contracted company shall be responsible for all labor and material costs incurred. These costs shall include but not be limited to the following; de-energize (if applicable), remove electrical apparatus/equipment, remove the defective item, re-excavate, deliver and place the new item, level, grout, backfill, restore site, replace the electrical apparatus/equipment, terminate the cables and energize. NV Energy reserves the right to designate a qualified contractor, to perform the work described above to best meet scheduling requirements.
3. Manufacturer shall correct any concrete structure defect, within 14 days of notification. When notified to repair 10 units or more, the supplier shall be granted 14 days per 10 units of repair time.

   NOTE: NVE reserves the right to require immediate repairs when, in NVE's opinion there is a danger to the public.

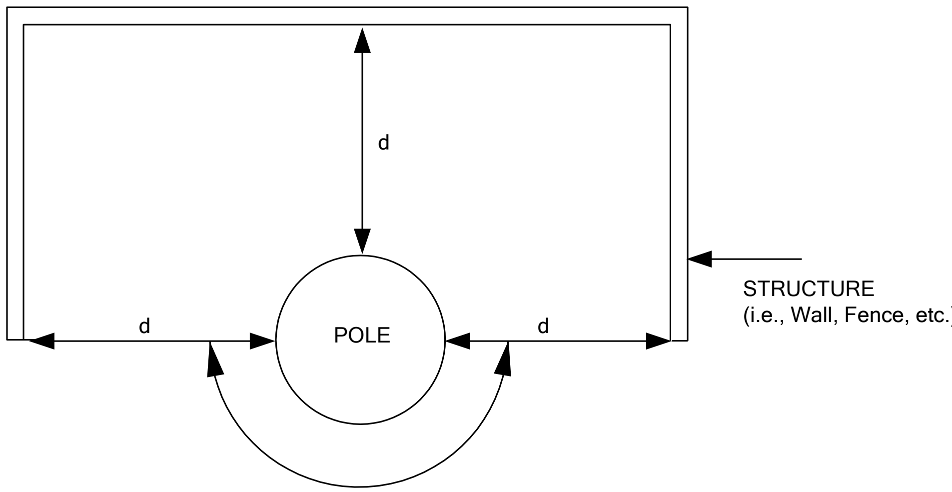
12. Repairing or Patching

1. Final decisions about repair or replacement of a damaged concrete structure belongs to NVE
2. All defective structures shall be repaired within the time specified in 12.A.
3. All honey combing or other defective concrete shall be removed to sound concrete (a minimum of 1" deep). Before placement of patching materials, an area at least 6" wide surrounding the area to be patched shall be dampened to prevent absorption of water from the patching material.
4. After the surface water has evaporated from the area to be patched, a bond coat of Type V Portland cement, Type F fly ash and fine mortar sand (1:1:1 ratio) shall be mixed to the consistency of thick cream and then well brushed onto the surface to be repaired.
5. When this bond coat begins to lose the water sheen, the premixed patching material shall be applied. The patching material shall be made of fine concrete aggregate (3/8" max.). Type V Portland cement and Type F fly ash in the same proportions as specified in the Section 5.2. The patched area shall be "struck off" to leave the patch slightly higher than the surrounding surface. The surface finish of the patch shall closely match the surface finish of the existing concrete.
6. Concrete shall be curried by using curing compound(s) (per ASTM), wet burlap bags, cotton absorptive mats or by sprinkling with vapor mist.
7. All repaired concrete structures shall be identified with a metal tag. The tag shall have the month, day and year of repair. The tag shall be permanently attached to the repaired concrete structures.

Table of Contents

THIS PAGE INTENTIONALLY LEFT BLANK

WOOD POLES

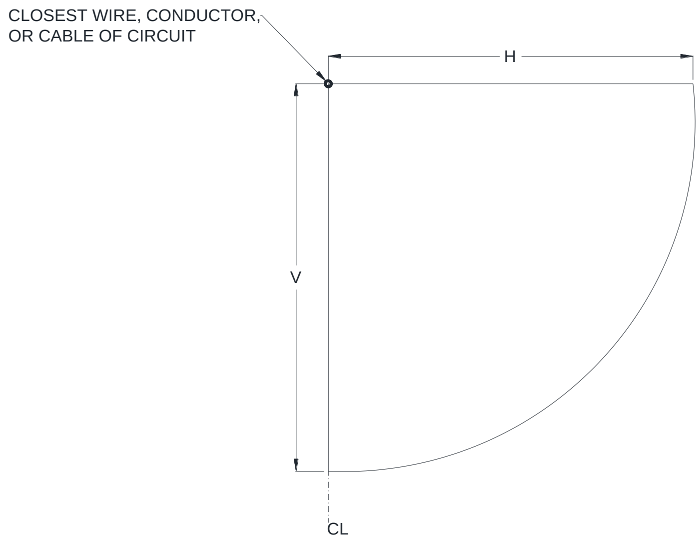


180° ACCESS REQUIRED
d = 4' Minimum Distance

NOTES:

1. NVE Electric Service Requirements RS-5 Property Line Use Requirements shall apply to NVE overhead distribution lines.
2. Specifically, permanent structures are not permitted under or over an NVE easement. Structure designs that interfere with the ingress/egress to and/or the operation and maintenance of overhead distribution lines within an NVE easement are not permitted unless approved by distribution.
3. For guyed structures/poles, the clearance dimension (d) shall include the guy and anchor.
4. All structure designs shall comply with or exceed the requirements of the latest edition or revisions to the NESC.
5. Pole shall be directly accessible from trucks to facilitate the safe removal or replacement of the pole, and the safe operation and maintenance of equipment on the pole.

PRIMARY CONDUCTORS



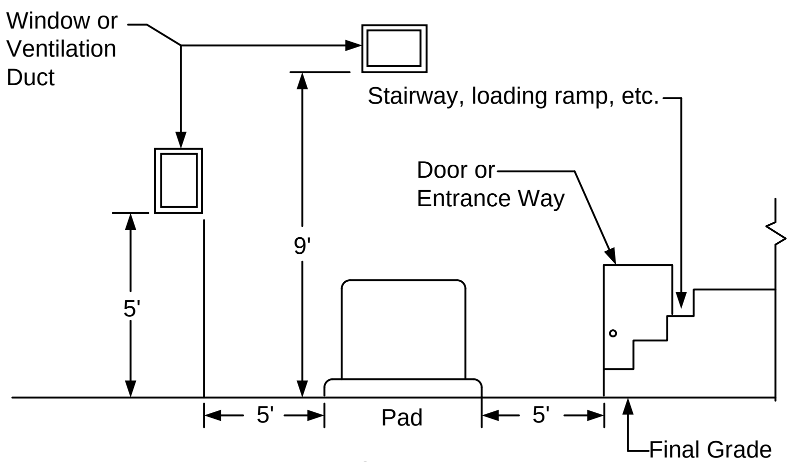
NOTES:

1. Streetlights, lighting support, traffic signal support, supporting structures of a second line, or any intermediate poles, shall maintain the following clearances from NVE energy facilities:

	Horizontal (ft)	Vertical (ft)
Phase Conductors	7.5	8
Neutral Conductors	3.5	3.5

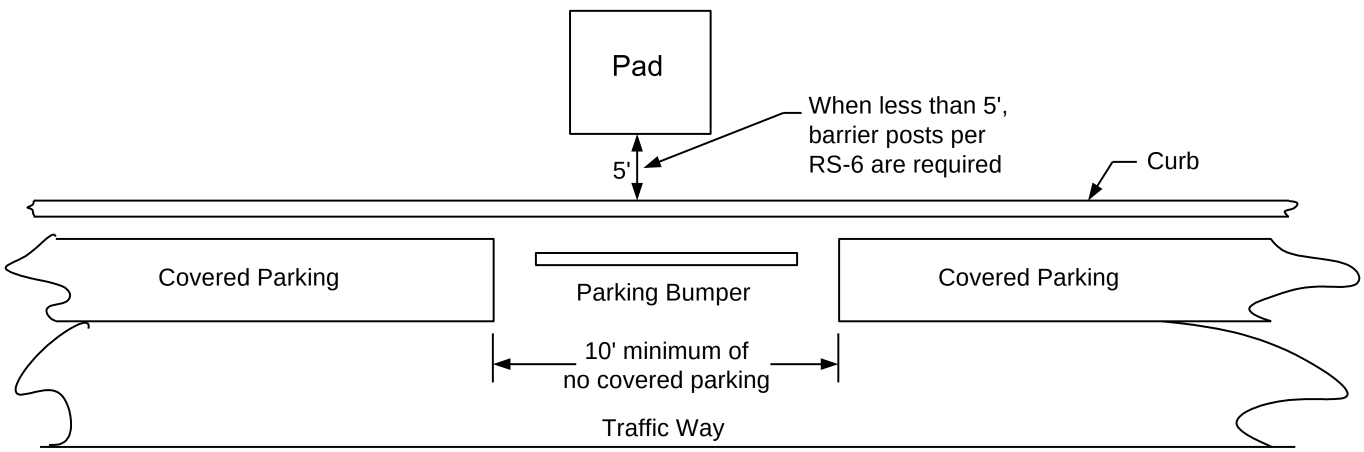
2. These clearances account for wind displacement and conductor sag.
3. All other installations shall follow the latest revision of the National Electric Safety Code.

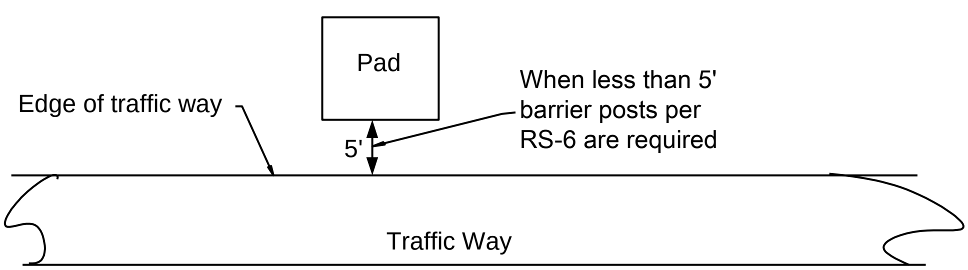
INSTALLATION REQUIREMENTS



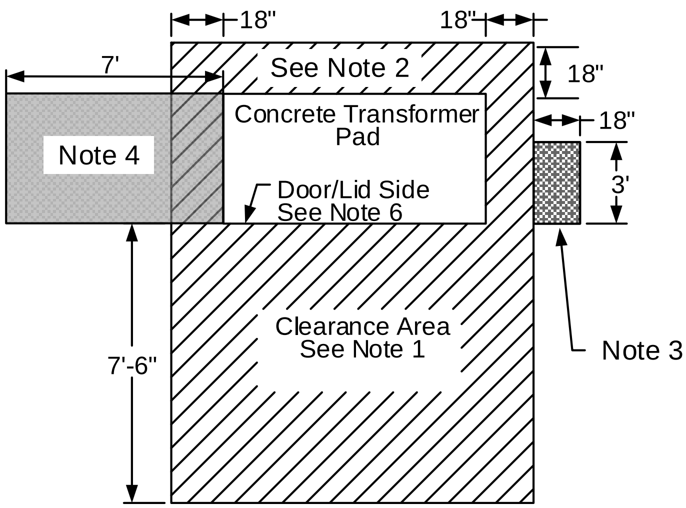
FRONT VIEW

NOTE:
1. Equipment pad shall be located as far as practical from windows, doors, fire escapes, entrances and ventilating ducts so as not to present a physical obstruction. It shall be the applicants responsibility to comply with any insurance regulations affecting the installation. The above shown dimensions are minimum clearances.

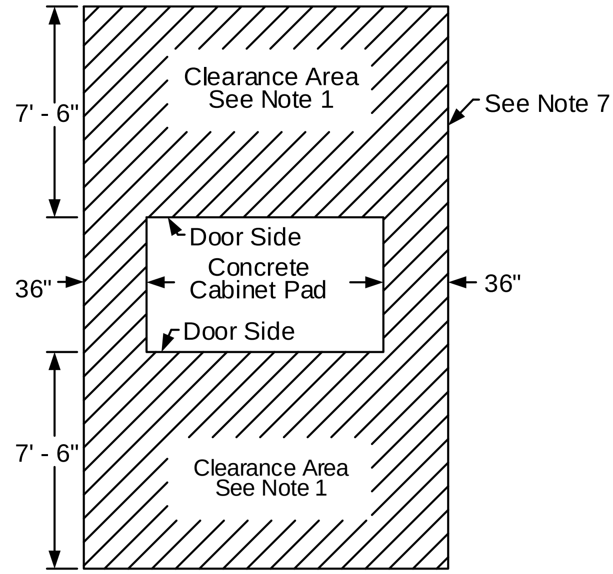




NV Energy				Electric Service Requirements	RS-5
				Clearances to Equipment Pad	
Drawn:	Eng:	Appr:	Date:		Revision: 9
MP	JR	DA	12/19		Page 1 of 6



All Transformer Pads



All Cabinet Pads

NOTES:

1. This area must be free of any above or below ground structures and/or landscaping. Examples include pad, wall, pedestal, foundation, handhole, pull box, meter box, plants, bushes, trees, etc.
2. When a PM transformer is next to a building or wall, the clearance between the structure to a 1 phase transformer is 18" and to a 3 phase transformer is 3'.
3. When secondary metering is required, provide additional clearance as shown.
4. Single phase PM transformer side access. See Retaining Walls, Note 3.
5. Designer:

   Open Areas (no obstructions):

   The pad shall not be more than 15' from the truck access to facilitate equipment installation and replacement.

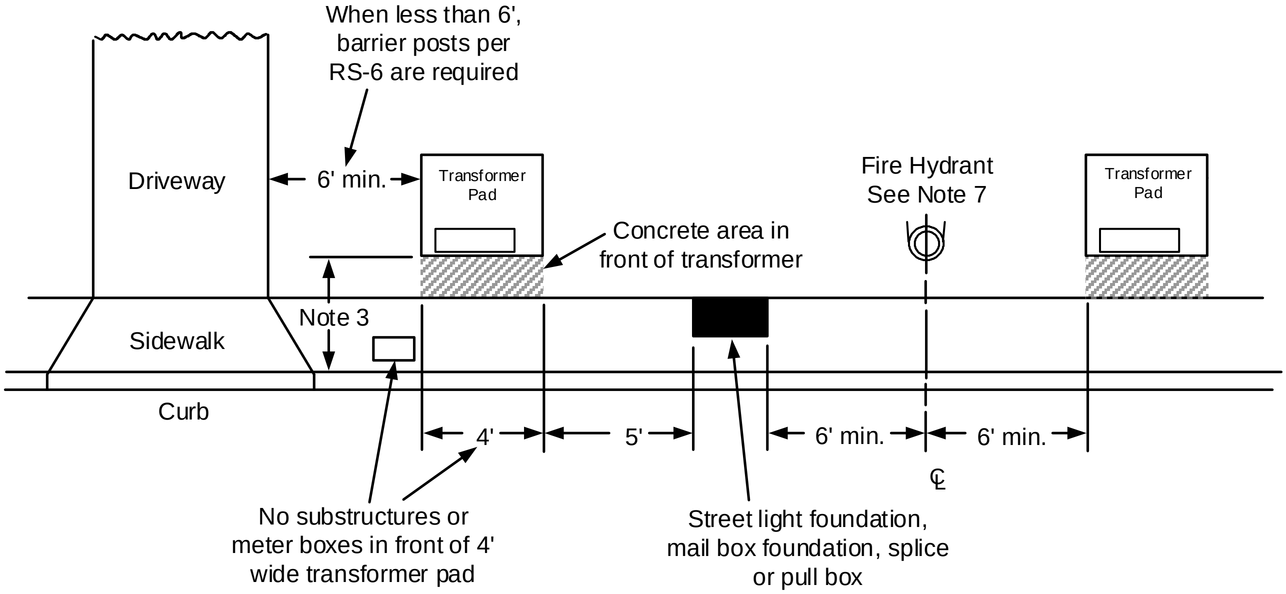
   Enclosed Areas (block walls or fences 10' or less in height above grade):

   The pad shall not be more than 10' from the truck access to facilitate equipment installation and replacement.

   Enclosed Areas (block walls or fences greater than 10' in height above grade):

   The pad shall be directly accessible from truck to facilitate equipment installation and replacement.
6. Transformer pad may be for a 1 phase PM transformer, multiple 1 phase PM transformers, or a 3 phase PM transformer.
7. Examples of cabinet equipment include: PM capacitor bank, PM switch/fuse cabinet, PM fuse cabinet, and PM meter cabinet.

   No poles, transformers, PM switches, etc. over 32" high are allowed in the sight distance area.

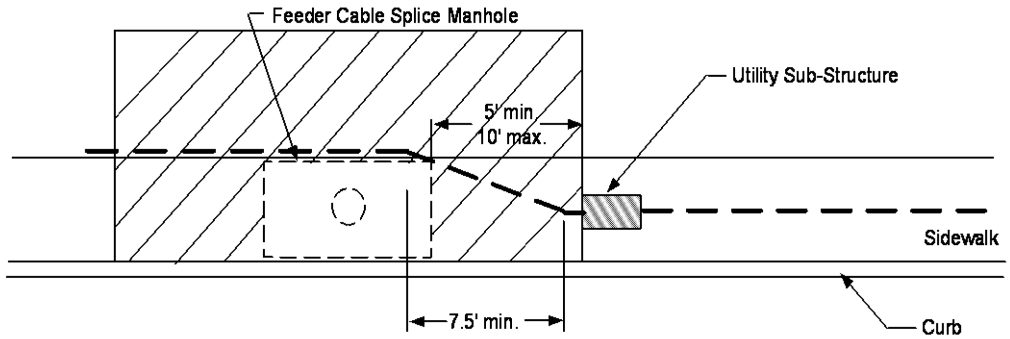


NOTES:

1. Do not install transformers on the apex of a Cul-de-Sac.
2. Do not install handhole, splice or pull box in driveway.
3. For a transformer in a residential area, where no sidewalk exists, concrete the area from the pad to the curb (up to 5’ for 1 phase transformer) for the entire width of the transformer pad.
4. For a transformer in a commercial area, where no sidewalk exists, concrete or asphalt the area from the pad to the curb (up to 10’ for 3 phase transformer) for the entire width of the transformer pad.
5. Direct all sprinkler/watering devices away from transformers, switch gear, or capacitor banks.
6. Do not obstruct access or compromise the work area to splice or pull boxes by wall(s), bushes, trees, etc.
7. There shall be a min. of 6’ clearance from the equipment pad to the centerline of a fire hydrant.
8. Refer to the RTC 201.2 Sight Visibility Zone at Intersection standard for equipment setbacks.
9. Refer to RTC standard 222 & 222.1 Driveway Geometrics for construction near driveways; all objects over 2’ tall must be placed at least 6’ away from driveways.

Property Use Requirements Under or Over NVE Easement or Distribution Lines

1. The following are not allowed on easements:
   A. Pools/spas or pool equipment;
   B. Storage sheds;
   C. Covered parking;
   D. Mobile homes
   E. Trees
   F. Customer owned poles (permanent or temporary);
   G. Permanent structures;
   H. Permanent storage yards
   I. Permanent travel trailers and RV's.



NOTES:

1. To allow conduit routing around the vault, maintain minimum 5' clearance from all substructures.

RETAINING WALLS

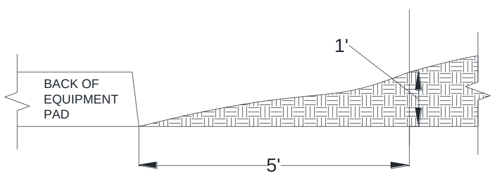


Figure 1
Maximum Allowable Grade Change

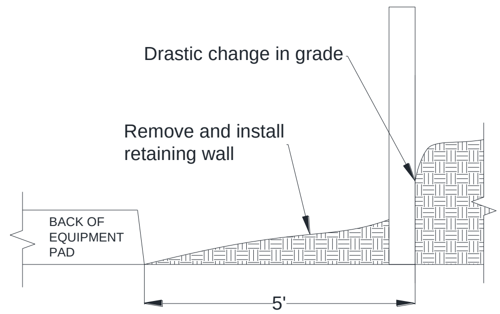


Figure 2
Unacceptable Grade Change

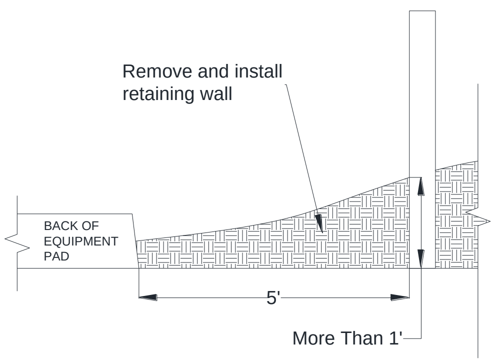


Figure 3
Unacceptable Grade Change

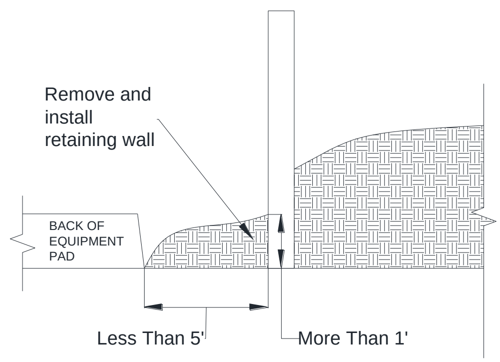


Figure 4
Unacceptable Grade Change

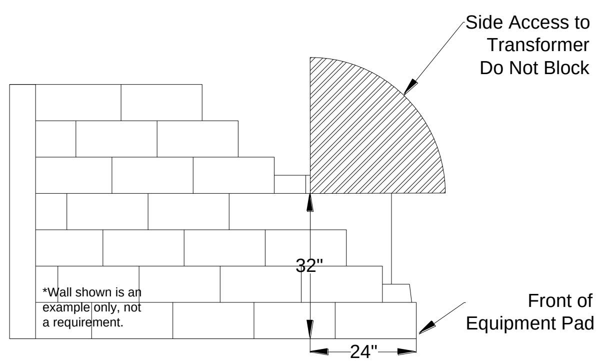


Figure 5
Transformer Side Access

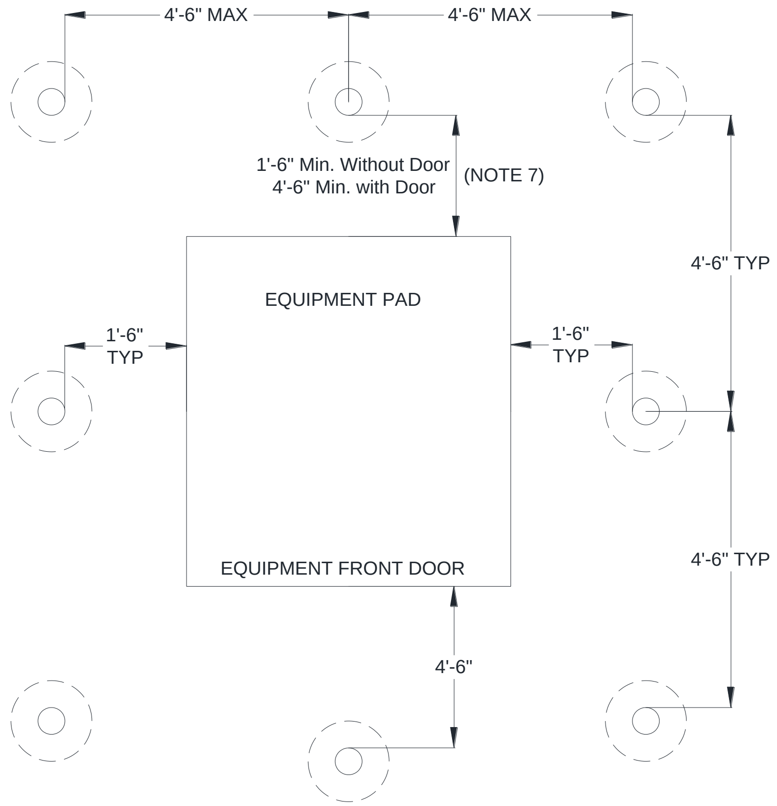
NOTES:

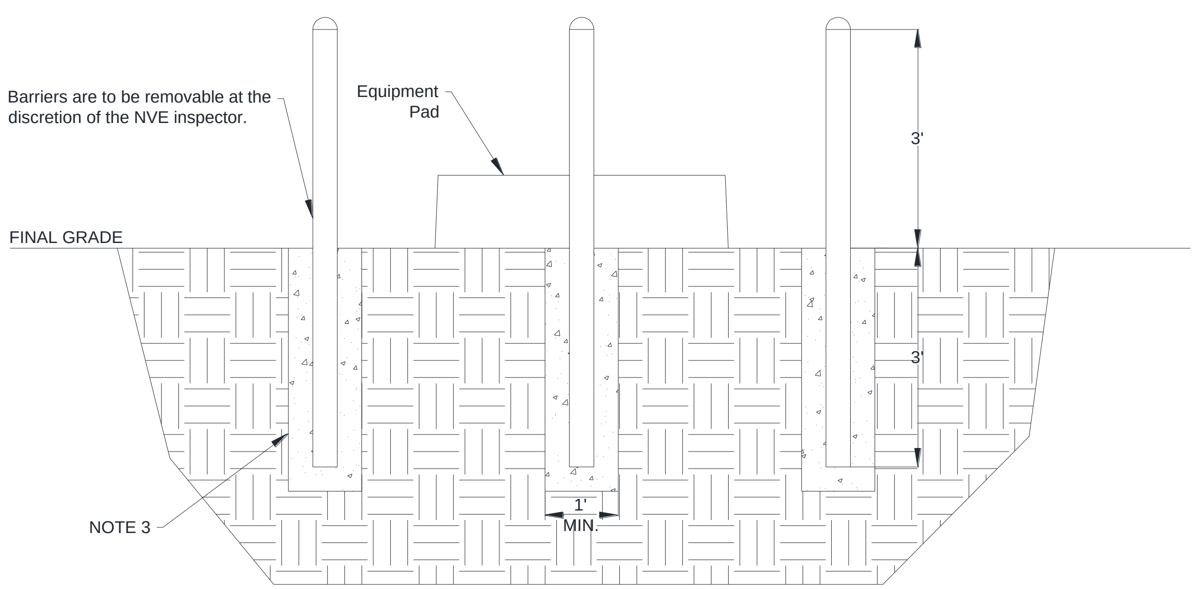
1. Retaining wall required when grade from bottom of pad rises or lowers more than 1' in 5' horizontally.

2. When walls are installed, the finished grade between the wall and pad shall be even with the bottom of the pad.

3. Walls built within 7' feet of the left edge of a single phase transformer pad shall not block access to the side of the transformer as shown in Figure 5.

INSTALLATION REQUIREMENTS



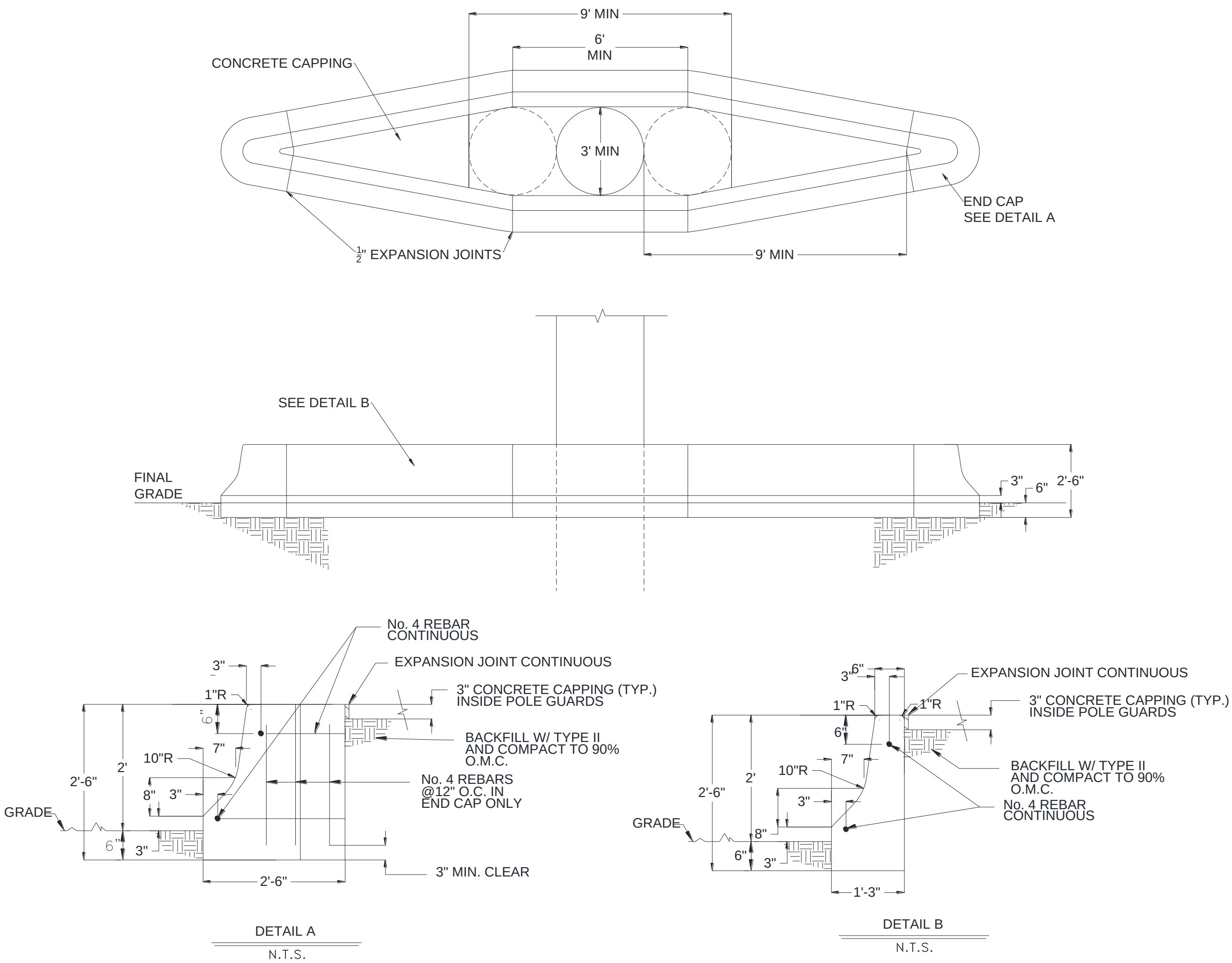


EQUIPMENT PADS

NOTES:

1. Barrier to be 4” steel pipe 6’-0” long, concrete filled, and painted with yellow street marking paint.
2. Holes for removable barriers must be a minimum of 1" larger than the outer diameter of the pipe.
3. Removable and permanent bollards shall have a full concrete foundation.
4. No overhead obstacles permitted above NVE equipment, unless approved by the T&D Standards Supervisor.
5. Barriers on sides not accessible to vehicles may be omitted.
6. All materials and labor for protective barrier installation shall be provided by the customer.
7. Provide adequate clearance for items such as cooling coils and opening of doors on equipment.
8. In any event, no other obstructions may be present in the 7’-6” clearance area shown in RS-5.
9. There shall be a minimum 6’ clearance from a barrier to the centerline of a fire hydrant.
10. In lieu of bollards, vehicle barrier walls designed to the latest revision of ASCE 7-10 section 4.5 may be submitted to T&D Standards for review. Side walls must be 32” tall.

CAUTION: Installation of barrier systems must be coordinated with electrical cables or conduit installation to avoid mutual interference.



POLE MEDIAN – NOT FOR NEW CONSTRUCTION

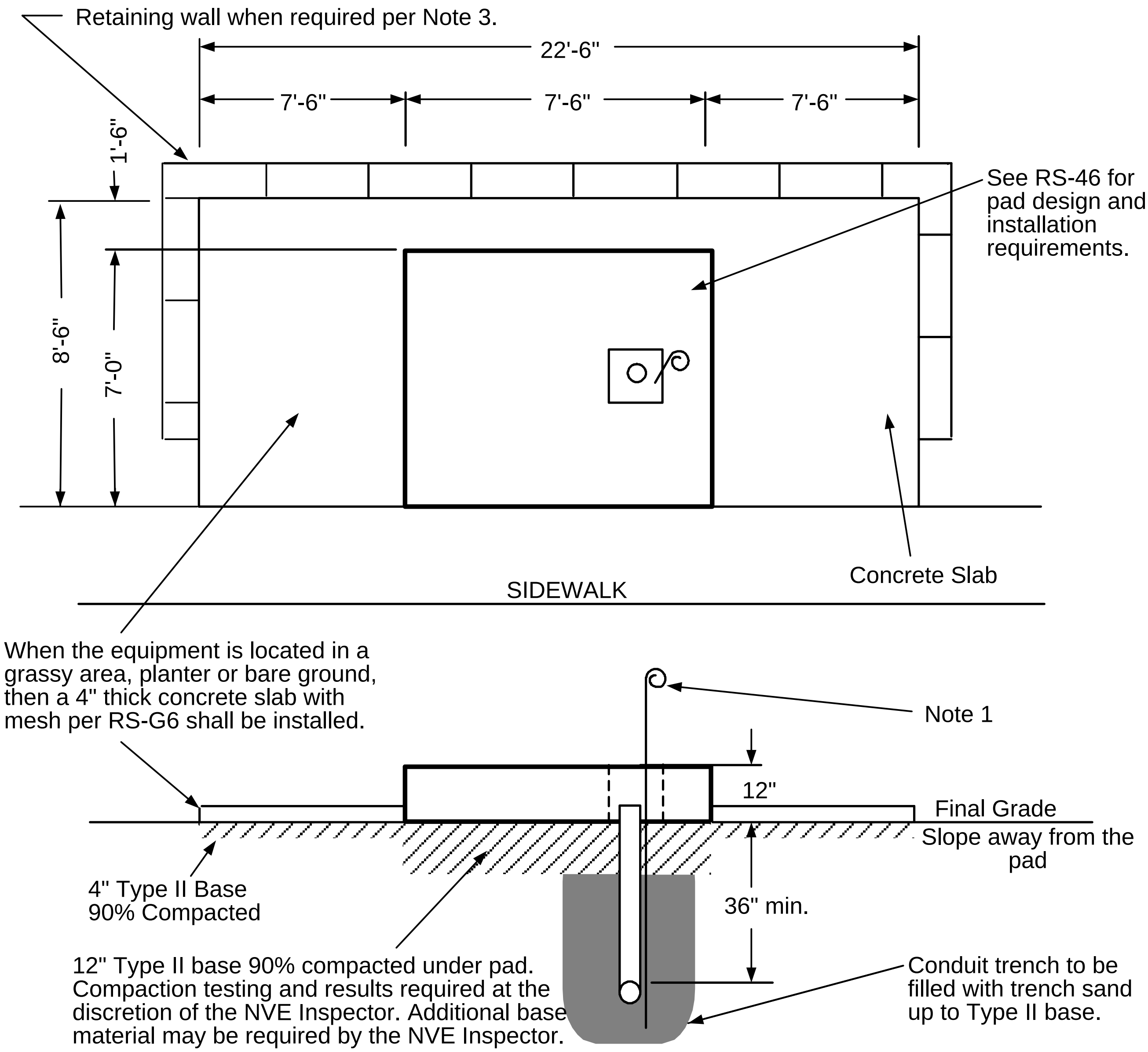
NOTES:

1. In parking lots or speed restricted areas, bollards shall be used at a 4' perimeter around a pole.
2. Where a pole is set in between traffic ways, the pole median above shall be installed.
3. Medians shall only be installed after the pole has been set.
4. Clearance on both sides of the median shall conform to RPI-15.
5. A Facility Safety Agreement is required when installing pole medians.
6. Anti-corrosion pole wraps may be needed if the development is increasing the ground elevation adjacent to the pole.

Table of Contents

THIS PAGE INTENTIONALLY LEFT BLANK

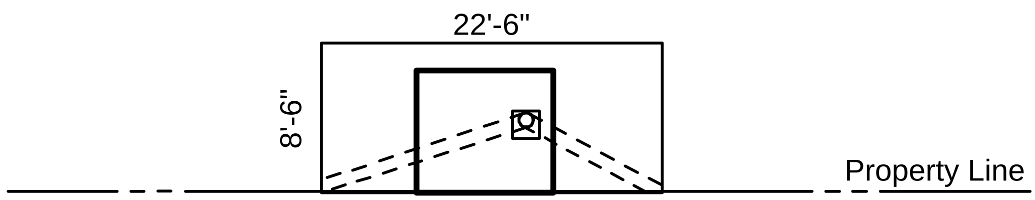
INSTALLATION REQUIREMENTS



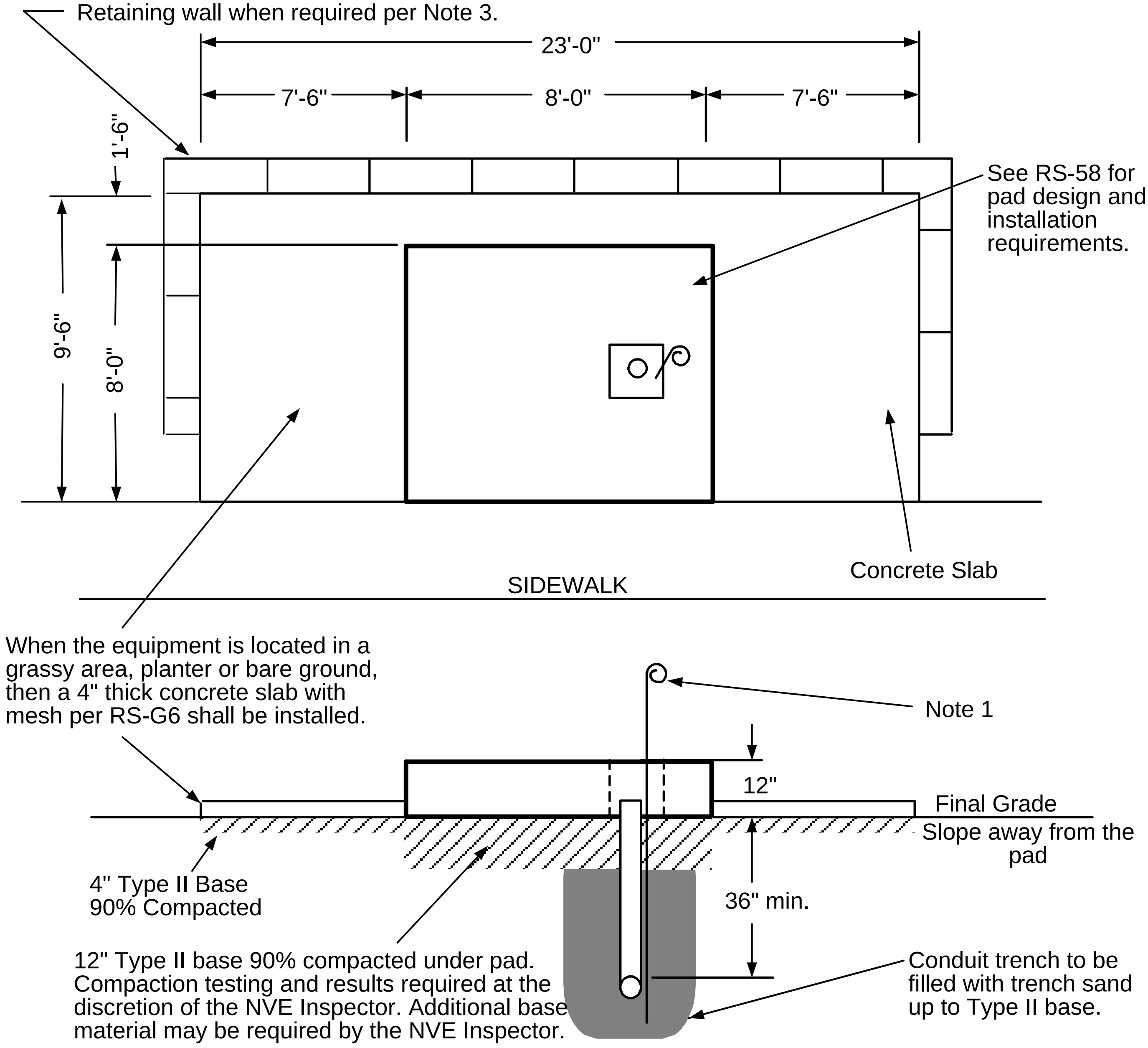
NV Energy				Electric Service Requirements	RS-7
				12kV Capacitor Bank Pad Placement: Adjacent to Sidewalk	
Drawn:	Eng:	Appr:	Date:		Revision: 3
MP	DB	DA	3/21		Page 1 of 2

NOTES:

1. Grounding by customer shall be 2-50’ #2-7 stranded bare copper ground wires laid in the bottom of the conduit trench in opposite directions with 2-5’ tails above the pad opening.
2. For location and clearances to other structures, see RS-13 to RS-28 and RS-5.
3. Retaining wall required when grade from bottom of pad rises or lowers more than 1’ in 5’ horizontally. See RS-5 for details.
4. Required easement:

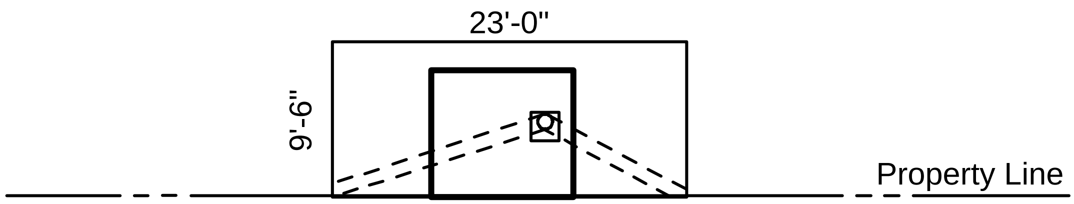


INSTALLATION REQUIREMENTS



NOTES:

1. Grounding by customer shall be 2-50’ #2-7 stranded bare copper ground wires laid in the bottom of the conduit trench in opposite directions with 2-5’ tails above the pad opening.
2. For location and clearances to other structures, see RS-13 to RS-28 and RS-5.
3. Retaining wall required when grade from bottom of pad rises or lowers more than 1’ in 5’ horizontally. See RS-5 for details.
4. Required easement:

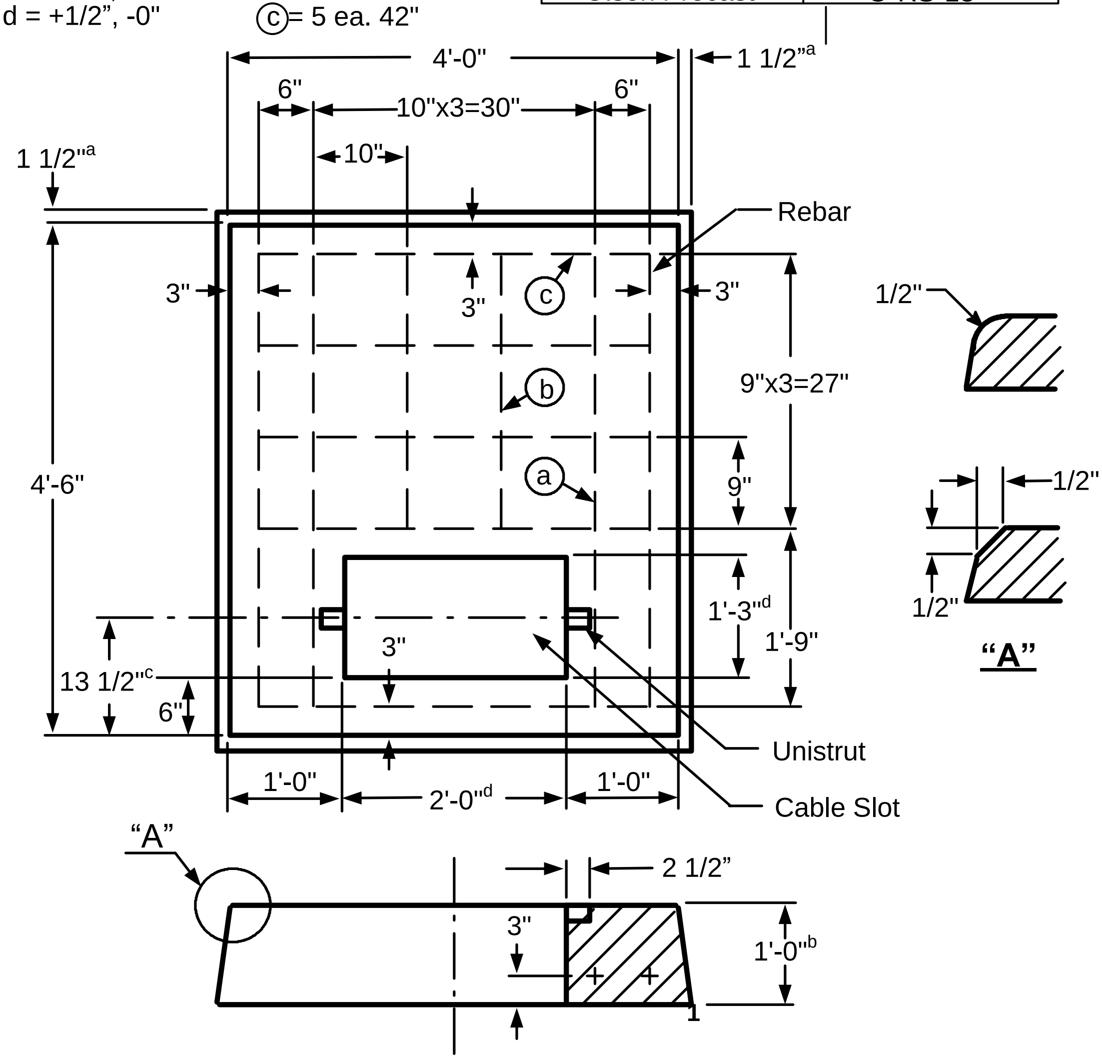


DESIGN REQUIREMENTS

TOLERANCES:
a = +0", -1 1/2"
b = +1/4", -0"
c = +1/2", -1/2"
d = +1/2", -0"

REBAR SCHEDULE:
a = 4 ea. 48"
b = 2 ea. 27"
c = 5 ea. 42"

APPROVED STRUCTURE	
MANUFACTURER	PAD
Jensen Precast	J-RS-13
Olson Precast	O-RS-13



RS-13, RS-19, AND RS-28 TRANSFORMER PADS

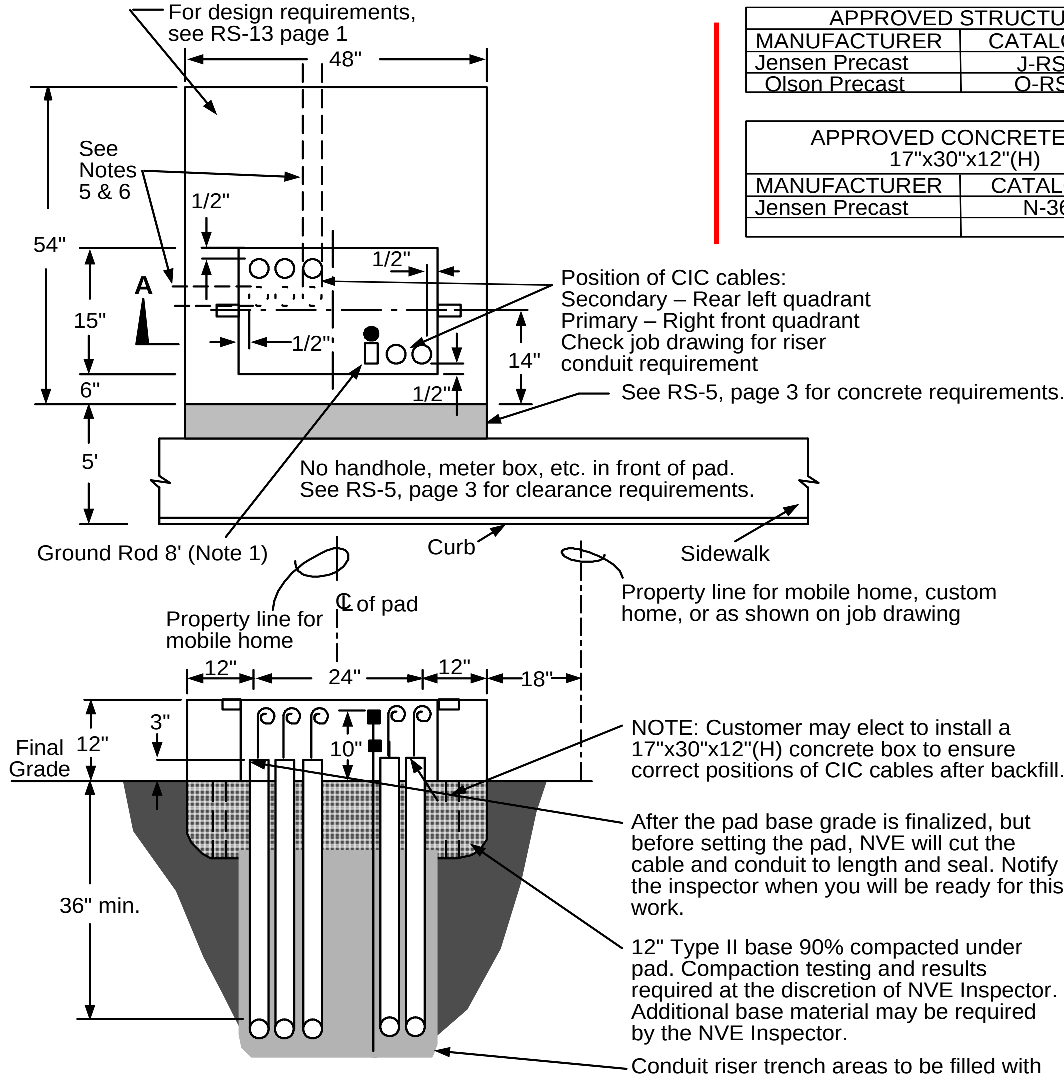
NOTES:

1. Rebar shall be a minimum #4 and placed into the above drawing according to the rebar schedules.
2. Pad unistruts shall be hot dip galvanized steel type P2000HG x 2-1/2”.
3. Pad cable slot shall be 15” x 24”.
4. Pad shall meet RS-G2 and RS-G3.

INSTALLATION REQUIREMENTS

APPROVED STRUCTURE	
MANUFACTURER	CATALOG NO.
Jensen Precast	J-RS-13
Olson Precast	O-RS-13

APPROVED CONCRETE BOX 17"x30"x12"(H)	
MANUFACTURER	CATALOG NO.
Jensen Precast	N-36



SECTION "A"

NOTES:

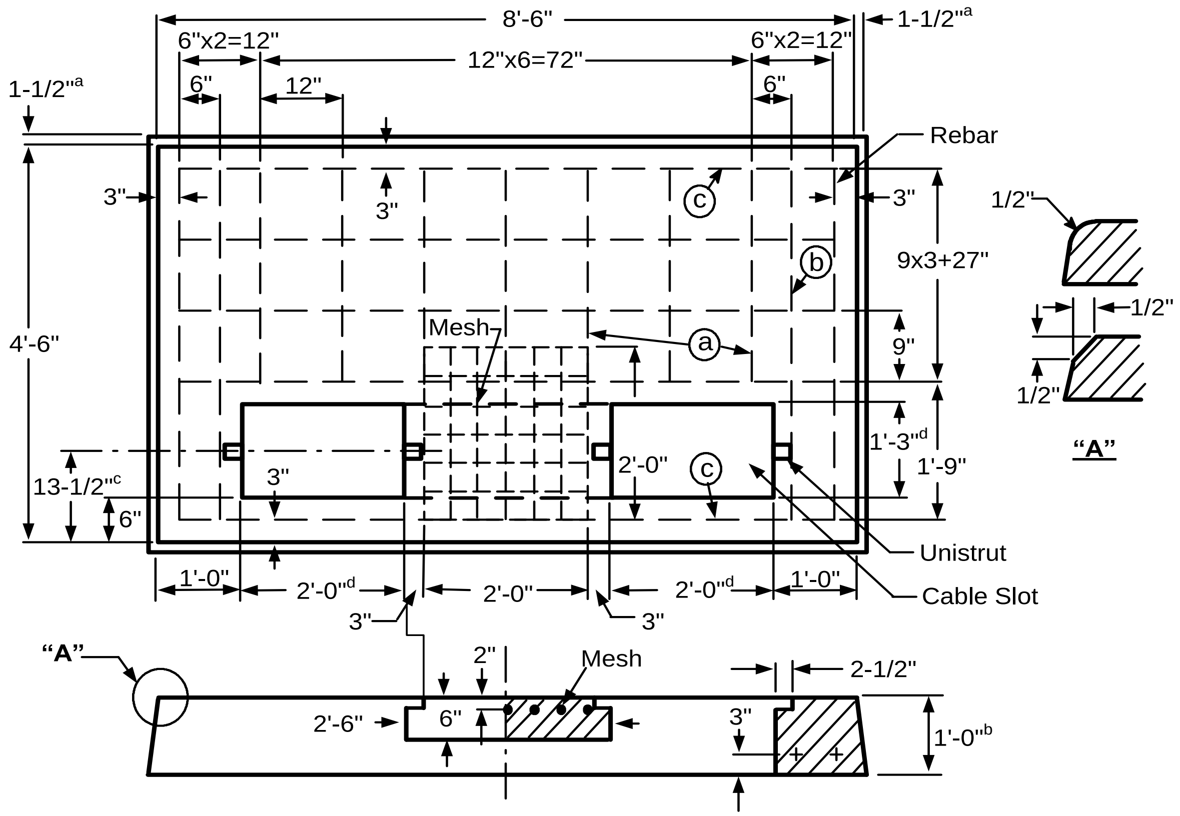
1. Ground rod per UT-113 or UT-213 by NVE. (Qty. 1 – ½" x 8' Rod)
2. Grounding in accordance with the latest edition/revision of the NESC.
3. For additional location and clearance requirements to other structures, see RS-5.
4. Retaining wall required when grade from bottom of pad rises or lowers more than 1' in 5' horizontally. See RS-5 for details.
5. Telephone and cable TV ground wires and clamps shall be installed by them.
6. 3" stubouts must be installed for future homes. Stubouts must clear pad by 6". Depth marker must be installed to locate 3" stubout.
7. 4" DB 60 PVC for 500 kcmil triplex, if required.
8. Stubouts for future services must be placed in front of other services.
9. The top of the pad shall be leveled and must clear the final grade by 12".

DESIGN REQUIREMENTS

TOLERANCES:
a = +0", -1 1/2"
b = +1/4", -0"
c = +1/2", -1/2"
d = +1/2", -0"

REBAR SCHEDULE:
a = 7 ea. 27"
b = 4 ea. 48"
c = 5 ea. 96"

APPROVED STRUCTURE	
MANUFACTURER	PAD
Jensen Precast	J-RS-14



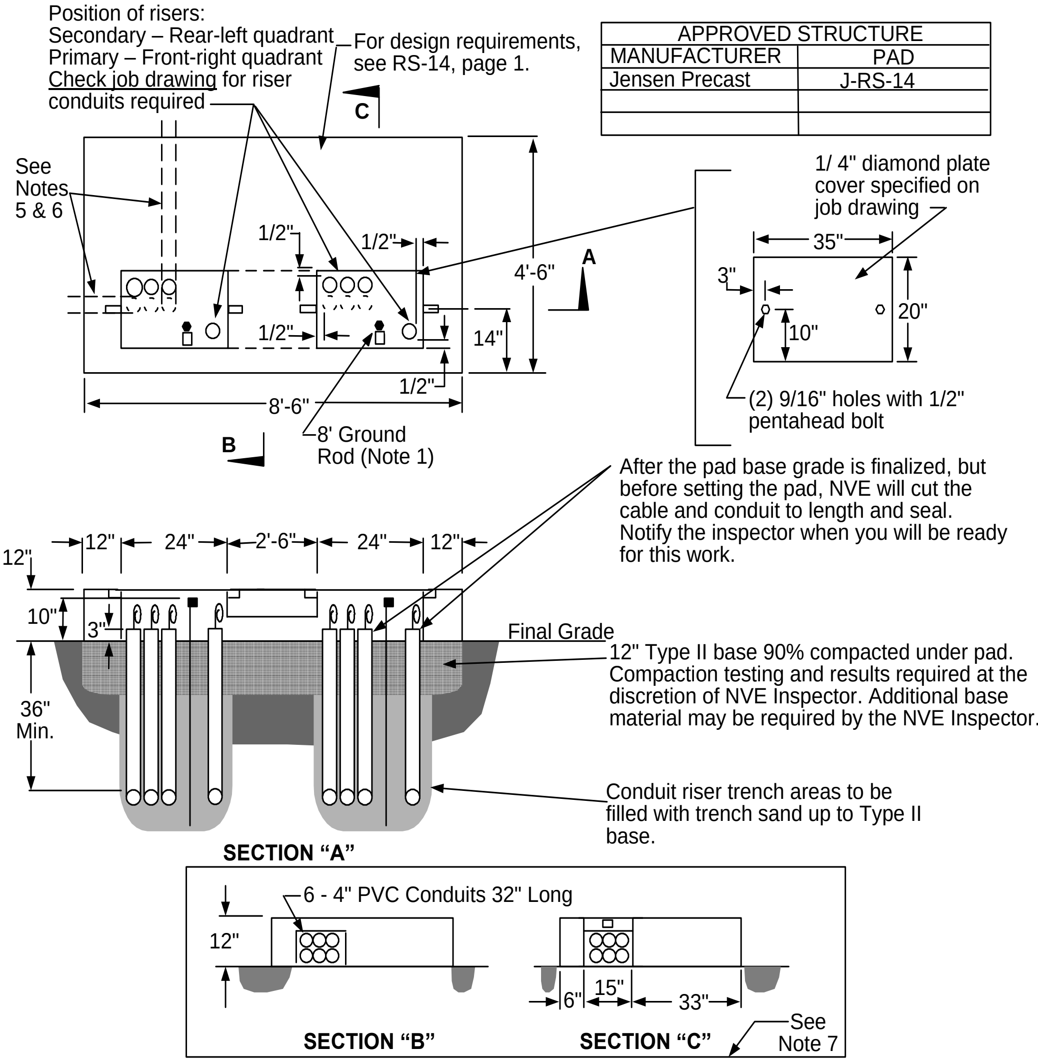
RS-14 AND RS-20 TRANSFORMER PADS

NOTES:

1. Rebar shall be a minimum #4 and placed according to the rebar schedules.
2. Mesh shall be welded wire fabric 4x4 – W4.0 x W4.0 and 2’ – 0”x 2’ – 0” square and placed between the two cable slots per above drawing.
3. Pad shall be two Unistruts hot dip galvanized steel type P2000HG x 2 – 1/2”.
4. Pad cable slot shall be two 15” x 24” with a connecting 15” x 6” channel between them.
5. Pad shall meet RS-G2 and RS-G3.

INSTALLATION REQUIREMENTS

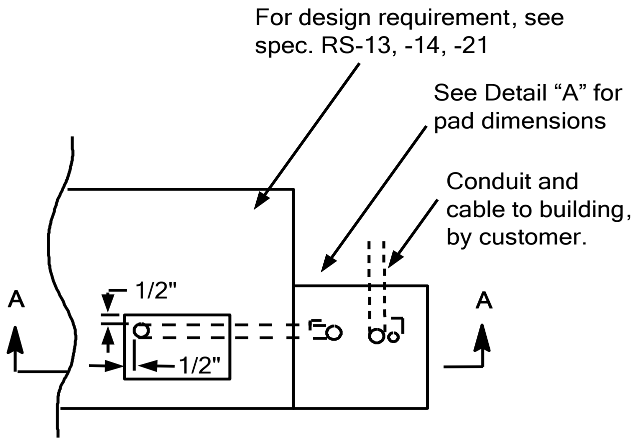
APPROVED STRUCTURE	
MANUFACTURER	PAD
Jensen Precast	J-RS-14



NOTES:

1. Ground rod per UT-114 or UT-214 by NVE. (Qty. 2 – 1/2" x 8' Rod)
2. Grounding in accordance with the latest edition/revision of the NESC.
3. For additional location and clearance requirements to other structures, see RS-5.
4. Retaining wall required when grade from bottom of pad rises or lowers more than 1' in 5' horizontally. See RS-5 for details.
5. Telephone and cable TV ground wires and clamps shall be installed by them.
6. 3" stubouts must be installed for future homes. Stubouts must clear pad by 6". Depth marker must be installed to locate 3" stubout.
7. 4" DB PVC for 500 kcmil triplex, if required.
8. Both sections "B" and "C" are pour-in-place pads only.
9. Stubouts for future services must be placed in front of other services.
10. The top of the pad shall be leveled and must clear the final grade by 12".

INSTALLATION REQUIREMENTS

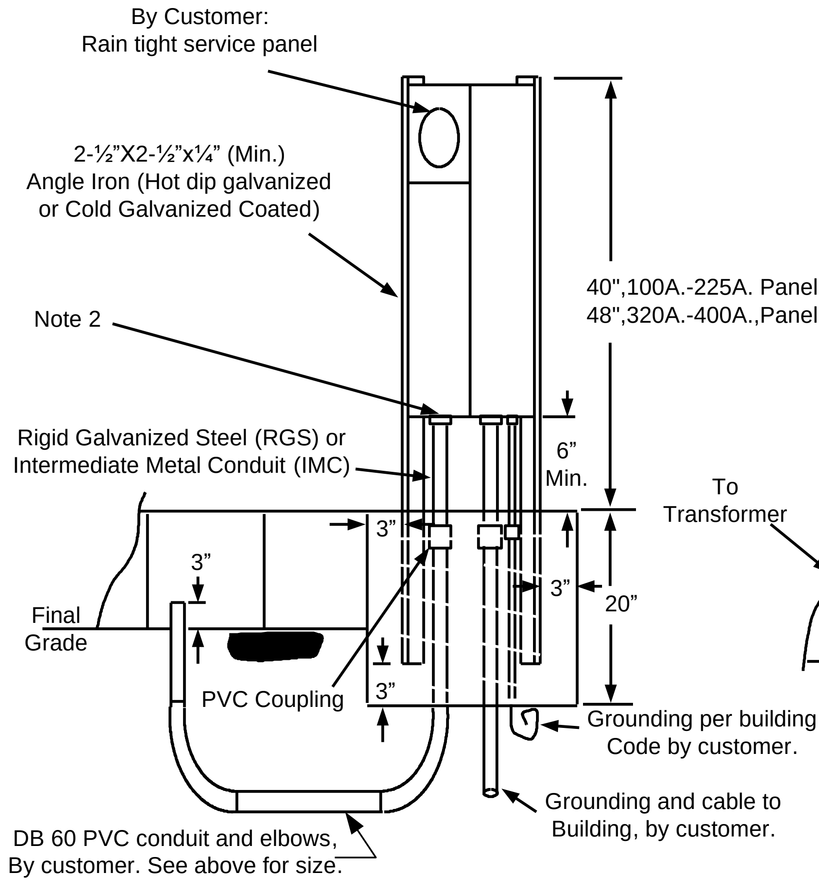


By Customer: **Commercial:**
1. Conduit and cable per building code.
2. Connections at service panel.
3. Pin Terminals for cables larger than 500 kcmil to reduce wire size to 500 kcmil at the transformer.

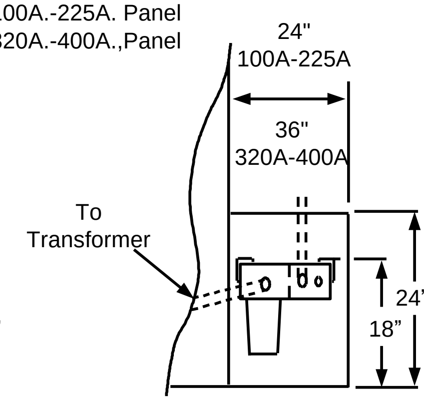
Residential:
DB 60 PVC conduit with approved pull string:
1. 100A -225A. panel: 2" conduit, 9-1/2" min. radius elbow
2. 320A.-400A. panel: 3" conduit, 13" min. radius elbows

By NVE: **Commercial:**
1. Meter
2. Connections at transformer.

Residential:
1. Meter
2. Cable and connections.



Section A-A



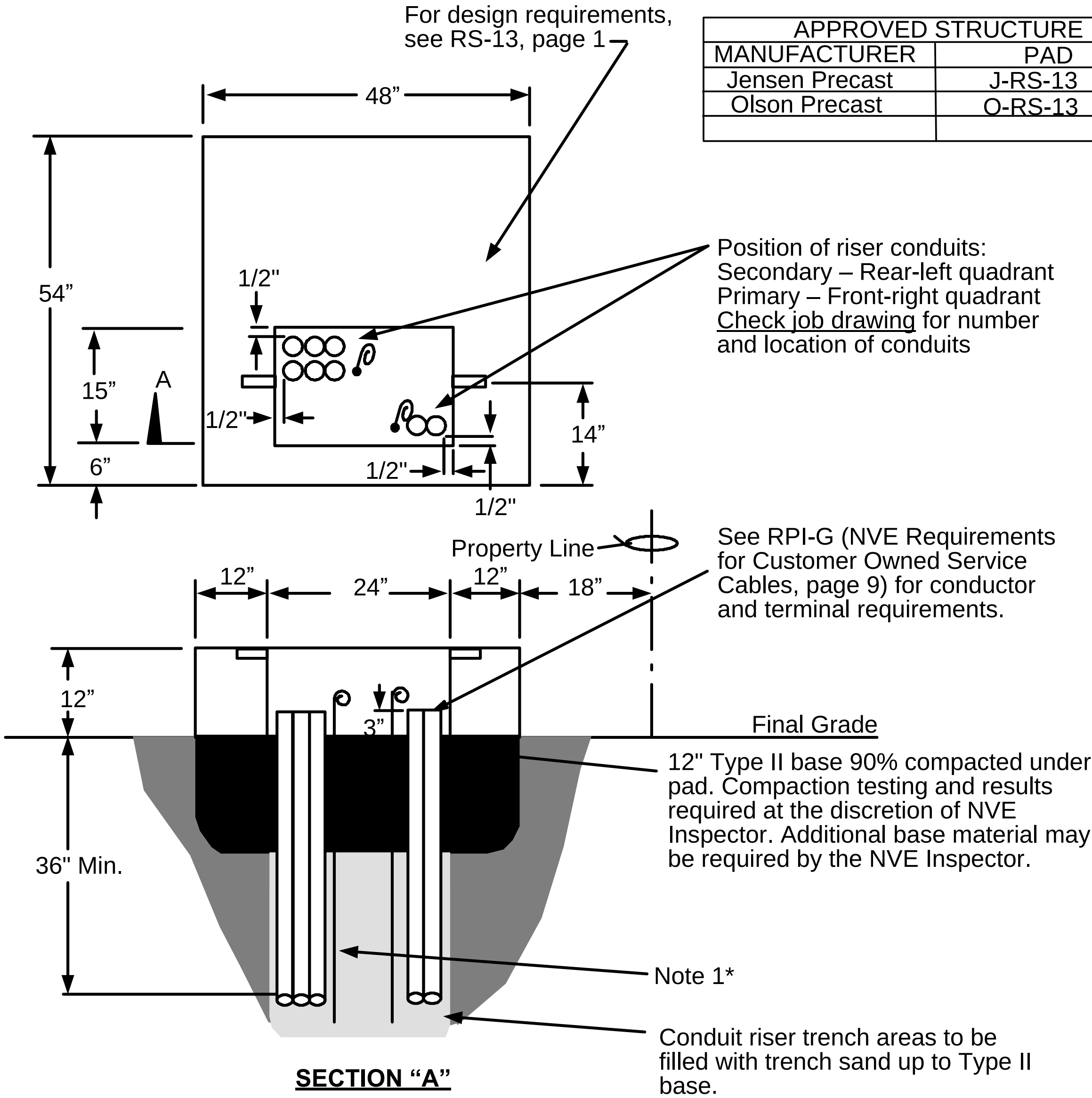
Detail "A"

NOTES:

1. All installations shall meet the City, County, or State building codes.
2. A hub or grounding jumper is required for proper grounding of the conduit. A hub is the preferred method.
3. For location and clearance to other structures see RS-5 and RPI-2.
4. Poured in place pad requirements:
   A. Concrete mix shall be class 6C 3000 per Clark County requirements.
   B. Top of pad to be smooth and level with ½" bevel on all outer edges.
5. Retaining wall required when grade from bottom of pad rises or lowers more than 1' in 5' horizontally. See RS-5 for details.
6. **DESIGNER:**
   A. This installation is used to serve a customer, having up to a 400A 1Ø panel, who does not want his meter panel on the building. Up to 200 amps, a single meter pedestal per RPM-7 and RS-70 may be used. The transformer(s) is NOT DEDICATED to this customer.
   B. In conjunction with this specification, you must also call out a transformer pad Installation spec. (RS-13, 14, 19, 20, or RS-21).
   C. In dedicated transformer application, no additional tools or materials are needed.
7. The top of the pad shall be leveled and must clear the final grade by 12".

INSTALLATION REQUIREMENTS

APPROVED STRUCTURE	
MANUFACTURER	PAD
Jensen Precast	J-RS-13
Olson Precast	O-RS-13



NOTES:

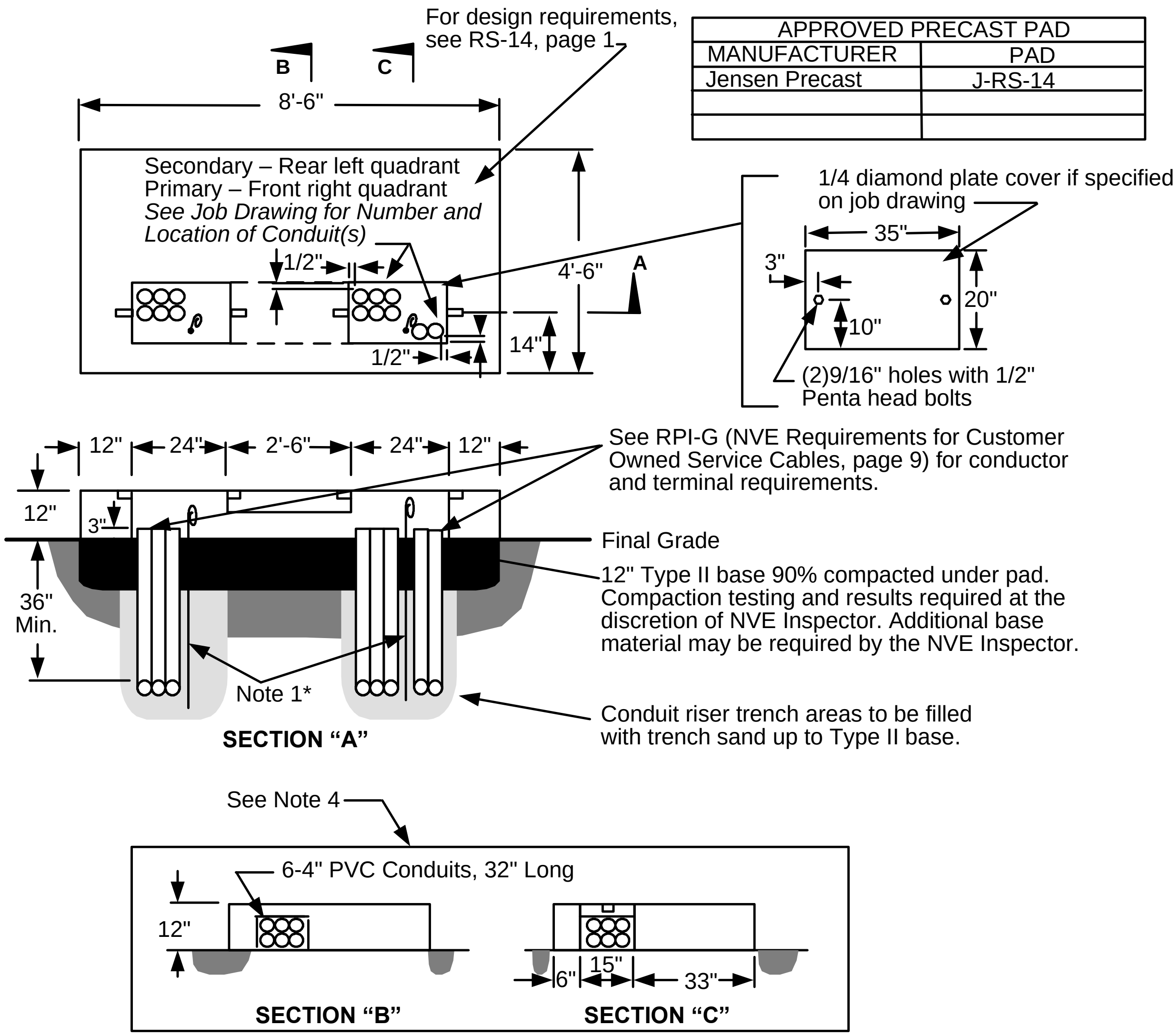
1. Grounding by customer shall be 2-50’ #2 stranded bare copper ground wires laid in the bottom of the conduit trench in opposite directions with 2-5’ tails in the pad opening.
2. For location and clearances to other structures, see: RS-5.
3. Retaining wall required when grade from bottom of pad rises or lowers more than 1’ in 5’ horizontally. See RS-5 for details.
4. Only at the discretion of NVE’s inspectors, a ½”x8’ copper ground rod can be installed.

***Grounding in accordance with the latest edition/revision of the NESC.**

THIS PAGE INTENTIONALLY LEFT BLANK

INSTALLATION REQUIREMENTS

APPROVED PRECAST PAD	
MANUFACTURER	PAD
Jensen Precast	J-RS-14



NOTES:

1. Grounding by customer shall be 2 - 50' #2-7 stranded bare copper ground wires laid in the bottom of the conduit trench in opposite directions with 2 - 5' tails in the pad opening.
2. For location and clearances to other structures, see: RS-5.
3. Retaining wall required when grade from bottom of pad rises or lowers more than 1' in 5' horizontally. See RS-5 for details.
4. Sections "B" and "C" are for pour-in-place pads only.
5. The top of the pad shall be leveled and must clear the final grade by 12".

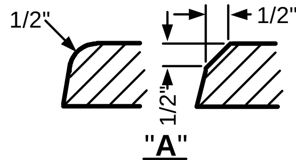
Only at the discretion of NVE's inspectors and T&D Standards, a ½"x8' copper ground rod can be installed in accordance with the latest edition/revision of the NESC.

THIS PAGE INTENTIONALLY LEFT BLANK

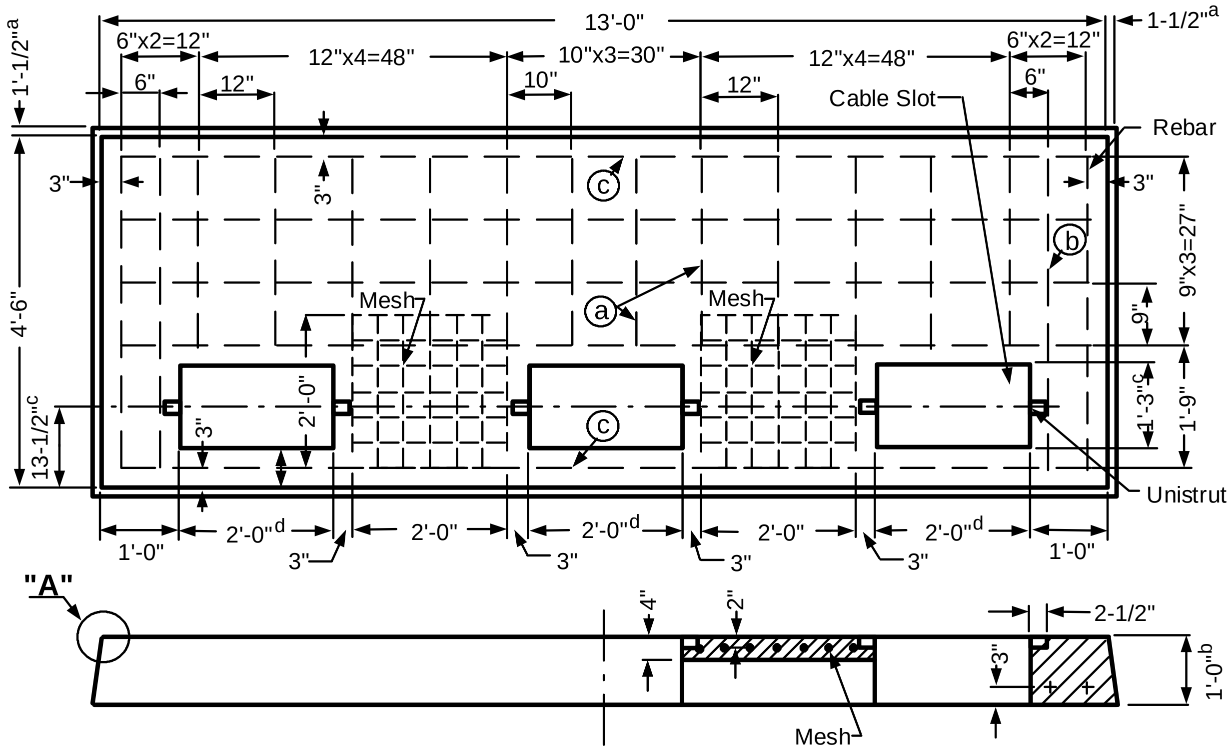
DESIGN REQUIREMENTS

TOLERANCES:
a = +0", -1 1/2"
b = +1/4", -0"
c = +1/2", -1/2"
d = +1/2", -0"

REBAR SCHEDULE:
a = 12 ea. 27"
b = 4 ea. 48"
c = 5 ea. 150"



APPROVED PRECAST PAD	
MANUFACTURER	PAD
Jensen Precast	J-RS-21

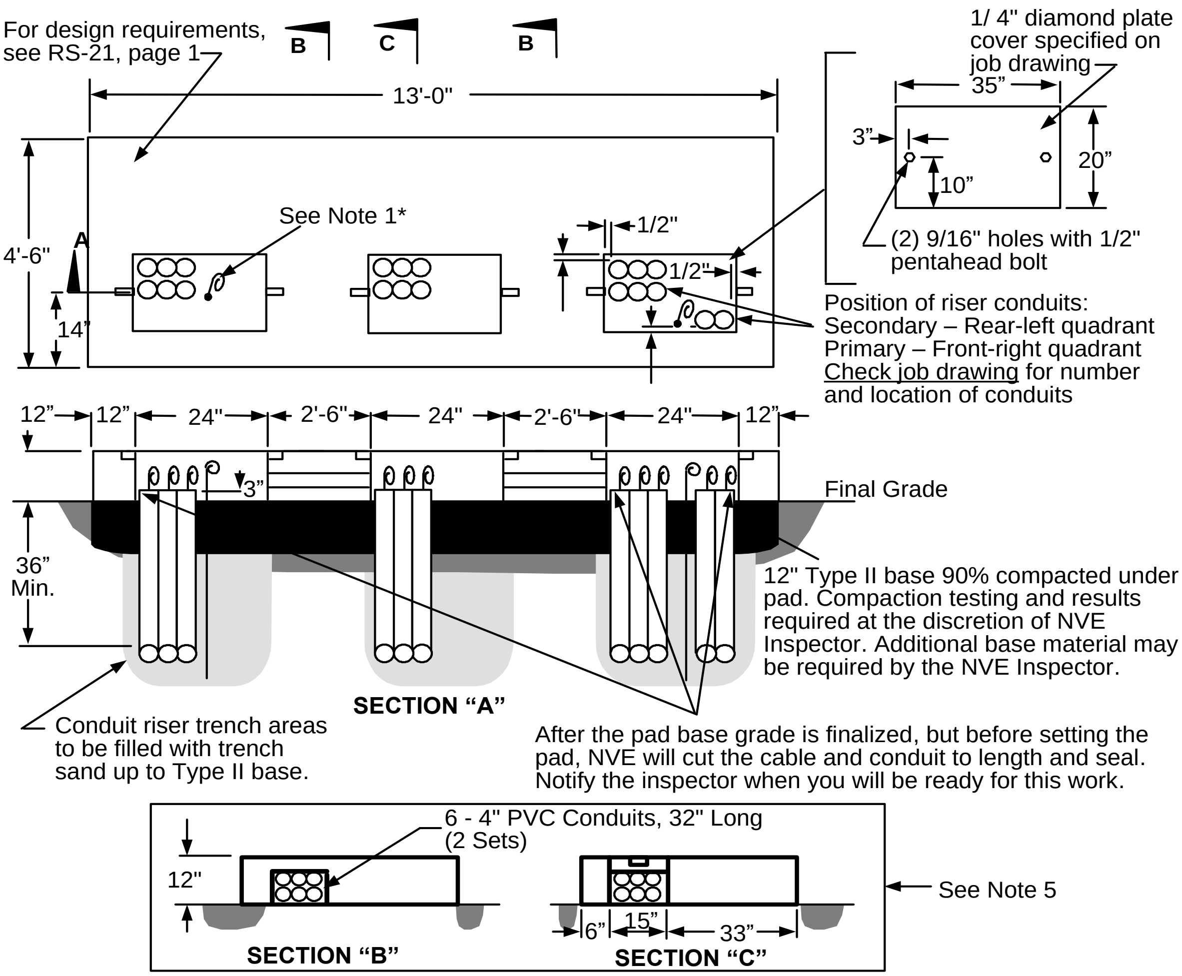


RS-21 TRANSFORMER PAD

1. Rebar
   - A. Minimum #4
   - B. Placed into the above drawing according to the rebar schedule.
2. Mesh
   - A. Welded wire fabric 4x4-W4.0xW4.0, and 2’-0”x2’-0” square.
   - B. Placed between the two cable slots.
3. Pad
   - A. Two Unistruts hot dip galvanized steel type P2000HGx2-1/2”.
   - B. Three 15”x24” cable slots.
   - C. Shall meet RS-G2 and RS-G3.

INSTALLATION REQUIREMENTS

APPROVED PRECAST PAD	
MANUFACTURER	PAD
Jensen Precast	J-RS-21



NOTES:

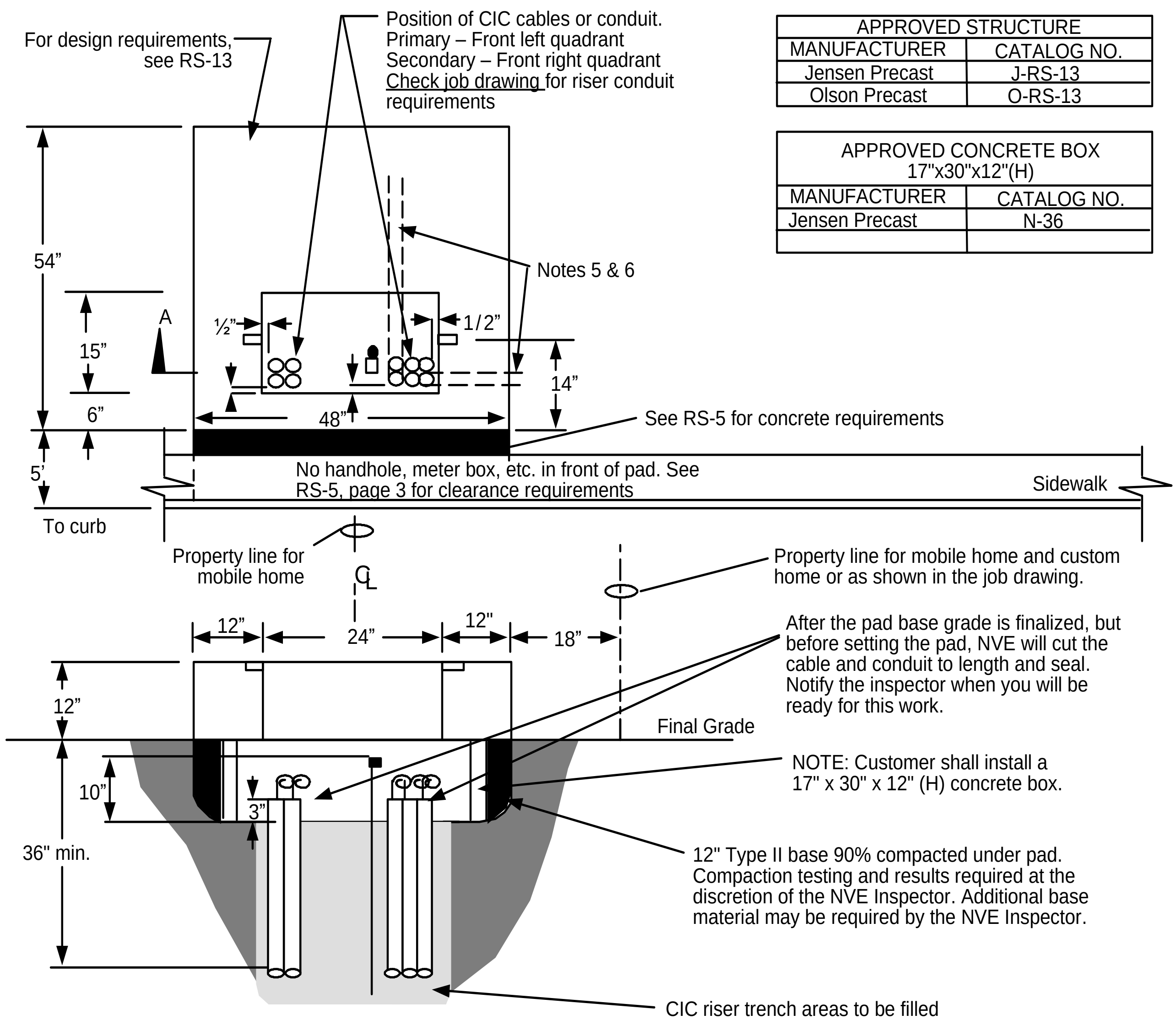
1. Grounding by customer shall be 2-50’ #2-7 stranded bare copper ground wires laid in the bottom of the conduit trench in opposite directions with 2-5’ tails in the pad opening.
2. For location and clearances to other structures, see RS-5.
3. Retaining wall required when grade from bottom of pad rises or lowers more than 1’ in 5’ horizontally. See RS-5 for details.
4. Telephone and cable TV ground wires and clamps installed by them.
5. Sections “B” and “C” are for pour-in-place pads only.
6. The top of the pad shall be leveled and must clear the final grade by 12”.

* Only at the discretion of NVE’s inspectors and T&D Standards, a ½”x8’ copper ground rod can be installed in accordance with the latest edition/revision of the NESC.

INSTALLATION REQUIREMENTS

APPROVED STRUCTURE	
MANUFACTURER	CATALOG NO.
Jensen Precast	J-RS-13
Olson Precast	O-RS-13

APPROVED CONCRETE BOX 17"x30"x12"(H)	
MANUFACTURER	CATALOG NO.
Jensen Precast	N-36



SECTION “A”

NOTES:

1. Ground rods per UT-121, by NVE. (Qty. 2 – ½” x 8’ Rod)
2. Grounding in accordance with the latest edition/revision of the NESC.
3. For location and clearances to other structures, see RS-5.
4. Retaining wall required when grade from bottom of pad rises or lowers more than 1’ in 5’ horizontally. See RS-5 for details.
5. Telephone and cable TV ground wires and clamps shall be installed by them.
6. 3” stubouts must be installed for future homes. Stubouts must clear pad by 6”. Depth marker must be installed to locate 3” stubout.
7. 4” DB 60 PVC for 500 kcmil triplex, if required.
8. Stubouts for future services must be placed in front of the other services.

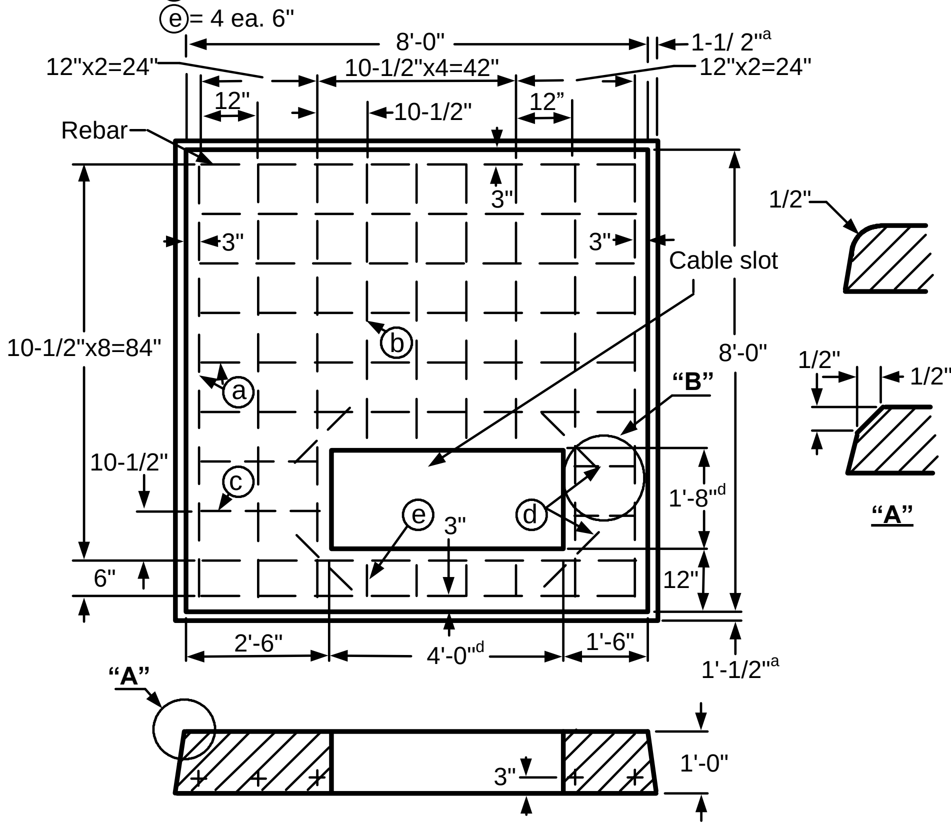
THIS PAGE INTENTIONALLY LEFT BLANK

DESIGN REQUIREMENTS

TOLERANCES:
a = +0", -1-1/2"
b = +1/4”, -0"
c = +0", -1/4"
d = +1/2”, -0”

REBAR SCHEDULE:
a = 13 ea. 90"
b = 4 ea. 58"
c = 2 ea. 24"
d = 6 ea. 12"
e = 4 ea. 6"

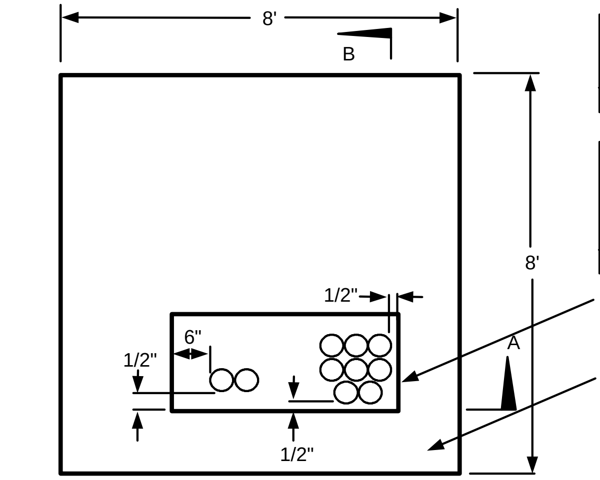
APPROVED PADS	
MANUFACTURER	PAD
Jensen Precast	J-RS-35



RS-35, RS-40, AND RS-41 TRANSFORMER PADS

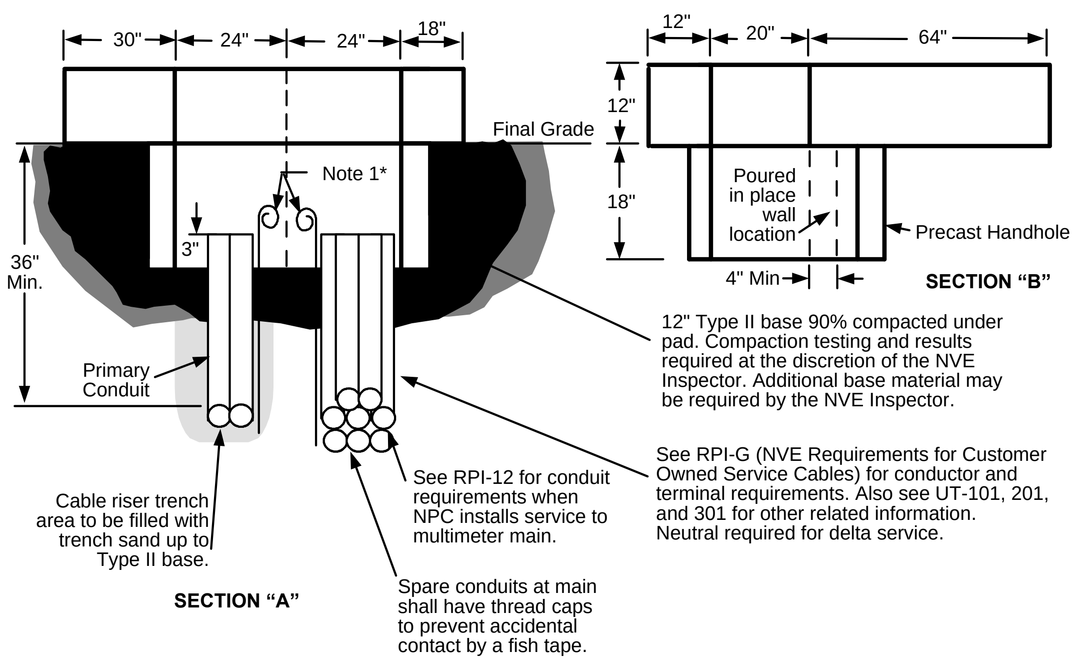
1. Rebar
   A. Minimum #4
   B. Placed into the above drawing according to the rebar schedule.
2. Pad
   A. A 20” x 48” cable slot.
   B. Shall meet RS-G2 and RS-G3.
3. Only the RSI-36 Pad
   A. Two 2-1/2” x 2-1/2” x 1/4” min. x 66” hot dip galvanized steel angle.
   B. A 1” diameter PVC ell with a minimum radius of 5-3/4”.
   C. A 1” diameter PVC coupling.

INSTALLATION REQUIREMENTS



APPROVED PRECAST PAD	
MANUFACTURER	CATALOG NO.
Jensen Precast	J-RS-35

APPROVED HANDHOLE 30" x 48" x 18"	
MANUFACTURER	CATALOG NO.
Jensen Precast	3048-18



NOTES:

1. Grounding by customer shall be 2-50' #2-7 stranded bare copper ground wires laid in the bottom of the conduit trench in opposite directions with 2-5' tails in the pad opening.
2. For location and clearances to other structures, see RS-5.
3. Retaining wall required when grade from bottom of pad rises or lowers more than 1' in 5' horizontally. See RS-5 for details.
4. All secondary conduits shall be located within 24" of the right side of the pad opening. The maximum number of secondary conduits can be up to 16.
5. The top of the pad shall be leveled and must clear the final grade by 12".

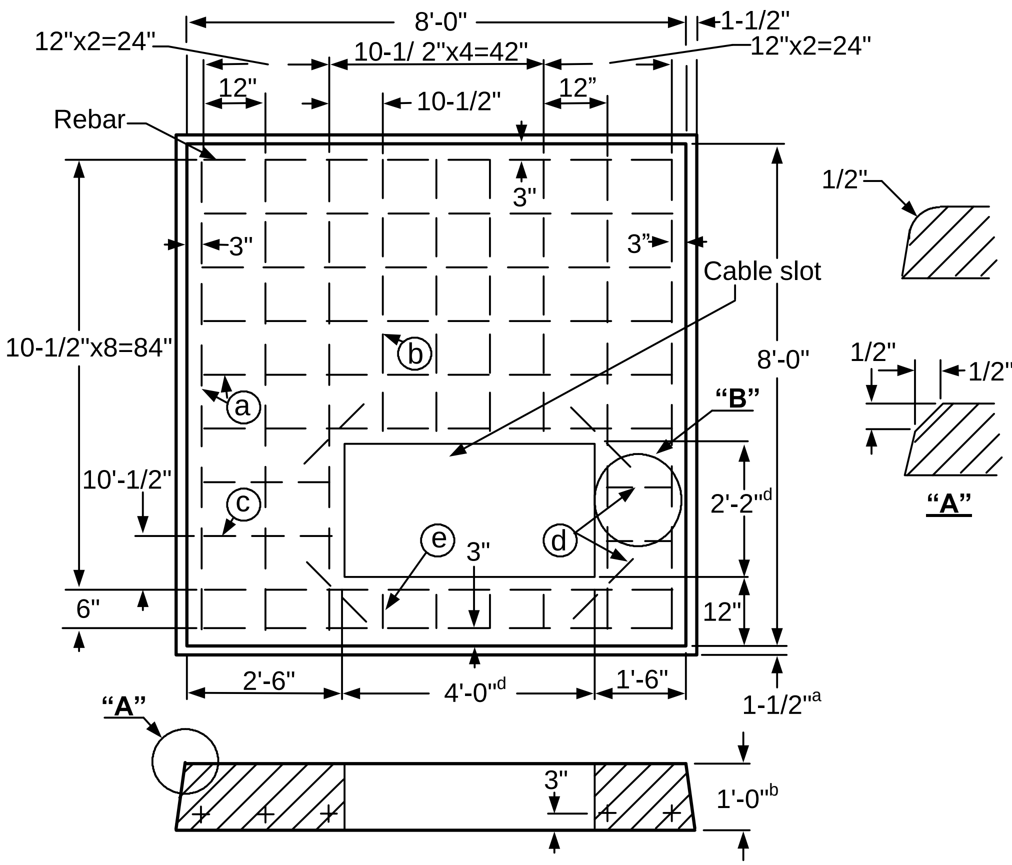
* Only at the discretion of NVE's inspectors and T&D Standards, a ½"x8' copper ground rod can be installed in accordance with the latest edition/revision of the NESC.

DESIGN REQUIREMENTS

TOLERANCES:
a = +0", -1-1/2"
b = +1/4", -0"
c = +0", -1/4"
d = +1/2", -0"

REBAR SCHEDULE:
a = 13 ea. 90"
b = 4 ea. 53"
c = 2 ea. 24"
d = 6 ea. 12"
e = 4 ea. 6"

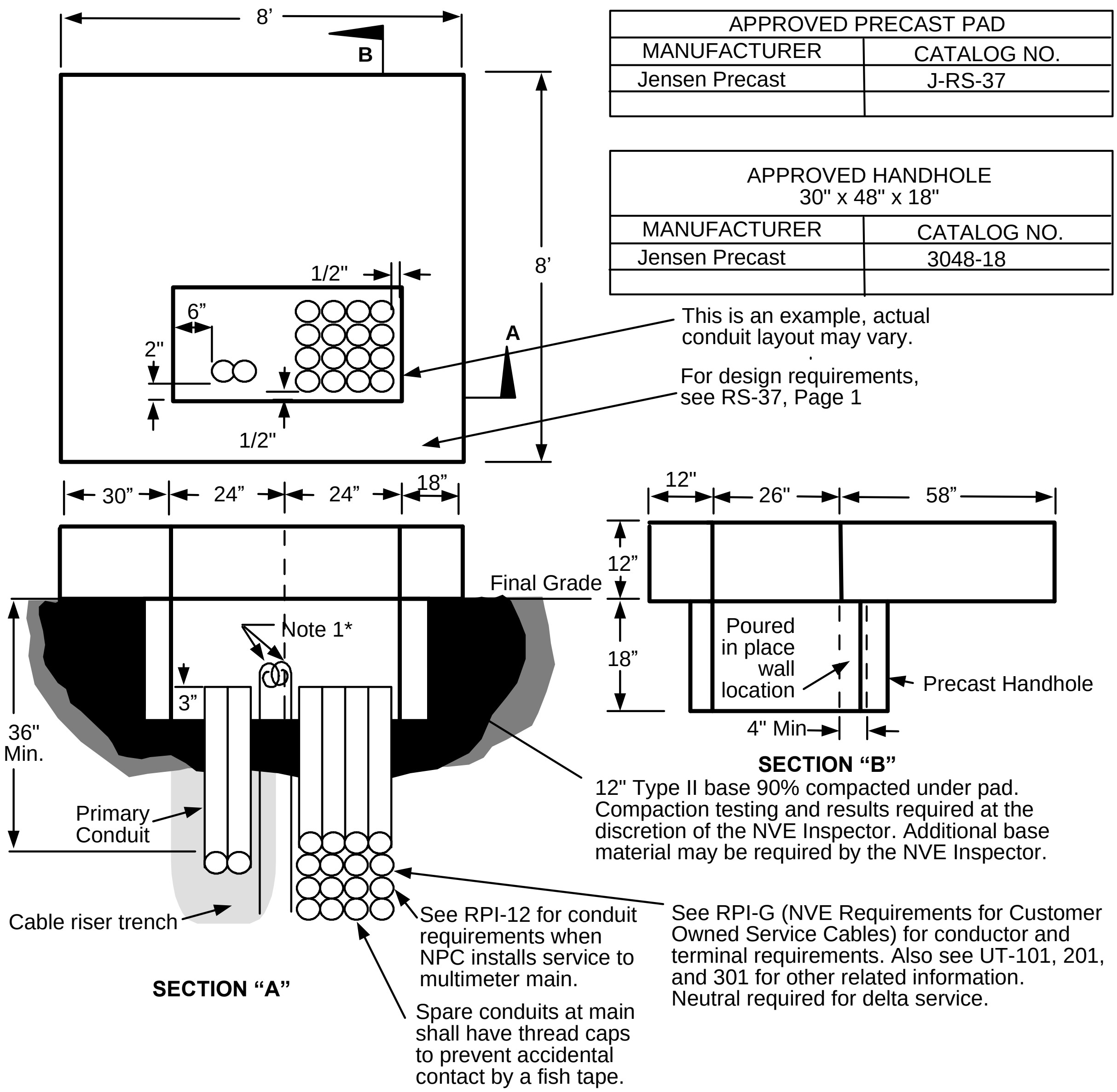
APPROVED PADS	
MANUFACTURER	PAD
Jensen Precast	J-RS-37



RS-37 TRANSFORMER PAD

1. Rebar
   A. Minimum #4
   B. Placed into the above drawing according to the rebar schedule.
2. Pad
   A. A 26” x 48” cable slot.
   B. Shall meet RS-G2 and RS-G3.
3. Only the RSI-39 Pad
   A. Two 2-1/2” x 2-1/2” x 1/4” min. x 66” hot dip galvanized steel angle.
   B. A 1” diameter PVC ell with a minimum radius 5-3/4”.
   C. A 1” diameter PVC coupling.

INSTALLATION REQUIREMENTS



APPROVED PRECAST PAD	
MANUFACTURER	CATALOG NO.
Jensen Precast	J-RS-37

APPROVED HANDHOLE 30" x 48" x 18"	
MANUFACTURER	CATALOG NO.
Jensen Precast	3048-18

NOTES:

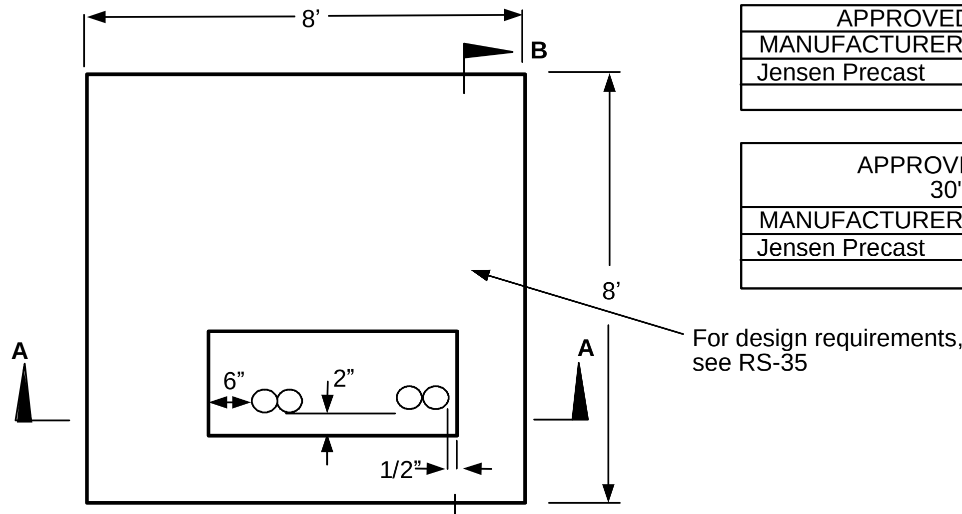
1. Grounding by customer shall be 2-50’ #2 stranded bare copper ground wires laid in the bottom of the trench in opposite directions with 2-5’ tails in the pad opening.
2. For location and clearances to other structures, see RS-5.
3. Retaining wall required when grade from bottom of pad rises or lowers more than 1’ in 5’ horizontally. See RS-5 for details.
4. All secondary conduits shall be located within 24” of the right side of the pad opening. The maximum number of secondary conduits can be up to 20.
5. The top of the pad shall be leveled and must clear the final grade by 12”.

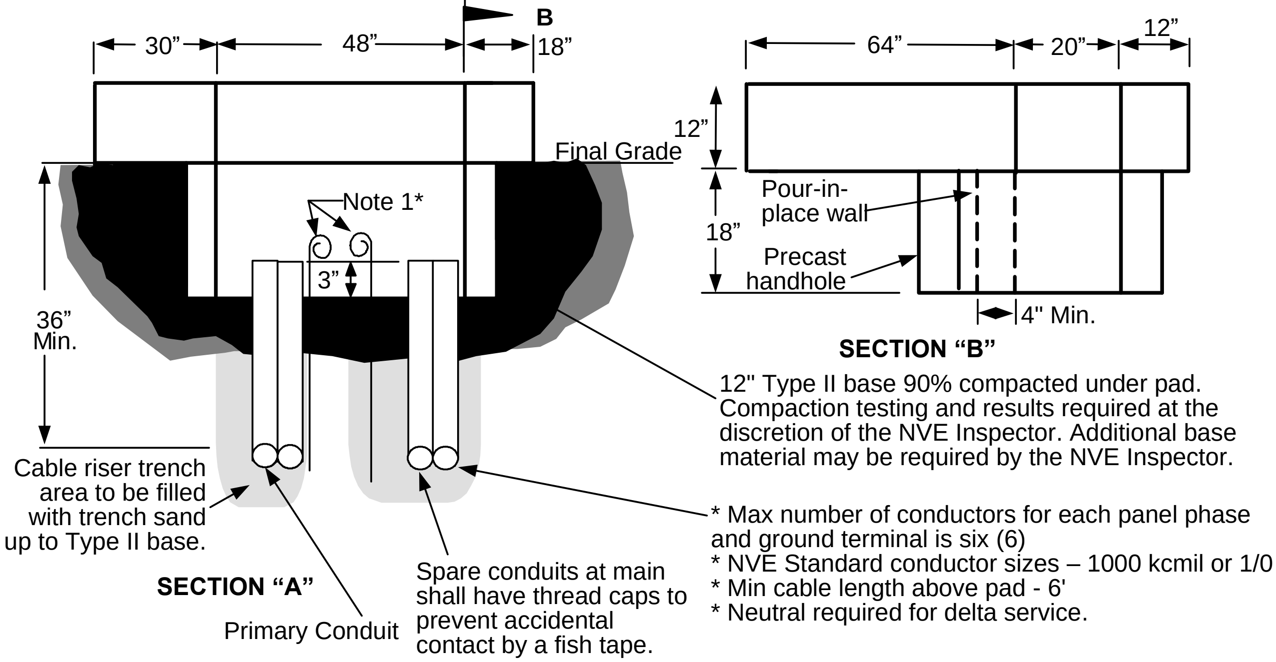
* *Only at the discretion of NVE's inspectors and T&D Standards, a ½"x8' copper ground rod can be installed in accordance with the latest edition/revision of the NESC.*

INSTALLATION REQUIREMENTS

APPROVED PRECAST PAD	
MANUFACTURER	CATALOG NO.
Jensen Precast	J-RS-35

APPROVED HANDHOLE 30"x48"x18"	
MANUFACTURER	CATALOG NO.
Jensen Precast	3048-18





NOTES:

1. Grounding by customer shall be 2-50’ #2-7 stranded bare copper ground wires laid in the bottom of the conduit trench in opposite directions with 2-5’ tails in the pad opening.
2. For location and clearances to other structures, see RS-5.
3. Retaining wall required when grade from bottom of pad rises or lowers more than 1’ in 5’ horizontally. See RS-5 for details.
4. All secondary conduits shall be located within 24” of the right side of the pad opening.
5. The top of the pad shall be leveled and must clear the final grade by 12”.

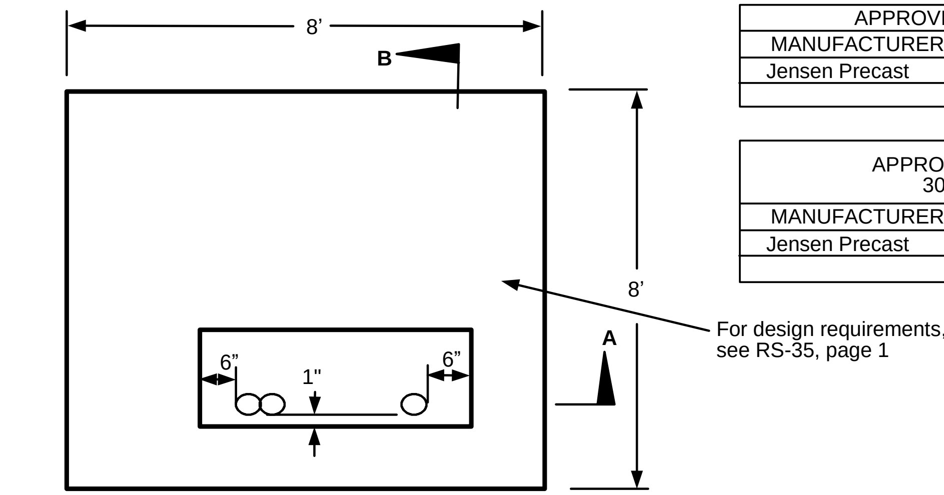
* Only at the discretion of NVE’s inspectors, a ½”x8’ copper ground rod can be installed in accordance with the latest edition/revision of the NESC.

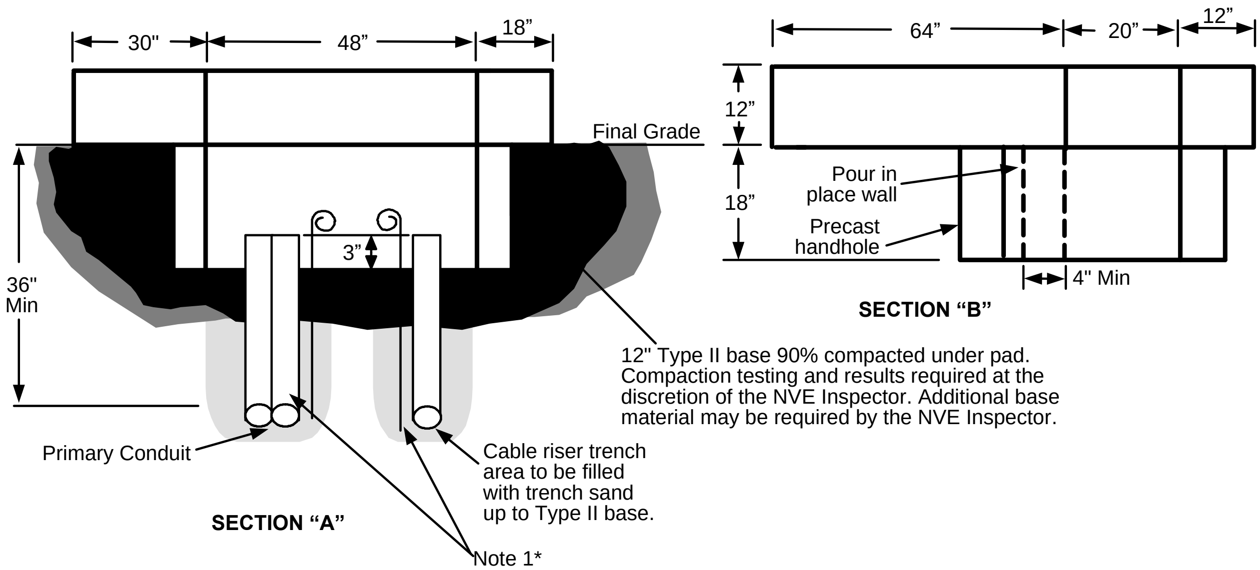
THIS PAGE INTENTIONALLY LEFT BLANK

Installation Requirements

APPROVED PRECAST PAD	
MANUFACTURER	CATALOG NO.
Jensen Precast	J-RS-35

APPROVED HANDHOLE 30" x 48" x 18"	
MANUFACTURER	CATALOG NO.
Jensen Precast	3048-18





NOTES:

1. Grounding by customer shall be 2-50’ #2-7 stranded bare copper ground wires laid in the bottom of the conduit trench in opposite directions with 2-5’ tails in the pad opening.
2. For location and clearances to other structures, see RS-5.
3. Retaining wall required when grade from bottom of pad rises and lowers more than 1’ in 5’ horizontally. See RS-5 for details.
4. All secondary conduits shall be located within 24” of the right side of the pad opening.
5. The top of the pad shall be leveled and must clear the final grade by 12”.

* Only at the discretion of NVE’s inspectors, a ½”x8’ copper ground rod can be installed in accordance with the latest edition/revision of the NESC.

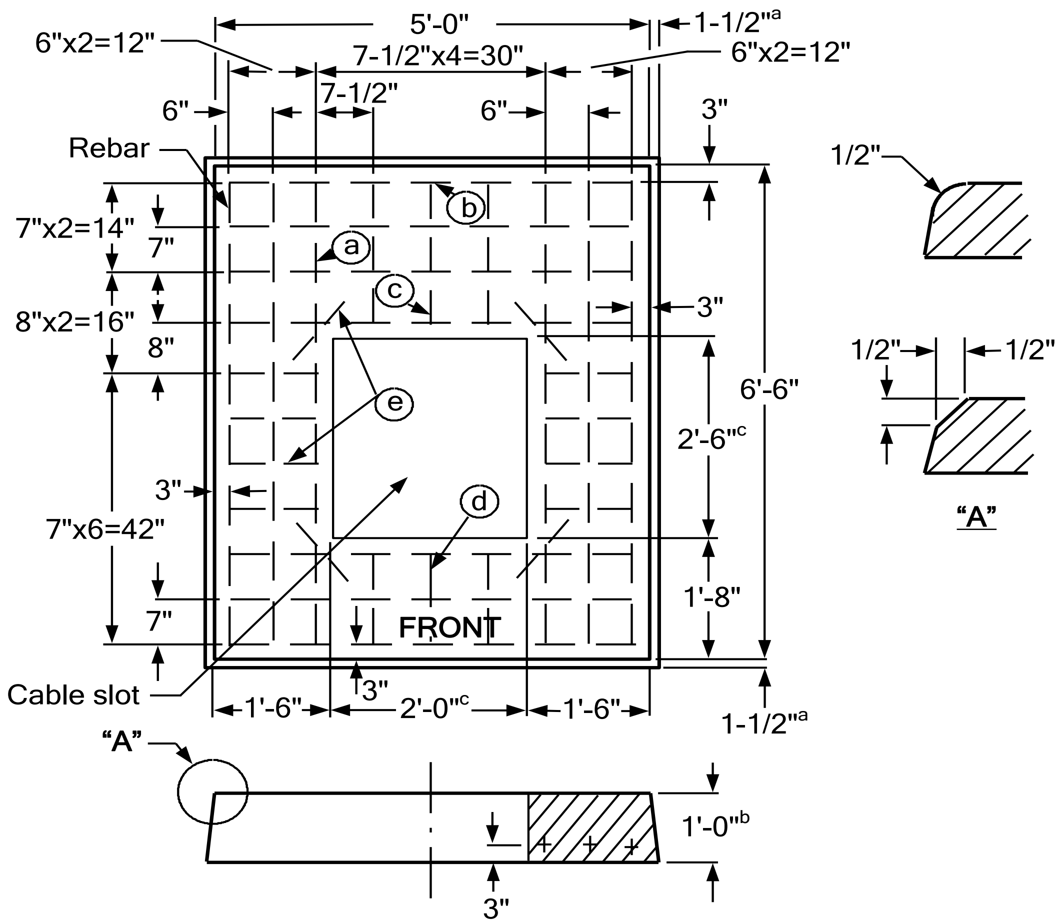
THIS PAGE INTENTIONALLY LEFT BLANK

DESIGN REQUIREMENTS

TOLERANCES:
a = +0", -1-1/2"
b = +1/4", -0"
c = +1/2", -0"

REBAR SCHEDULE:
a = 6 ea. 72"
b = 7 ea. 54"
c = 3 ea. 22"
d = 3 ea. 14"
e = 12 ea. 12"

APPROVED PADS	
MANUFACTURER	PAD
Jensen Precast	J-RS-45



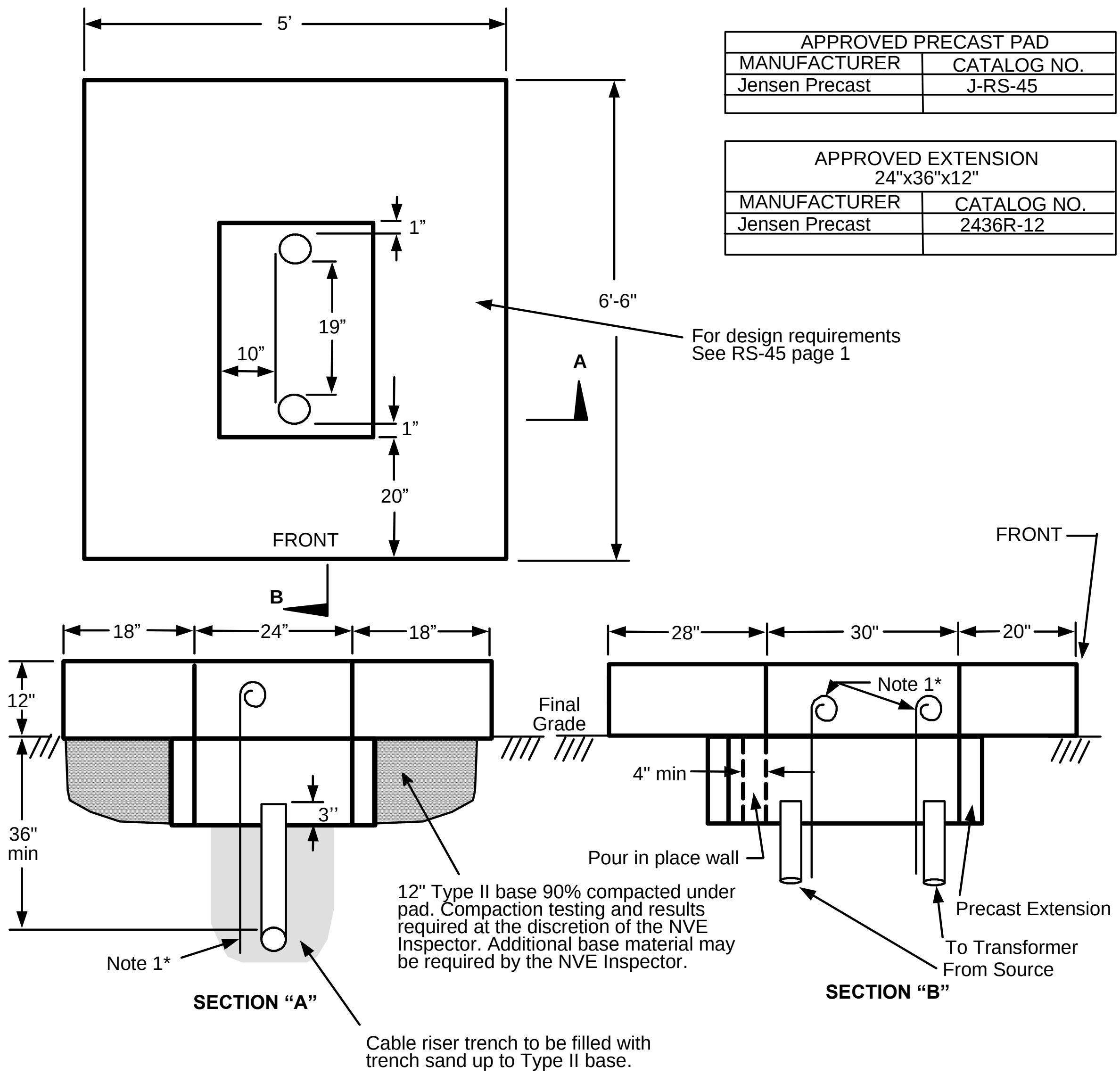
RS-45 CABINET PAD

1. Rebar
   - A. Minimum #4
   - B. Placed into the above drawing according to the rebar schedules.
2. Pad
   - A. A 24” x 30” cable slot.
   - B. Have the word “Front” embossed on the top of the pad as shown.
   - C. Shall meet RS-G2 and RS-G3.

Installation Requirements

APPROVED PRECAST PAD	
MANUFACTURER	CATALOG NO.
Jensen Precast	J-RS-45

APPROVED EXTENSION 24"x36"x12"	
MANUFACTURER	CATALOG NO.
Jensen Precast	2436R-12



NOTES:

1. Grounding by customer shall be 2-50' #2-7 stranded bare copper ground wires laid in the bottom of the conduit trench in opposite directions with 2-5' tails in the pad opening.
2. For location and clearances to other structures, see: RS-5.
3. Retaining wall required when grade from bottom of pad rises or lowers more than 1' in 5' horizontally. See RS-5 for details.
4. All secondary conduits shall be located within 24" of the right side of the pad opening.
5. The top of the pad shall be leveled and must clear the final grade by 12".

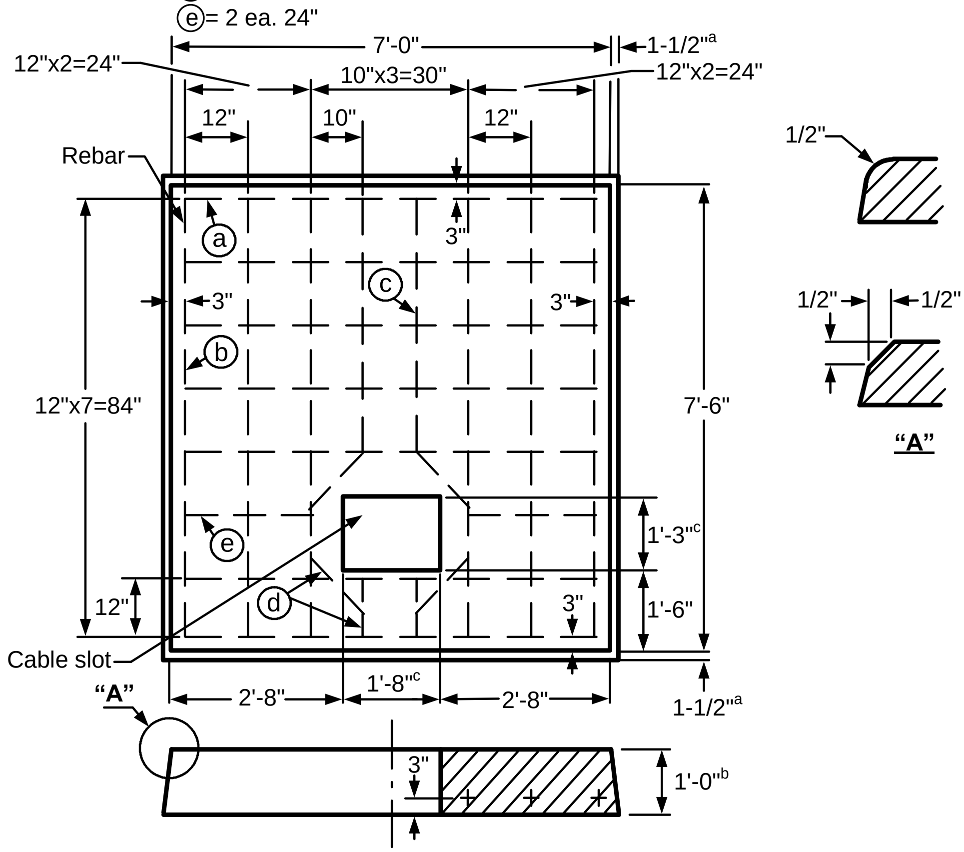
* Only at the discretion of NVE's inspectors, a ½"x8' copper ground rod can be installed in accordance with the latest edition/revision of the NESC.

DESIGN REQUIREMENTS

TOLERANCES:
a = +0", -1-1/2"
b = +1/4", -0"
c = +1/2", -0"

REBAR SCHEDULE:
a = 7 ea. 78"
b = 6 ea. 84"
c = 2 ea. 48"
d = 6 ea. 12"
e = 2 ea. 24"

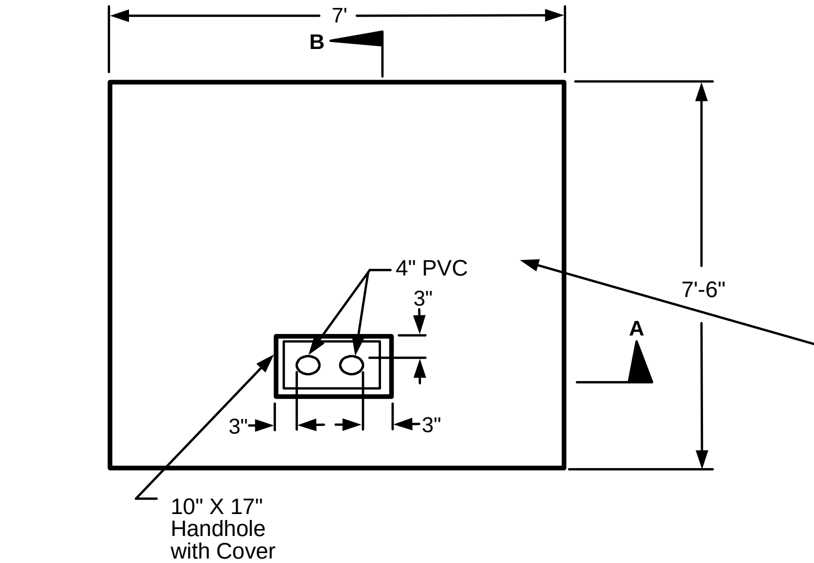
APPROVED PADS	
MANUFACTURER	PAD
Jensen Precast	J-RS-46
Olson Precast	O-RS-46



RS-46 CABINET PAD

1. Rebar
   A. Minimum #4
   B. Placed into the above drawing according to the rebar schedule.
2. Pad
   A. A 15” x 20” cable slot.
   B. Shall meet RS-G2 and RS-G3.

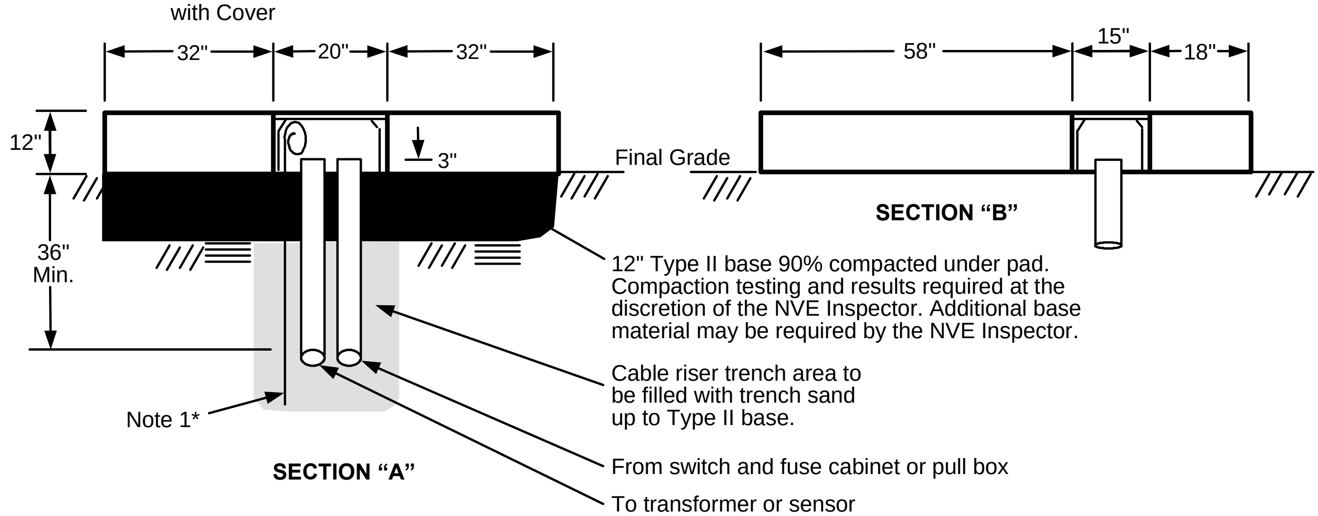
INSTALLATION REQUIREMENTS



APPROVED PRECAST PAD	
MANUFACTURER	CATALOG NO.
Jensen Precast	J-RS-46
Olson Precast	O-RS-46

APPROVED HANDHOLE 10" x 17"	
MANUFACTURER	CATALOG NO.
Jensen Precast	N9

For design requirements, see RS-46, Page 1



NOTES:

1. Grounding by customer shall be 2-50' #2-7 stranded bare copper ground wires laid in the bottom of the conduit trench in opposite directions with 2-5' tails in the pad opening.
2. For location and clearances to other structures, see RS-5.
3. Retaining wall required when grade from bottom of pad rises or lowers more than 1' in 5' horizontally. See RS-5 for details.
4. All secondary conduits shall be located within 24" of the right side of the pad opening.
5. The top of the pad shall be leveled and must clear the final grade by 12".

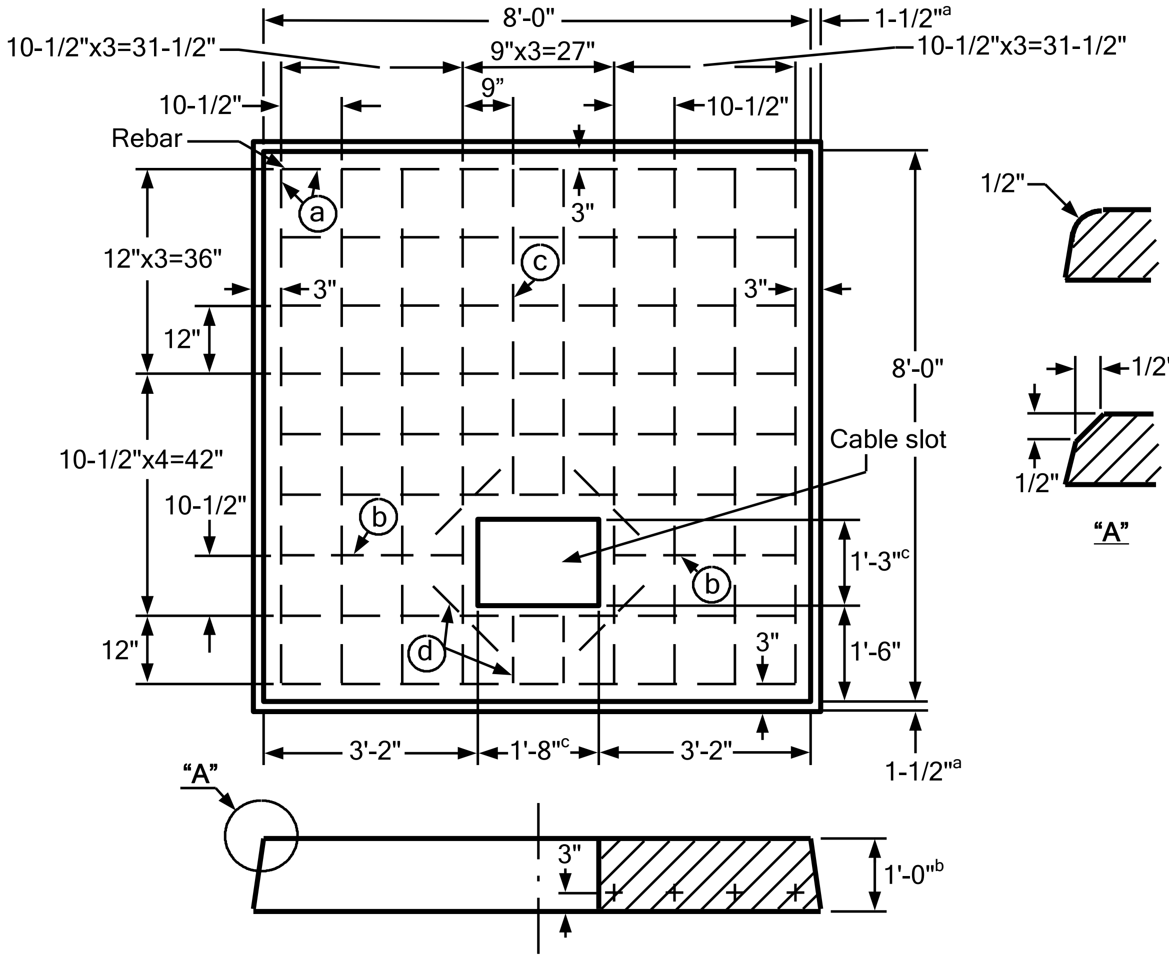
* Only at the discretion of NVE's inspectors, a 1/2" x 8' copper ground rod can be installed in accordance with the latest edition/revision of the NESC.

DESIGN REQUIREMENTS

TOLERANCES:
a = +0", -1-1/2"
b = +1/4", -0"
c = +1/2", -0"

REBAR SCHEDULE:
a = 16 ea. 90"
b = 2 ea. 32"
c = 2 ea. 57"
d = 6 ea. 12"

APPROVED PADS	
MANUFACTURER	PAD
Jensen Precast	J-RS-58



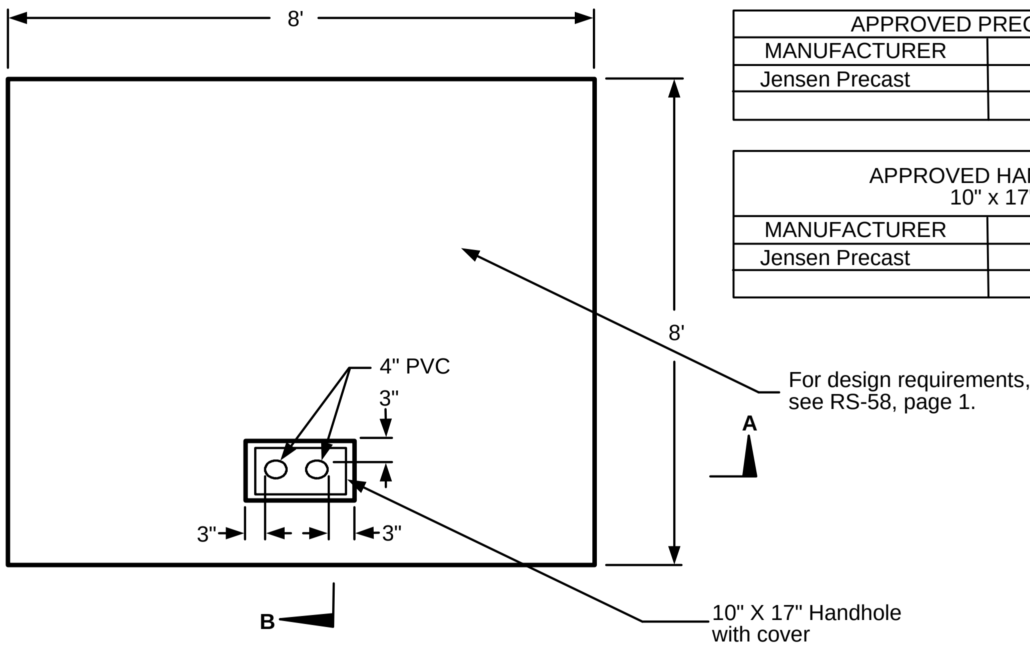
RS-58 CABINET PAD

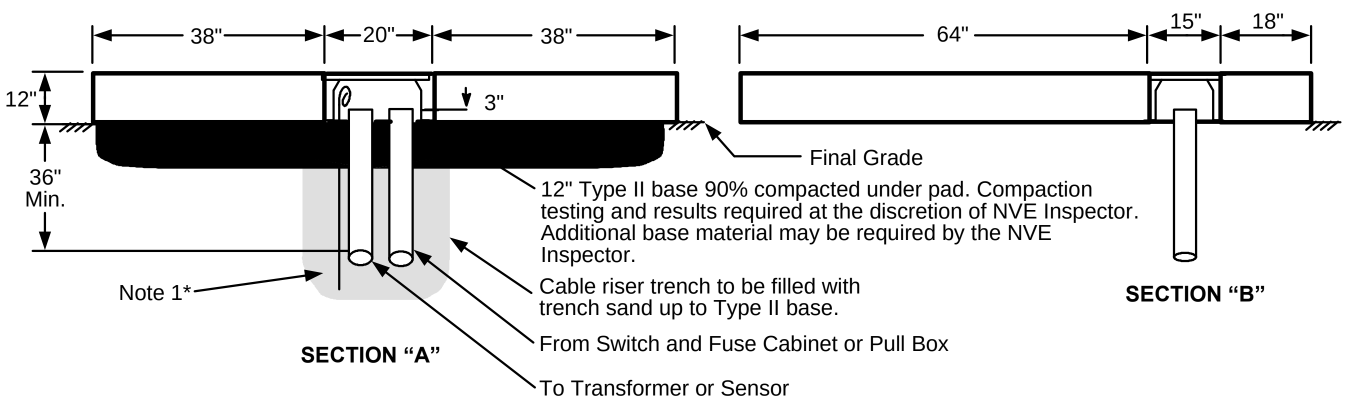
1. Rebar
   A. Minimum #4
   B. Placed into the above drawing according to the rebar schedule.
2. Pad
   A. A 15” x 20” cable slot.
   B. Shall meet RS-G2 and RS-G3.

INSTALLATION REQUIREMENTS

APPROVED PRECAST PAD	
MANUFACTURER	CATALOG NO.
Jensen Precast	J-RS-58

APPROVED HANDHOLE 10" x 17"	
MANUFACTURER	CATALOG NO.
Jensen Precast	N9





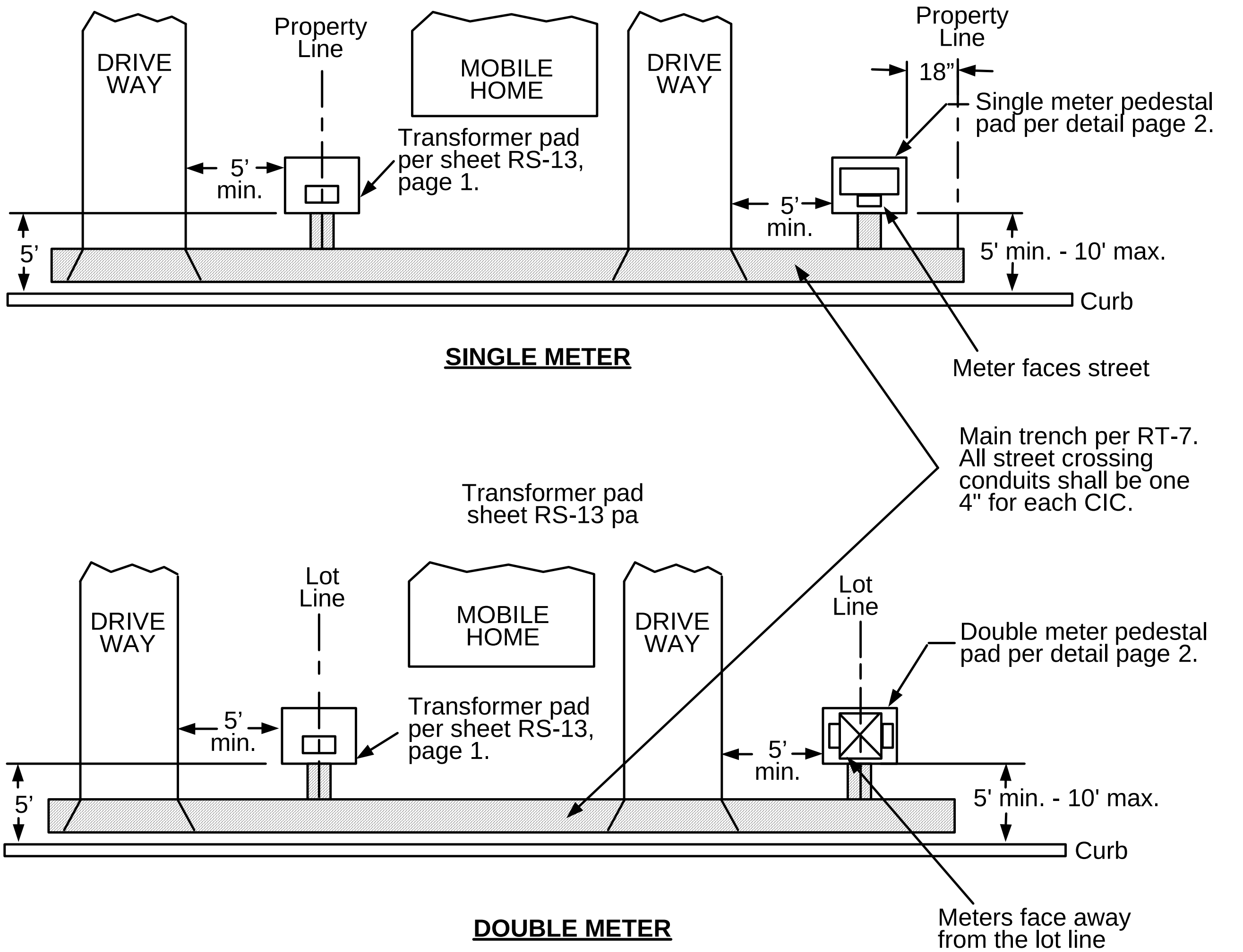
SECTION "A"

SECTION "B"

NOTES:

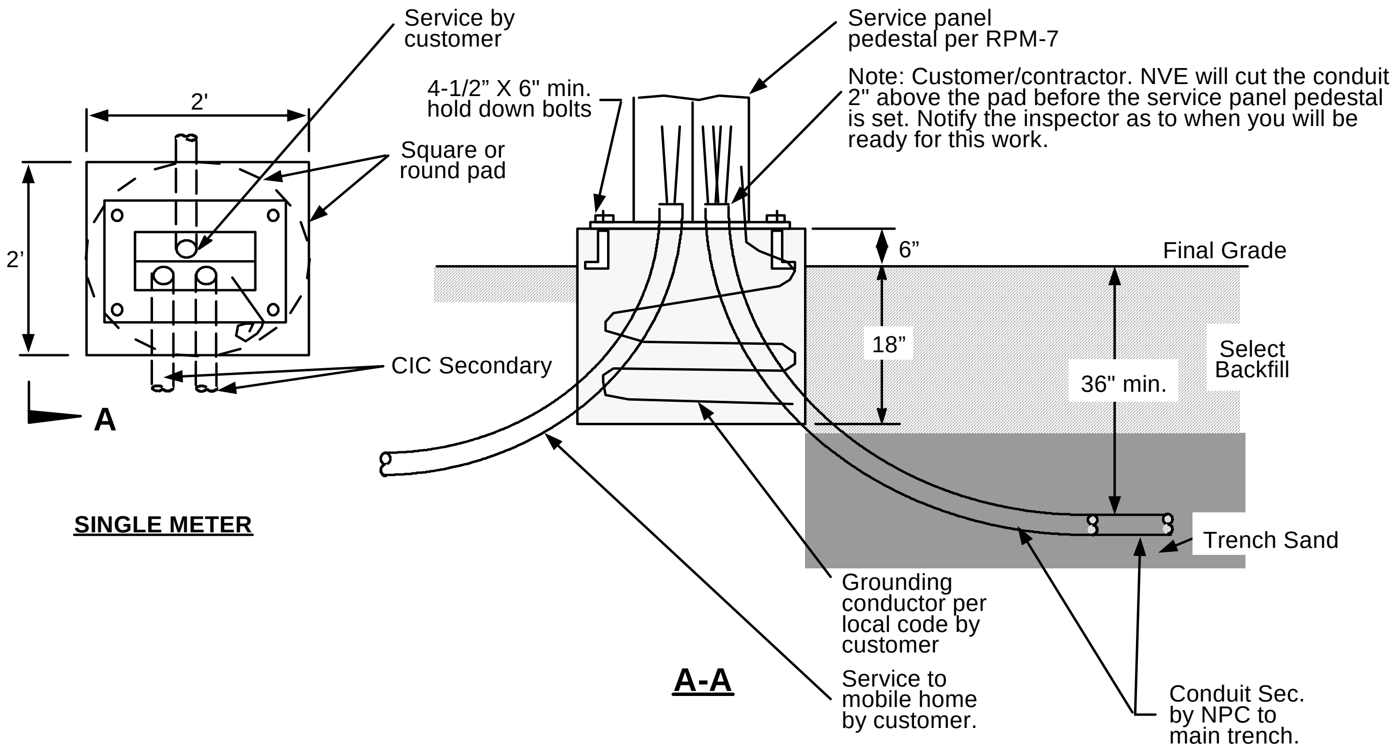
1. Grounding by customer shall be 2-50' #2-7 stranded bare copper ground wires in the bottom of the conduit trench in opposite directions with 2-5' tails in the pad opening.
2. For location and clearances to other structures, see RS-5.
3. Retaining wall required when grade from bottom of pad rises or lowers more than 1' in 5' horizontally. See RS-5 for details.
4. All secondary conduits shall be located within 24" of the right side of the pad.
5. The top of the pad shall be leveled and must clear the final grade by 12".

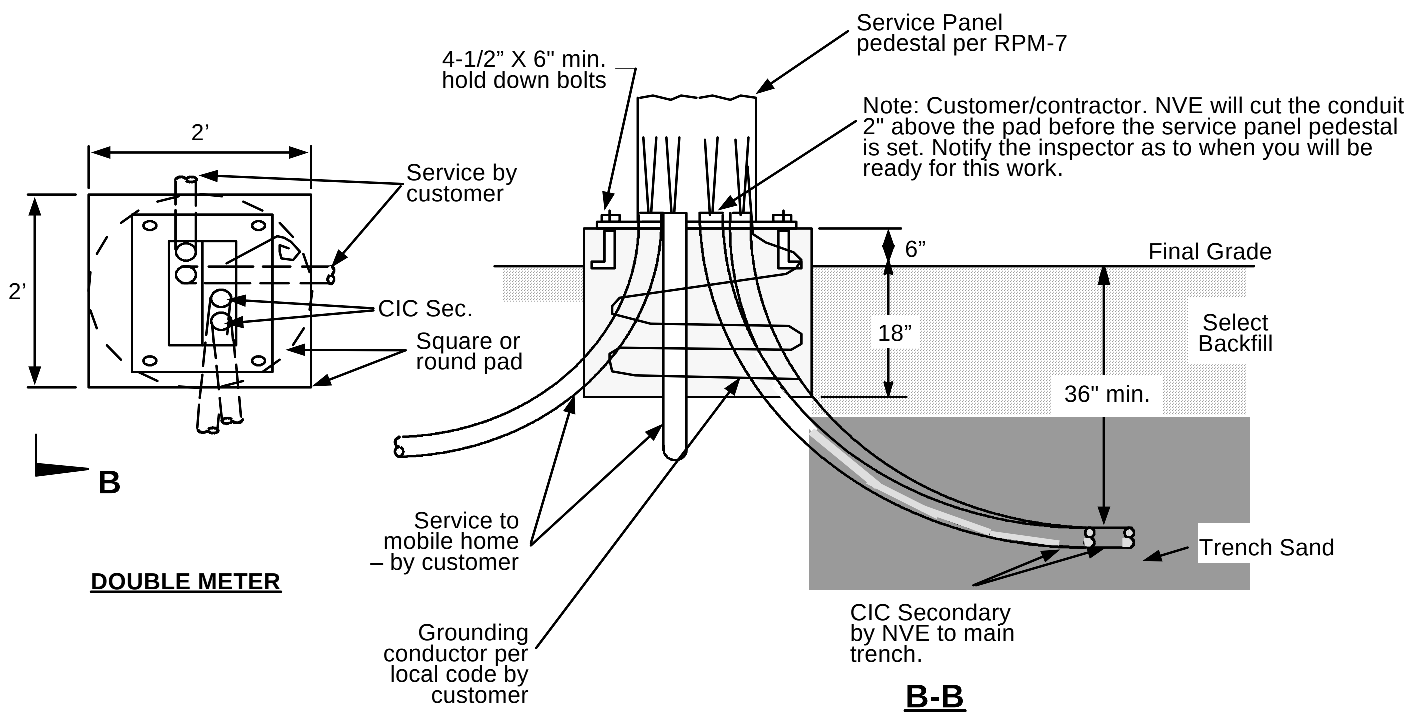
* Only at the discretion of NVE's inspectors, a ½"x8' copper ground rod can be installed in accordance with the latest edition/revision of the NESC.



NOTES:

1. Use single meter pedestal in mobile home estates and a double meter pedestal in mobile home parks. Customer shall provide meter pedestal according to RPM-7.
2. Clearances on meter side(s) of pedestal shall be per RPI-2.
3. Poured – in – place pad requirements:
   A. Concrete mix shall be Class 6C 3000 per Clark County requirements.
   B. The top of the pad shall be smooth and level.
4. This structure shall conform to general requirements of RS-G6.





Note: See RT-1 and RT-7, RT-8, or RT-12 for trench requirements.

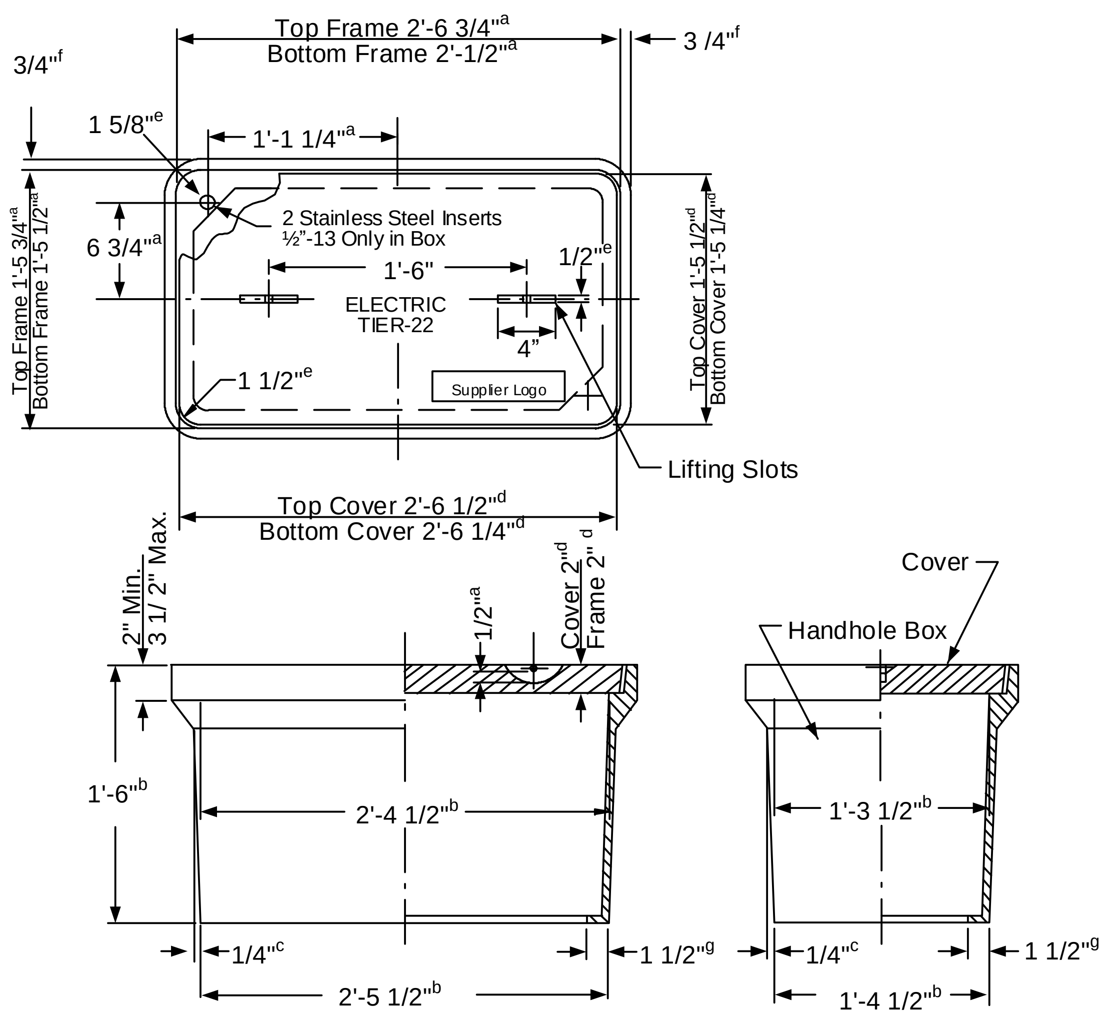
Table of Contents

THIS PAGE INTENTIONALLY LEFT BLANK

DESIGN REQUIREMENTS

TOLERANCES:
a = +1/16", -1/16"
b = +1/2", -1/2"
c = +1/8", -1/4"
d = +1/32", -1/32"
e = +1/16", -0"
f = +1/4", -0"
g = +1/2", -1/4"

APPROVED HANDHOLE		
MANUFACTURER	**HANDHOLE BOX**	**COVER**
Armorcast	A6001640PCX18	A6001947HD-NVE
Quazite	PG1730BA18J	PG1730H653
Oldcastle	17302030	17304617
Jensen Precast	100002035	100005021

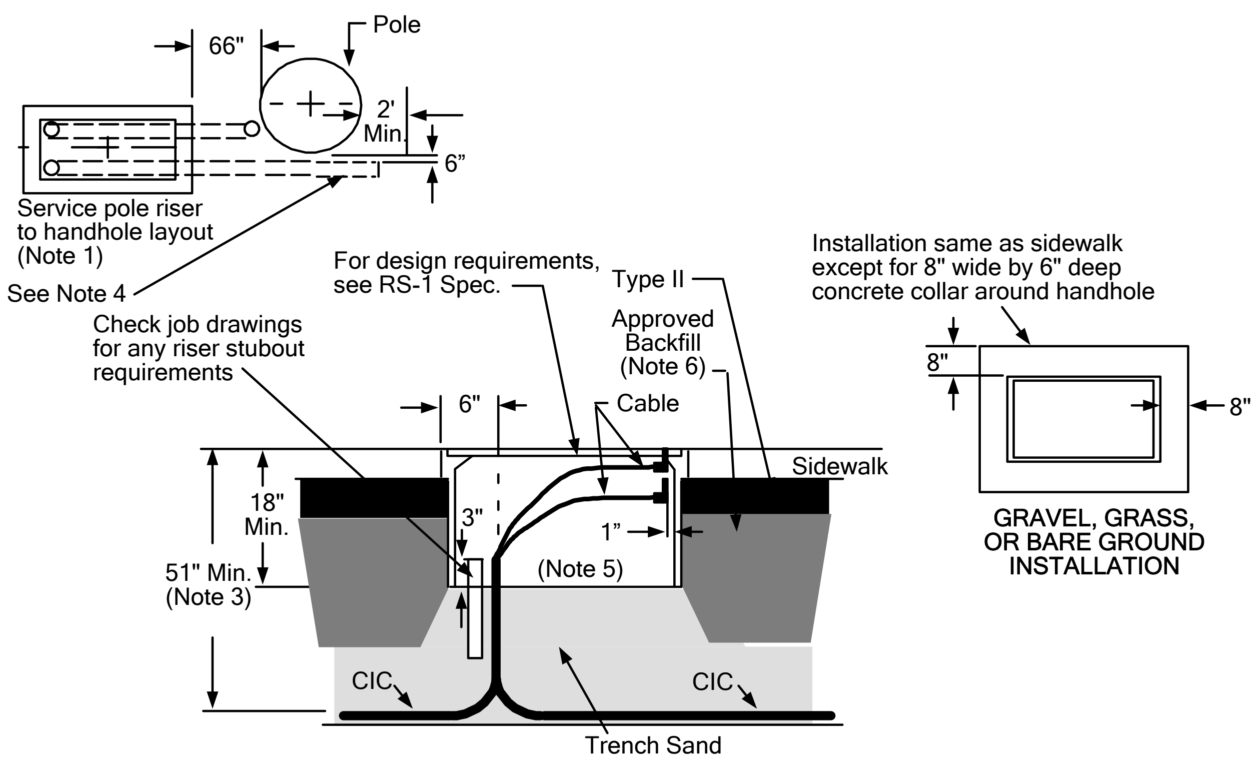


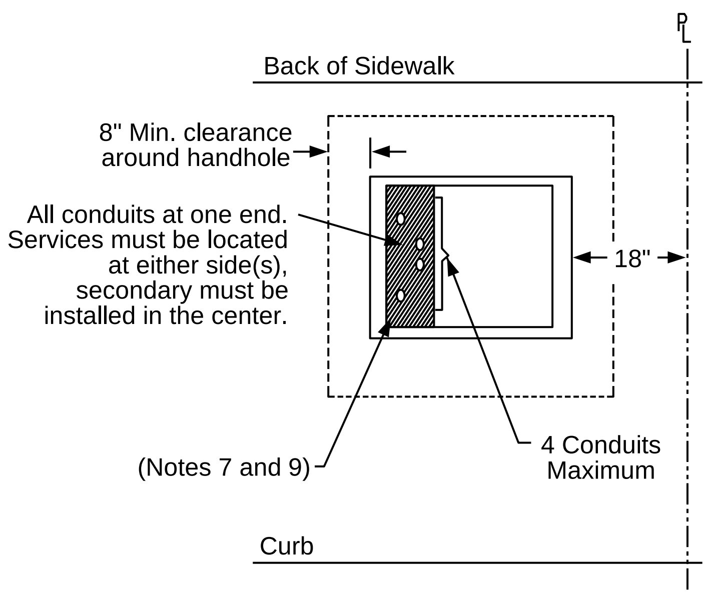
RS-1 HANDHOLE

NOTES:

1. The handhole shall meet specification RS-G1.

NV Energy				Electric Service Requirements	RS-1
Drawn:	Eng:	Appr:	Date:	Handhole: Secondary Junction	Revision: 4
GV	RD	DA	05/19		Page 1 of 4



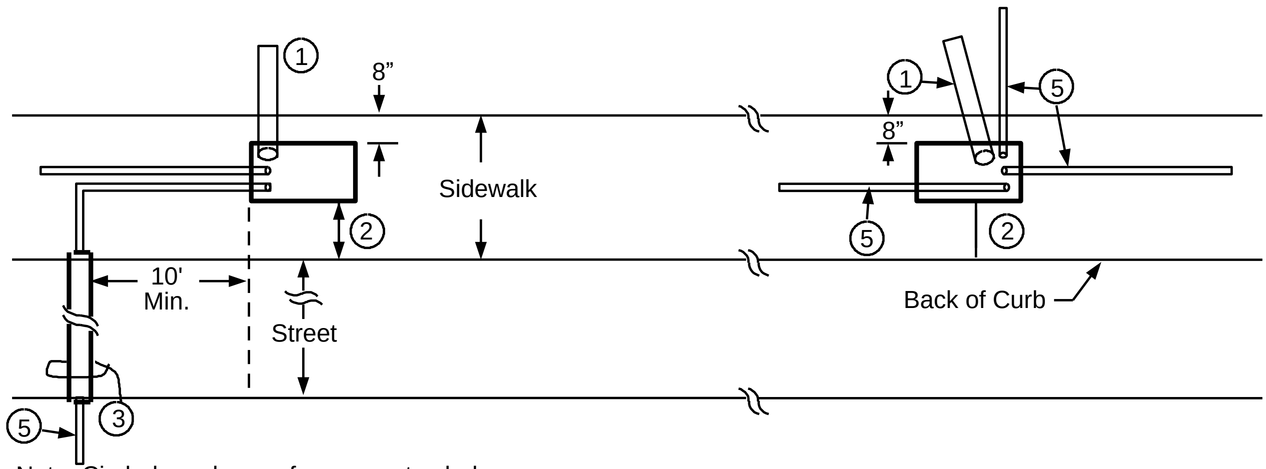


SIDEWALK INSTALLATION DETAIL

NOTES:

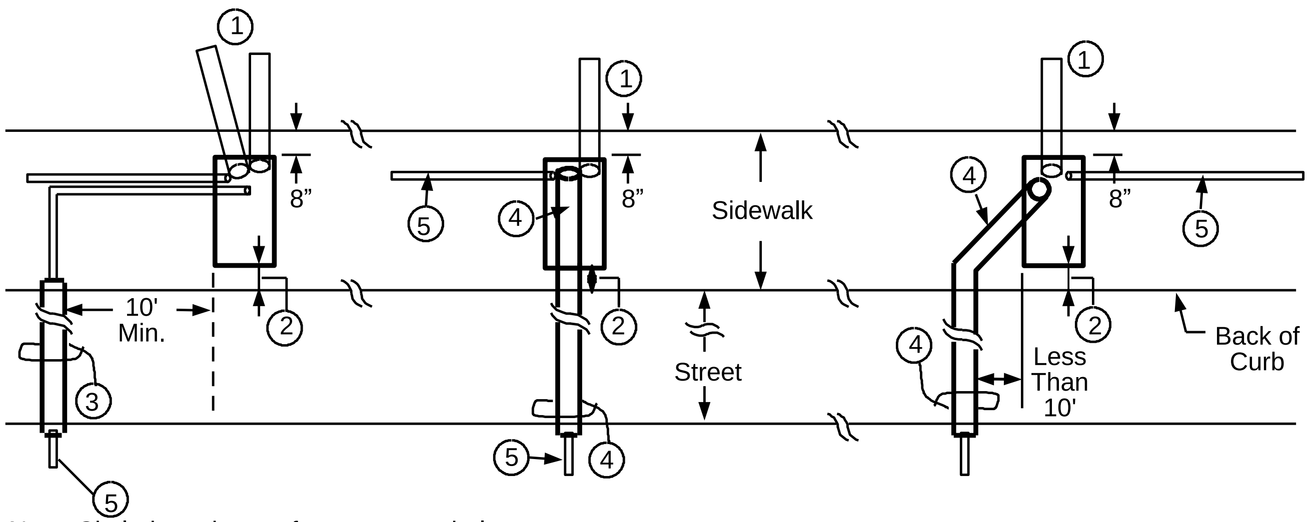
1. The NVE Inspector will place a grade stripe on the pole and stake location of handhole relative to the residential service pole riser.
2. If this structure does not meet all requirements or exhibits poor workmanship, it shall be rejected by NVE.
3. 51” minimum is for the handhole only.
4. A 3” PVC stubout is required if a future residential CIC system service or a 4” stubout for commercial service will be installed. The stubout must pass adjacent to the pole as illustrated.
5. Cable must be trained and cut so that the backs of the connector blocks are a minimum of 1” from the end of handhole wall as illustrated.
6. For backfill requirements see RT-1.
7. Stubouts for future services must be placed per “Sidewalk Installation Detail”.
8. There shall be a minimum 6’ clearance from the handhole to the center of a fire hydrant.
9. There shall be a minimum 1” separation between conduits to facilitate the installation of debris seals.

APPROVED CIC ROUTING HANDHOLE



Note: Circled numbers reference notes below

JUNCTION BOX PLACED PARALLEL WITH 3’ MINIMUM SIDEWALK



Note: Circled numbers reference notes below

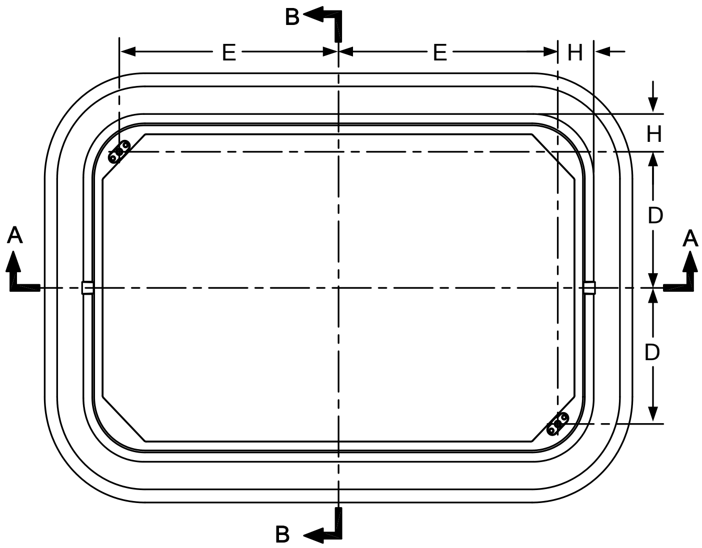
JUNCTION BOX PLACED PERPENDICULAR WITH 4’ MINIMUM SIDEWALK

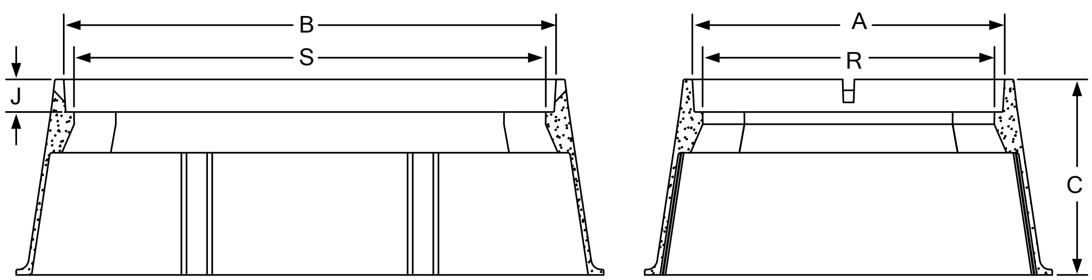
NOTES:

1. If there are future services, the customer shall install a 3”, 36” radius, 90° Schedule 40 PVC Bend stubout for each future CIC service. This will prevent undermining the sidewalk and dislocating the handhole.
2. There shall be a minimum of 8” of concrete around the handhole in the sidewalk.
3. If the customer installs a street crossing conduit, it shall be a 4” Schedule 40 PVC conduit for each secondary.
4. If a street crossing conduit is extended into a handhole (or a pull box), a 3”, 36” radius, Schedule 40 PVC bend is required.
5. Installed secondary CIC.

DESIGN REQUIREMENTS

APPROVED ENCLOSURES		
MANUFACTURER	**BOX**	**COVER**
QUAZITE/HUBBLE	LT3048B502	PG3048H55217
OLDCASTLE	PC 3048-18	PC 3048-T T22





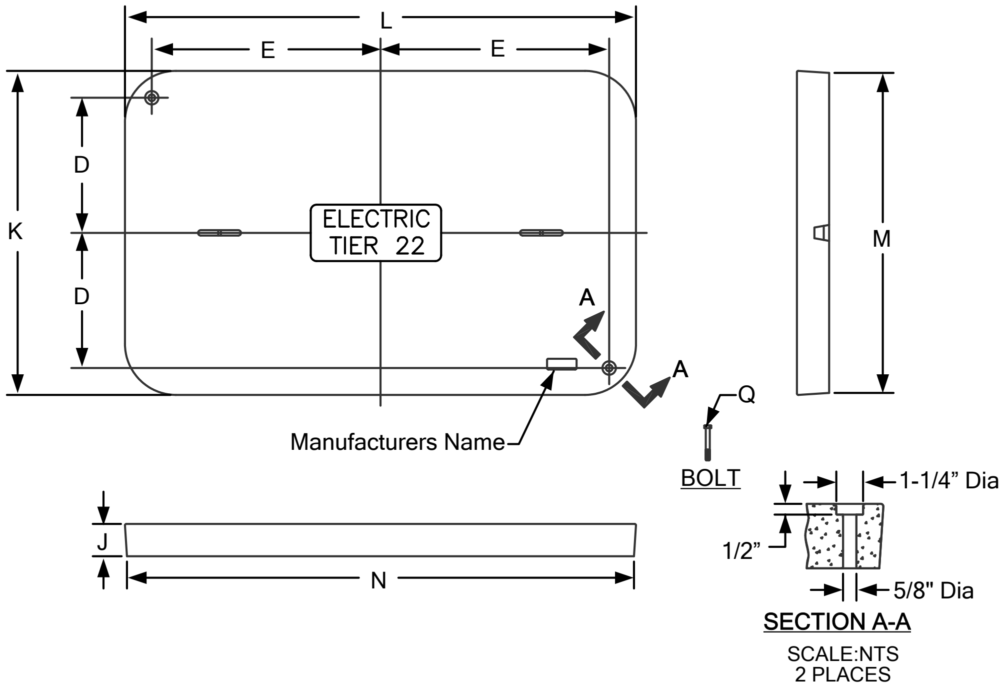
SECTION A-A

SECTION B-B

RS-3: 1/0 SPLICE ENCLOSURE DETAIL

NOTES:

1. The enclosure shall meet specification RS-G7.



RS-3: 1/0 SPLICE ENCLOSURE LID DETAIL

DIMENSIONS (INCHES) – TIER 22 ENCLOSURE

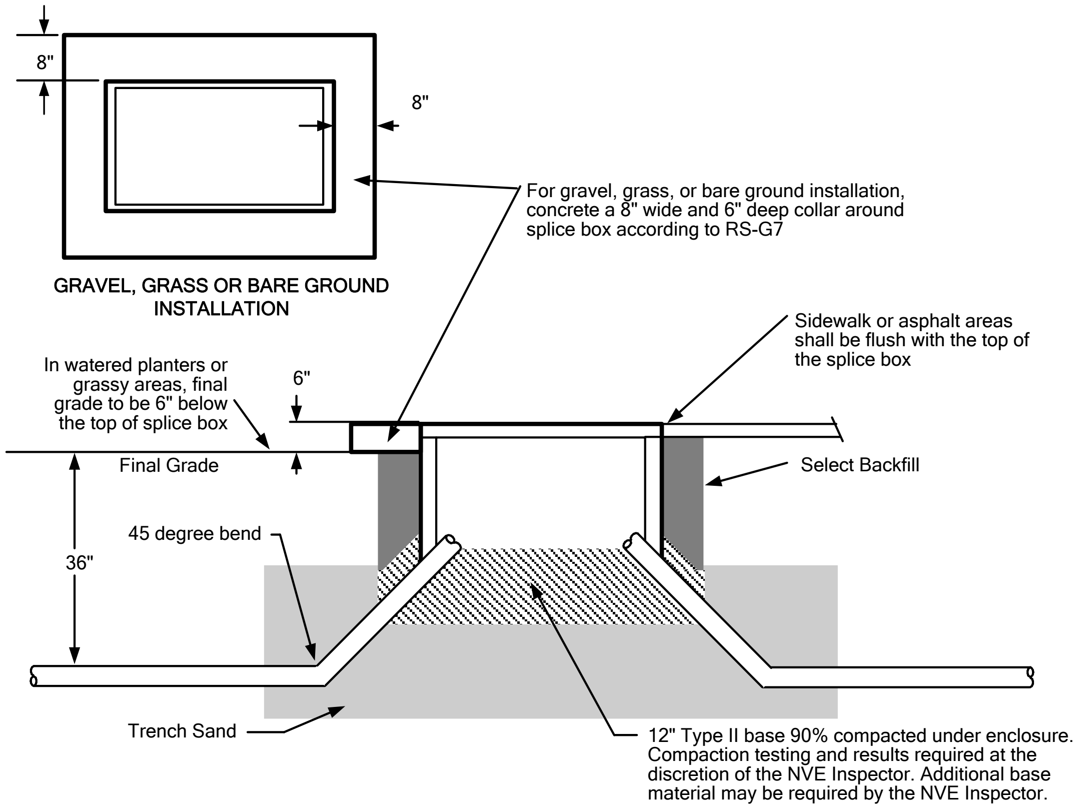
BOX	A	B	C	D	E	H	J	R	S
30 x 48 x 18	30 3/8	47 7/8	18	12 9/16	21 5/16	3 1/2	3	28 3/8	45 7/8

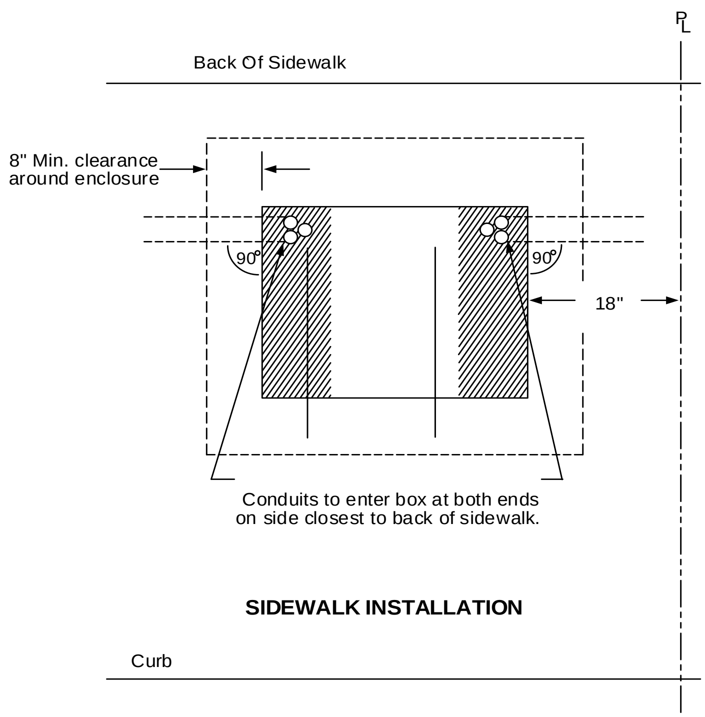
COVER	D	E	J	K	L	M	N
30 x 48	12 9/16	21 5/16	3	30 1/8	47 5/8	29 5/8	47 1/8

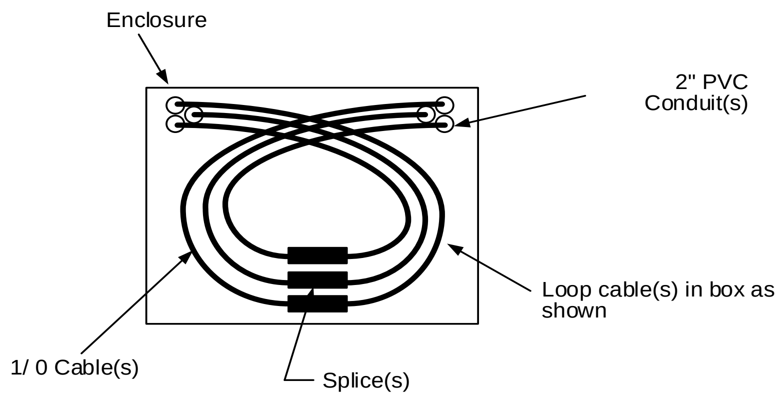
NOTES:

1. Box and cover dimensions are listed to ensure interchangeability between manufacturers
2. Bottom dimensions on most boxes are not given to enable manufacturer flexibility with materials and processes.
3. Q – Bolt, Pentahead SST 1/2-13 x 3 1/4

INSTALLATION REQUIREMENTS







NOTES:

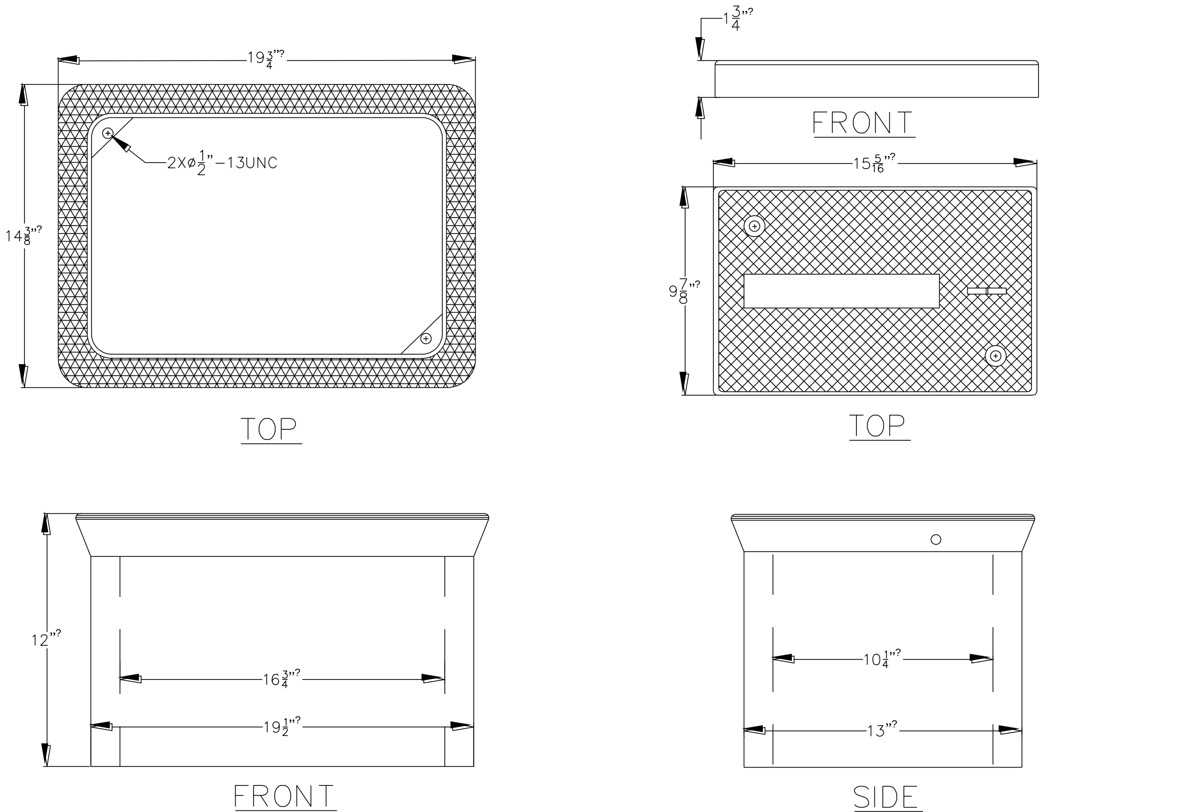
1. The RS-3 Splice Enclosure is intended for splicing 1/0 primary cables only. Use an RS-82, 83 or 85 if junction switching points are required.
2. Ground wires shall be installed. Grounding shall consist of the following:
   - A. 2-50’ lengths of #2-7 stranded bare copper ground wires laid in the bottom of the conduit trench in opposite directions.
   - B. An additional 5’ of the ground wire will be left in the box.
3. This enclosure is approved for splicing up to 3 phases of primary 1/0 cable.
4. If this structure does not meet all requirements or exhibits poor workmanship, it shall be rejected by NVE.
5. For backfill requirements see RT-1.
6. There shall be a minimum 6’ clearance from the handhole to the center of a fire hydrant.
7. See RS-5 for additional clearance requirements.
8. Debris shields shall be installed on conduits where entering the enclosure.

DESIGN REQUIREMENTS

TOLERANCES:

a = +1/2" , −1/2"
b = +1/16" , −1/16"
d = +1/32" , −1/32"

APPROVED HANDHOLE		
MANUFACTURER	HANDHOLE BOX	LID
Jensen Precast	HN1017−B	HN1017−L01



RS−10 HANDHOLE

1. Purpose

This specification covers the structural requirements for 10”(W) X 17”(L) X 12” (H) concrete handholes.

2. General

1. The handhole shall be constructed per the latest edition of the Western Underground Committee Guide 3.3 (WUCG 3.3) and ASTM C857 except as modified herein.
2. All construction work is subject to inspection and testing by NVE. If the handhole does not meet all the requirements or exhibits poor workmanship, the NVE field inspector shall reject it.
3. All parts exposed to the sun shall be made from an ultraviolet (UV) resistant material or have a UV coating.
4. Covers shall not be concave or have stiffeners at the bottom and shall weigh a minimum of 20lbs.
5. Under normal backfilling and tamping around the handhole, the box section shall not become concave or bowed.
6. Requirement 2.2 from WUCG 3.3 does not apply to handholes manufactured under this specification.

3. Finish

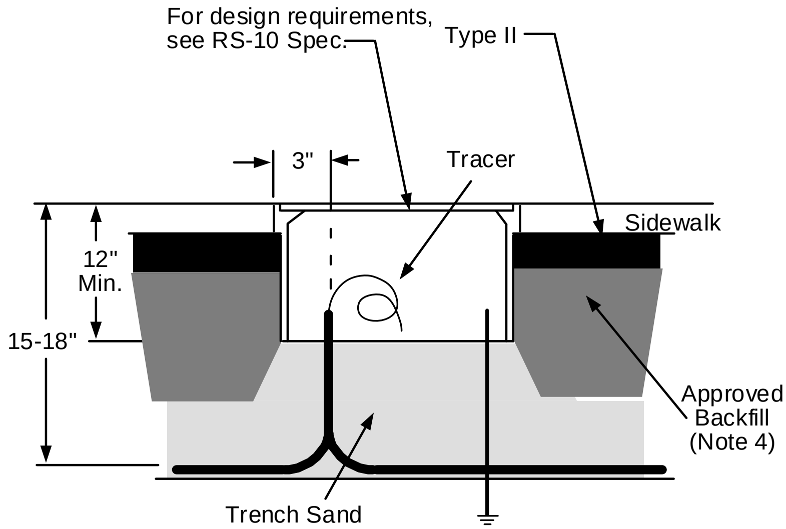
1. The handhole box wall shall be straight, free of depressions, bumps or other irregularities and have an inward flange at the base. The handhole shall be free of cracks, chips, etc.
2. The top of the cover shall be true, even, and level with a non-skid surface. Finished surface variations shall not exceed 1/32” per foot when measured with a straight edge in any direction.
3. The supplier logo and the word “ELECTRIC” shall be embossed in the top of the cover.
4. The manufacturing date (month, day, year) shall be marked on the bottom surface of the cover and inside of the box.
5. The vertical gap between the top of the box and the top of the cover shall not exceed 1/8” at any point.

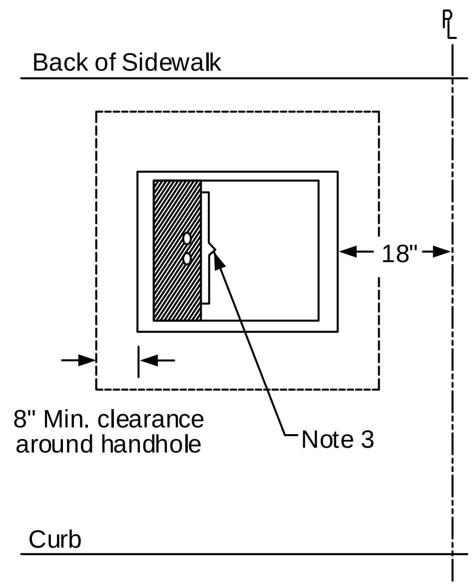
4. Testing

1. New suppliers shall provide a test report performed by an independent laboratory. The tested handhole shall meet or exceed all requirements from the latest edtition of WUCG 3.3 and ASTM C857.
2. Two handholes shall be selected randomly and tested annually for the structural requirements by a Nevada State Certified Laboratory. The supplier is responsible for finding a testing laboratory and covering all expenses. The test shall be performed in the first quarter of each year. NVE T&D Standards personnel may observe these tests.
3. A copy of the certified tests shall be sent no later than April 1st of every year to:

NV Energy
T & D Standards Department
P.O. Box 98910, M/S19
Las Vegas, Nevada 89151-0001
Phone: (702) 402-6541
Fax: (702) 402-6575

INSTALLATION REQUIREMENTS





SIDEWALK INSTALLATION DETAIL

Notes:

1. If this structure does not meet all requirements or exhibits poor workmanship, it shall be rejected by NVE.
2. There shall be a minimum 6’ clearance from the handhole to the center of a fire hydrant.
3. All tracer wire shall be terminated on a single side of the box to allow adequate working space.
4. For backfill requirements, see RT-1.
5. There shall be a ground at each RS-10 location.
6. Approved tracer wire is ASTM B3 solid #12 copper with a red linear low density polyethylene jacket.

DESIGN REQUIREMENTS

APPROVED BOXES	
Manufacturer	PULLBOX
Jensen Precast	J-RS-80
Olson Precast	0-RS-80

TOLERANCES:

a = +1/2" , -1/2"

b = +0" , -1"

c = +0" , -1/16"

LEGEND:

1. BOX EXTENSION
2. 2" DUCT TERMINATOR
3. SUMP PUMP RECESS
4. PULLING EYE
5. 4" TERMINATOR
6. 2" TERMINATOR
7. MASTIC
8. BOX SECTION
9. 1" PVC CONDUIT
10. RS-80 HATCH
11. $\frac{1}{2}$"-13 UNC INSERT

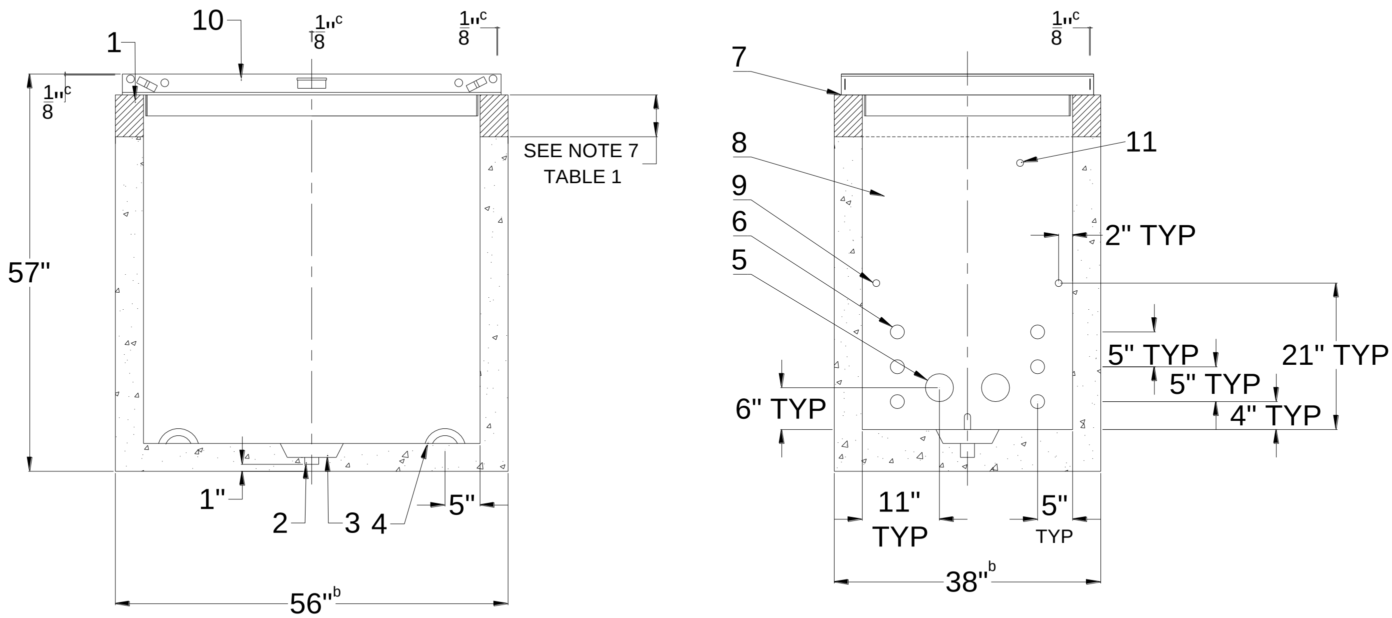


Figure 1. RS-80 SPLICE BOX (General Use Applications)

1. RS-80 HATCH

1. See RS-H for design requirements.
2. The gap between the precast structure and the lid shall be sealed with mastic or similar material approved by NVE.

2. BOX EXTENSION

1. 30" (W) X 48" (L) inside dimensions with tolerances of ± 1".

3. BOX SECTION

1. Six 2” and two 4” diameter PVC conduit terminators through each end wall.
2. Two 1” diameter PVC conduit through each end wall.
3. A 9” diameter x 2” deep sump pump recess with 2” diameter Duct Terminator in the middle of the floor. Per T & D Standards, Bow Co. Industries Inc. Part # T2000 or equivalent.
4. Two steel pulling eyes in the floor.
5. 30” (W) x 48” (L) inside dimensions with tolerances of ± 1”.
6. Two ½” grounding inserts nuts, one in each end wall.

4. ENTIRE STRUCTURE

1. All exposed steel shall be hot dip galvanized after fabrication, except torsion bars.
2. Torsion bars shall be spray galvanized.
3. Shall meet RS–G2 and RS–G4.

   NOTE: For traffic areas (e.g., streets, roads, etc.), use the RS–83 box.
4. For other areas subject to vehicular traffic, vehicular protection barriers per RS-6 shall protect RS-80 boxes.

5. GROUNDING

1. The inserts shall be spaced in accordance with this specification drawing. Inserts to be attached to the internal box rebar by spot welding or approved connector. The insert shall accept ½” American Standard Thread. Continuity between all inserts installed in the box sections shall be checked and verified prior to shipping by manufacturer / supplier.

6. Installation Requirements

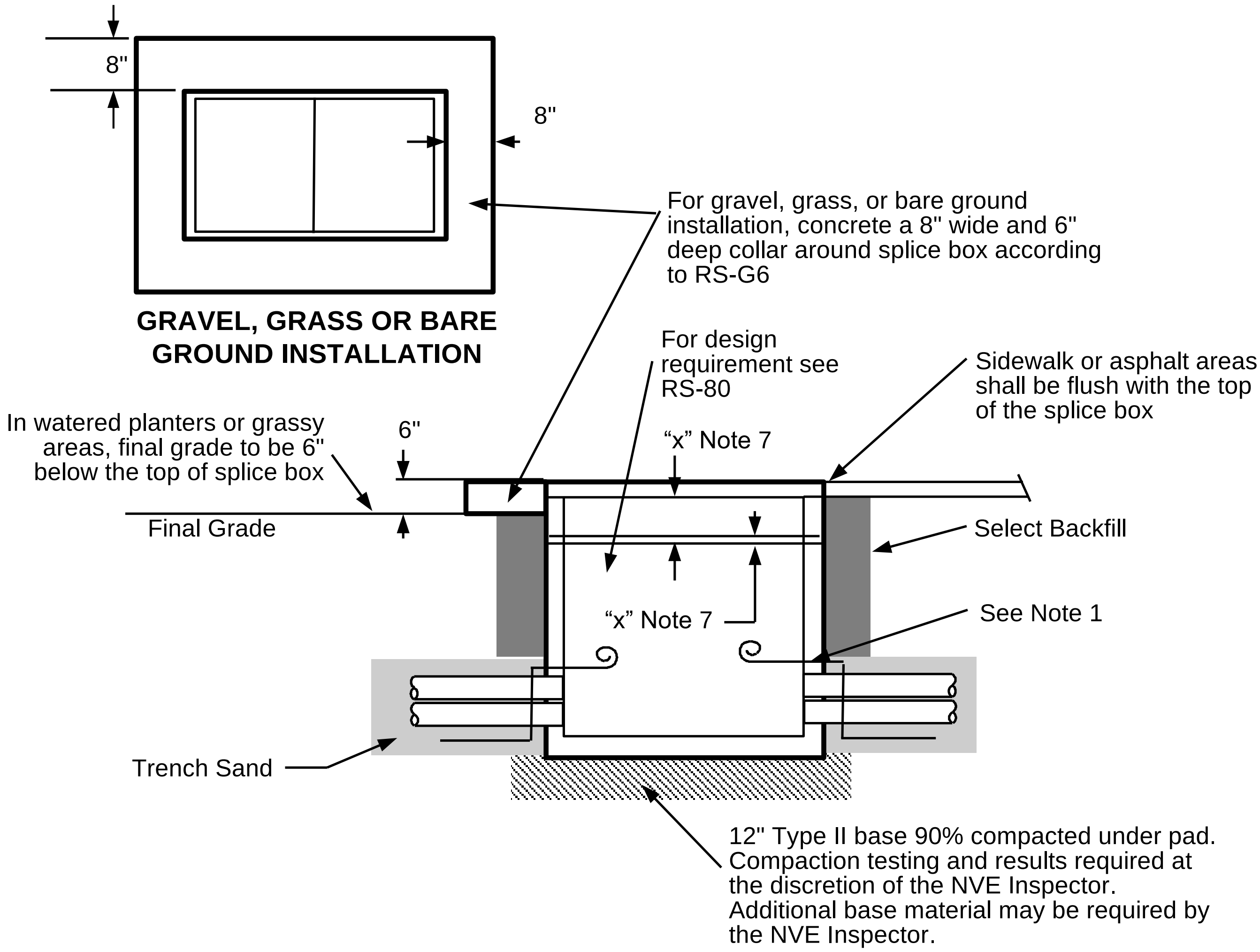


Figure 6. RS-80 Installation Requirements

NOTES:

1. Ground wires shall be installed through a 1" PVC conduit in the structures end walls. Grounding by customer shall consist of the following:
   - A. 2-50' lengths of #2-7 stranded bare copper ground wires laid in the bottom of the conduit trench in opposite directions.
   - B. An additional 5' of the ground wire will be left in the box.
   - C. No exceptions allowed.
2. This box shall be used as a splice box for primary cables (US-115) or for commercial secondary cables.
3. When this box is for commercial secondary cables, then the Designer shall specify on the construction drawing the required number of terminators and their locations.
4. If the final grade is unknown, it is preferable to make the top of the splice box too low, rather than too high.

5. The bottom surface of the box shall be level.
6. If the ground water level is at least 3’ below the bottom of the splice box, the 2” diameter knockout in the sump pump recess shall be removed.
7. All new installations to be set to final grade. Grade changes prior to cable installation will require the box to be raised or lowered. If any final grade adjustments are required after the cable is pulled, take the actions listed in Table 1.

Table 1. Adjustment Requirements

Adjustment	Action
-6” to +5”	NVE contractor shall exchange existing 12” extension with 6” to 17” high extension ordered from the original manufacturer.
+6” to +12”	NVE contractor may order one additional 6” to 12” height extension from original manufacturer.
Below -6” & above 12”	Any extension shorter than 6” or exceeding 12” in height shall be subject to T&D Standards department approval.

8. This box shall be installed in non-traffic areas only.
   NOTE: For traffic areas (e.g., streets, roads, etc.) use the RS–83 box
9. There shall be a minimum 6’ clearance from the RS–80 box to the centerline of a fire hydrant.
10. Retaining wall required when grade from the top of the lid rises or lowers more than 1’ in 5’ horizontally or when required by developer as perimeter wall. See RS-5 for details.
11. NV Energy lineman shall install # 2 bare copper bus to grounding inserts and attach all bonding wires.

THIS PAGE IS INTENTIONALLY LEFT BLANK

DESIGN REQUIREMENTS

LEGEND:
1. ½" BRASS INSERT
2. BOX EXTENSION
3. 2" DUCT TERMINATOR
4. SUMP PUMP RECESS
5. PULLING EYE
6. 4" TERMINATOR
7. 2 TON SWIFT LIFT
8. MASTIC
9. BOX SECTION
10. 1" PVC CONDUIT
11. 2" TERMINATOR
12. RS-80 HATCH

APPROVED BOXES	
MANUFACTURER	**MANHOLE**
JENSEN PRECAST	J-RS-80M
OLSON PRECAST	O-RS-80M

TOLERANCES:
a = +1/2" , -1/2"
b = +0" , -1"
c = +0" , -1/16"

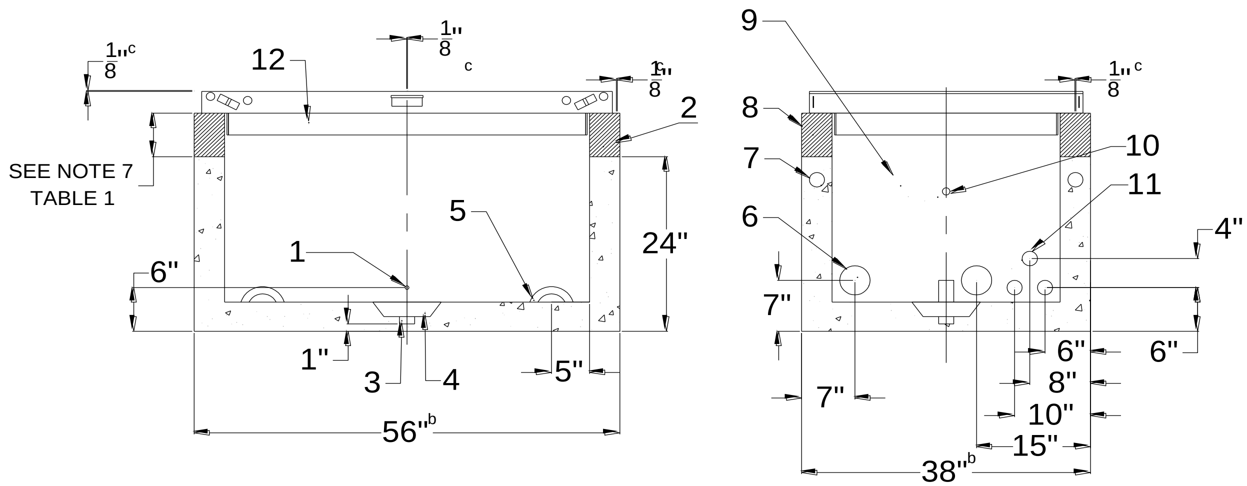


Figure 1: RS-80M SPLICE BOX

1. RS-80 HATCH

1. See RS-H for design requirements.
2. The gap between the precast structure and the lid shall be sealed with mastic or similar material approved by NVE.

2. BOX EXTENSION

1. 30” (W) X 48” (L) inside dimensions with tolerances of ± 1”.

3. BOX SECTION

1. Three 2” and two 4” diameter PVC conduit terminators through each end wall.
2. One 1” diameter PVC conduit through each end wall.
3. A 9” diameter x 2” deep sump pump recess with 2” diameter Duct Terminator in the middle of the floor. Per T & D Standards, Bow Co. Industries Inc. Part # T2000 or equivalent.
4. Two steel pulling eyes in the floor.

5. 30” (W) x 48” (L) inside dimensions with tolerances of ± 1”.
6. One ½” brass insert on each side wall.

4. ENTIRE STRUCTURE

1. All exposed steel shall be hot dip galvanized after fabrication, except torsion bars.
2. Torsion bars shall be spray galvanized.
3. Shall meet RS–G2 and RS–G4.

   NOTE: For traffic areas (e.g., streets, roads, etc.), use the RS–83 box.
4. For other areas subject to vehicular traffic, vehicular protection barriers per RS-6 shall protect RS-80M boxes.

5. GROUNDING

The inserts shall be spaced in accordance with this specification drawing. Inserts to be attached to the internal box rebar by spot welding or approved connector. The insert shall accept ½”-13 UNC Thread. Continuity between all inserts installed in the box sections shall be checked and verified prior to shipping by manufacturer / supplier.

6. Installation Requirements

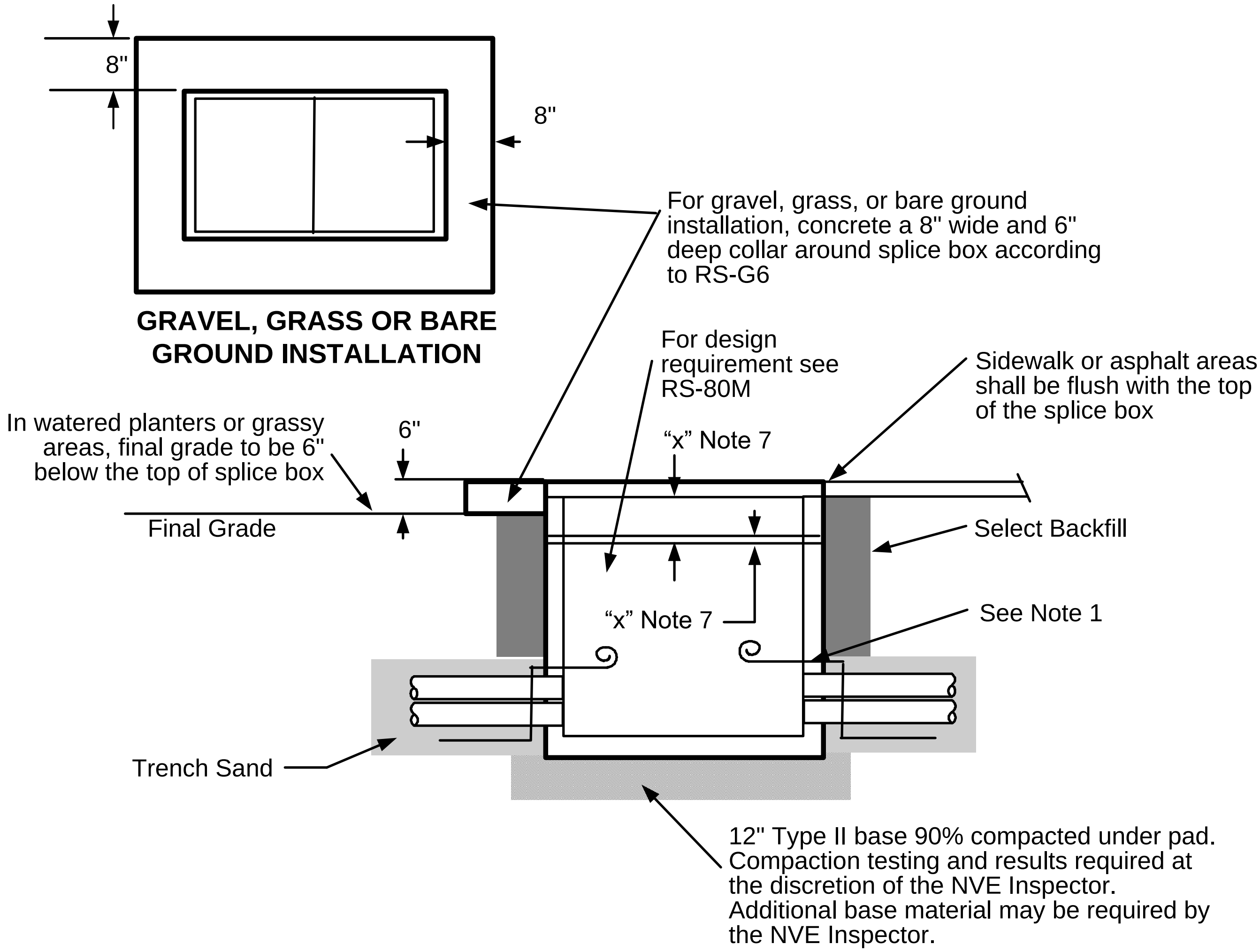


Figure 8. RS-80M Installation Requirements

NOTES:

1. Ground wires shall be installed through a 1" PVC conduit in the structures end walls. Grounding by customer shall consist of the following:
   A. 2-50' lengths of #2-7 stranded bare copper ground wires laid in the bottom of the conduit trench in opposite directions.
   B. An additional 5' of the ground wire will be left in the box.
   C. No exceptions allowed.
2. This box shall be used as a splice box for primary cables (US-115) or for commercial secondary cables.
3. When this box is for commercial secondary cables, then the Designer shall specify on the construction drawing the required number of terminators and their locations.
4. If the final grade is unknown, it is preferable to make the top of the splice box too low, rather than too high.

5. The bottom surface of the box shall be level.
6. If the ground water level is at least 3’ below the bottom of the splice box, the 2” diameter knockout in the sump pump recess shall be removed.
7. All new installations to be set to final grade. Grade changes prior to cable installation will require the box to be raised or lowered. If any final grade adjustments are required after the cable is pulled, take the actions listed in Table 1.

Table 1. Adjustment Requirements

Adjustment	Action
-6” to +5”	NVE contractor shall exchange existing 12” extension with 6” to 17” high extension ordered from the original manufacturer.
+6” to +12”	NVE contractor may order one additional 6” to 12” height extension from original manufacturer.
Below -6” & above 12”	Any extension shorter than 6” or exceeding 12” in height shall be subject to T&D Standards department approval.

8. This box shall be installed in non-traffic areas only.
   NOTE: For traffic areas (e.g., streets, roads, etc.) use the RS–83 box
9. There shall be a minimum 6’ clearance from the RS–80M box to the centerline of a fire hydrant.
10. Retaining wall required when grade from the top of the lid rises or lowers more than 1’ in 5’ horizontally or when required by developer as perimeter wall. See RS-5 for details.
11. NV Energy lineman shall install # 2 bare copper bus to grounding inserts and attach all bonding wires.

THIS PAGE INTENTIONALLY LEFT BLANK

DESIGN REQUIREMENTS – MAINTENANCE ONLY

APPROVED PULL BOXES		
Manufacturer	Regular	Intercept
Jensen Precast	J-RS-81	J-RS-81-I

TOLERANCES:
a = +1/2" , -1/2"
b = +0" , -1"
c = +0" , -1/16"

LEGEND:
1. BOX EXTENSION
2. UNISTRUT
3. MOLDED KNOCKOUT
4. SUMP PUMP RECESS
5. PULLING EYE
6. 6" TERMINATOR
7. 4" TERMINATOR
8. BOX SECTION
9. 1" PVC CONDUIT
10. MASTIC
11. RS-81A HATCH

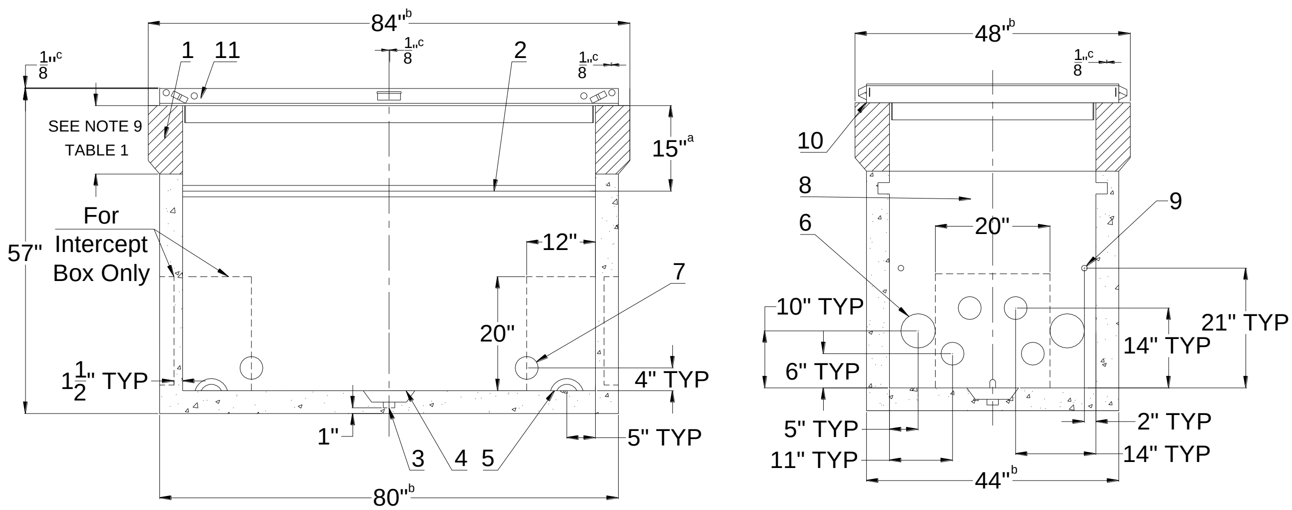


Figure 1. RS-81 Regular or Intercept Box

1. RS-81A HATCH

1. See RS-H for design requirements.
2. The gap between the precast structure and the lid shall be sealed with mastic or similar material approved by NVE (see Figure 1).

2. BOX EXTENSION

2. 36” (W) x 72” (L) inside dimensions with tolerances of ±1”.

3. BOX SECTION

1. Two 6”, four 4” and two 1” diameter PVC conduit terminators through each end wall (or two 20” square knockouts in the end walls).
2. Two 4” diameter PVC conduit terminators through each side wall (or two 12” x 20” knockouts).
3. Two steel pulling eyes in the floor.
4. A 9” diameter x 2” deep sump pump recess with 2” diameter knockout in the middle of the floor.

5. Two hot dipped galvanized steel unistruts (P3200HG x 72”) located in opposite walls.
6. Unistrut shall have a foam barrier installed during manufacture.

   NOTE: A final QA/QC check of all unistrut prior to shipping/delivery shall be conducted to ensure no grout or concrete material is contained within the unistrut. If any grout or concrete material is found at time of inspection it shall be removed
7. 36” (W) x 72” (L) inside dimensions with tolerances of ±1”.

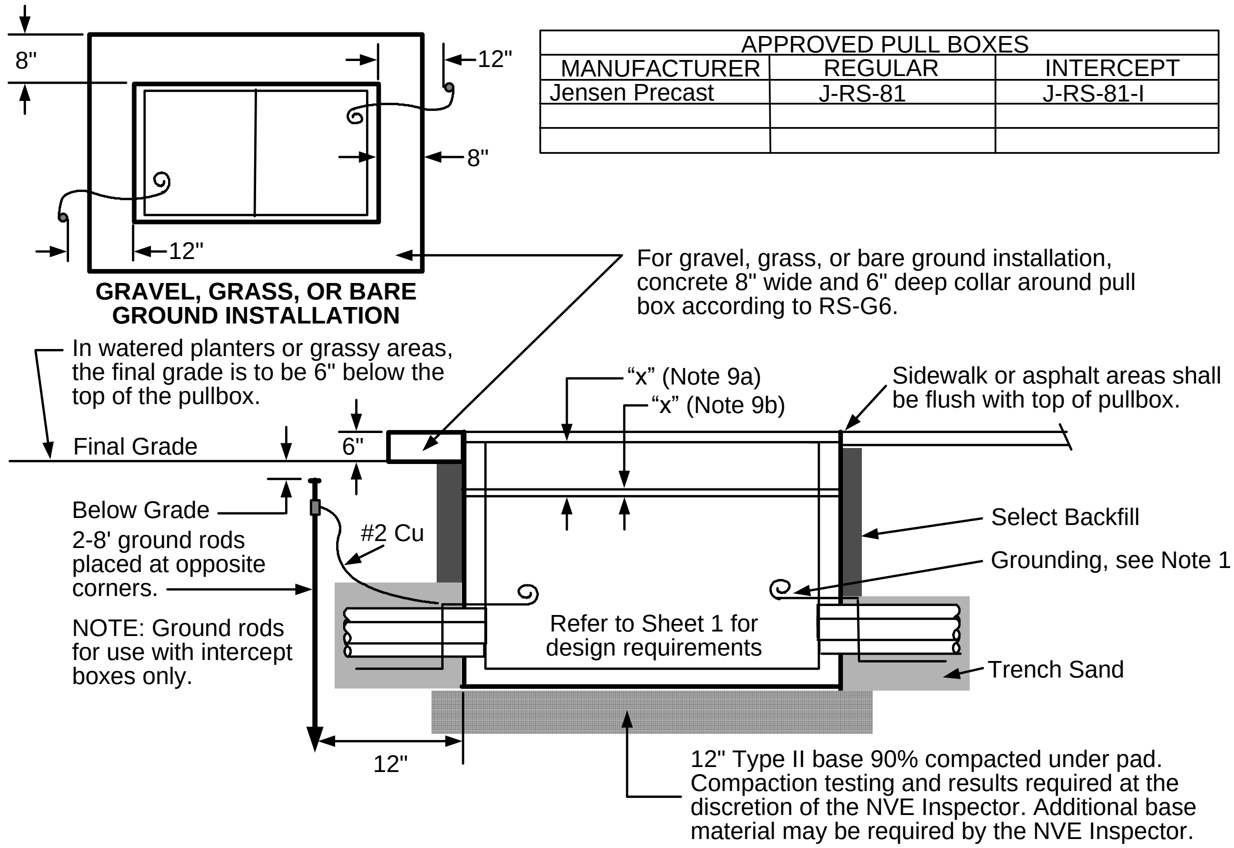
4. ENTIRE STRUCTURE:

1. All exposed steel shall be hot dip galvanized after fabrication, except torsion bars.
2. Torsion bars shall be spray galvanized.
3. Shall meet RS-G2 and RS-G4.

   NOTE: For traffic areas (e.g., streets, roads, etc.), use the RS–83 box.

INSTALLATION REQUIREMENTS – MAINTENANCE ONLY

APPROVED PULL BOXES		
MANUFACTURER	REGULAR	INTERCEPT
Jensen Precast	J-RS-81	J-RS-81-I



NOTES:

1. Grounding by customer, shall be one of the following:
   - A. **With regular box installation:** 2-50' #2-7 stranded bare copper ground wires laid in the bottom of the conduit trench in opposite directions with 2-5' tails left in the box. Ground wires to be installed through a 1" PVC conduit in the structures end walls.
   - B. **With intercept box installation:** Only at the discretion of the NVE Inspector, two 1/2" x 8' copper clad ground rods placed at opposite corners of the box may be installed
   - C. No exceptions allowed.

   *****Grounding in accordance with the latest edition/revision of the NESC.
2. This box can handle up to 3 primary cables including 3-4 way modules (cable junctions or splices to be installed according to DIS Specifications: UJ-101, UJ-201 or US-115).
3. If the final grade is unknown, it's preferable to make the top of the pull box too low, rather than too high.
4. If the designer specifies additional conduit openings, the contractor shall core drill the holes as required.
5. The bottom surface of the box shall be level.
6. If the ground water level is at least 3' below the bottom of the splice box, the 2" diameter knockout in the sump pump recess shall be removed.
7. Two 1/2" spring nuts shall be installed by NVE for each module.
8. Intentionally Omitted

9. If any final grade adjustment “x” is needed, take the actions listed in Table 1.

Table 1. Adjustment Requirements

Adjustment	Action
-6” to +5”	NVE contractor shall exchange existing 12” extension with 6” to 17” high extension ordered from the original manufacturer.
+6” to +12”	NVE contractor may order one additional 6” to 12” height extension from original manufacturer.
Below -6” & above 12”	Any extension shorter than 6” or exceeding 12” in height shall be subject to T&D Standard’s department approval.

10. This box may be installed in sidewalks or in delivery alleys behind commercial developments.
    NOTE: For traffic areas (e.g., streets, roads, etc.), use the RS–83 box.
11. Retaining wall required when grade from the top of the lid rises or lowers more than 1’ in 5’ horizontally or when required by developer as perimeter wall. See RS-5 for details.

DESIGN REQUIREMENTS

LEGEND:
1. BOX EXTENSION
2. UNISTRUT
3. 2" DUCT TERMINATOR
4. SUMP PUMP RECESS
5. PULLING EYE
6.A. 2" TERMINATOR
6.B 6" TERMINATOR
7. 4" TERMINATOR
8. BOX SECTION
9. 1" PVC CONDUIT
10. MASTIC
11. RS-82A HATCH
12. RS-82B HATCH
13. $\frac{1}{2}$" - 13 UNC INSERT

Approved Pull Boxes	
Manufacturer	PULLBOXES
Jensen Precast	J-RS-82
Olson Precast	O-RS-82

TOLERANCES:
a = +1/2" , -1/2"
b = +0" , -1"
c = +0" , -1/16"

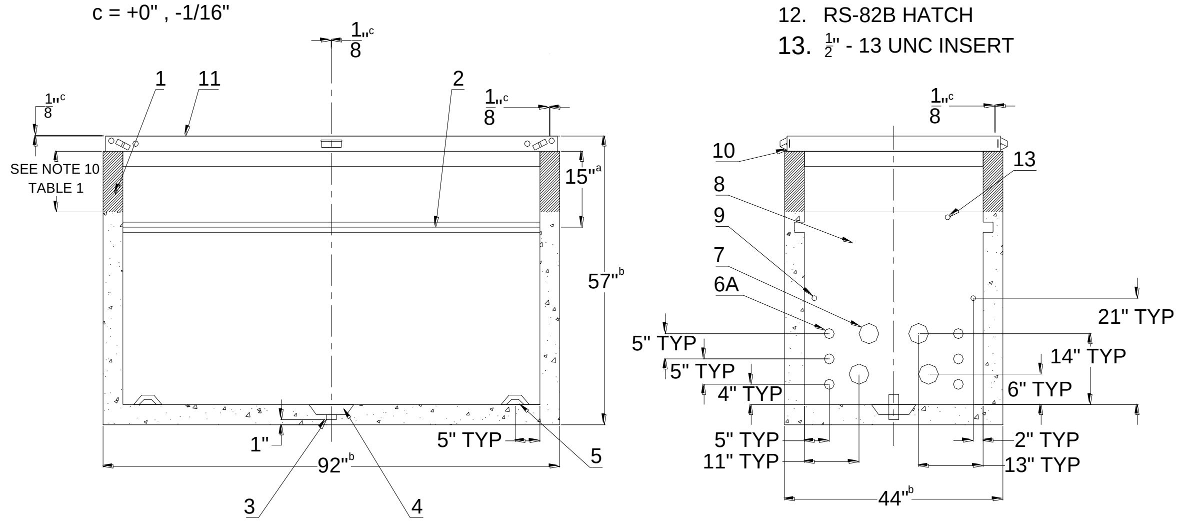


Figure 2. RS-82A Pullbox (Torsion Assisted Lid) for General Use Applications

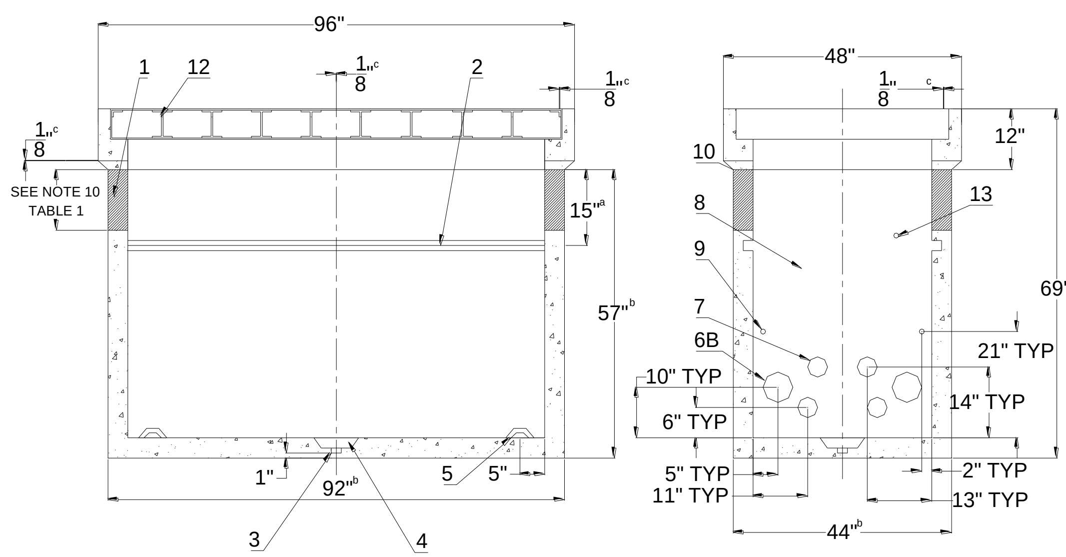


Figure 2. RS-82B Pullbox (Three Piece Lid) for Special Applications

				Electric Service Requirements	RS-82
NVEnergy				Pull Box: 36"x 84"x 48"	
Drawn:	Eng:	Appr:	Date:		Revision: 12A
JJ	JR	DA	9/19		Page 1 of 6

1. RS-82 HATCH

1. See RS-H for design requirements.
2. The gap between the precast structure and the lid shall be sealed with mastic or similar material approved by NVE (see Figure 1)

2. BOX EXTENSION

1. 36” (W) x 84” (L) inside dimensions with tolerances of ±1”.

3. BOX SECTION FOR GENERAL USE APPLICATIONS

1. Four 4” and six 2” diameter PVC conduit terminators through each end wall.
2. Two 1” diameter PVC conduit through each end wall.
3. Two steel pulling eyes in the floor.
4. A 9” diameter x 2” deep sump pump recess with 2” diameter duct terminator in the middle of the floor. Per T & D Standards: Bow Co. Industries Inc. Part# T2000 or equivalent.
5. Two hot dipped galvanized steel unistruts (P3200HGx84”) located on opposite walls.
6. Unistrut shall have a foam barrier installed during manufacture.

   NOTE: A final QA/QC check of all unistrut prior to shipping/delivery shall be conducted to ensure no grout or concrete material is contained within the unistrut. If any grout or concrete material is found at time of inspection it shall be removed

6. 36” (W) x 84” (L) inside dimensions with tolerances of ± 1”.
7. Two ½” grounding inserts nuts, one in each end wall, to be located 4” below unistrut.

4. ENTIRE STRUCTURE

1. All exposed steel shall be hot dip galvanized after fabrication, except torsion bars.
2. Torsion bars shall be spray galvanized.
3. Shall meet RS-G2 and RS-G4.

   NOTE: For traffic areas (e.g. streets, roads, etc.), use the RS-83 box.

4. For areas subject to vehicular traffic, vehicular protection barriers per RS-6 shall protect the RS-82 box.
5. Shims of any type are not allowed for installation of this box.

5. GROUNDING

1. The inserts shall be spaced in accordance with this specification drawing. Inserts to be attached to the internal box rebar by spot welding or approved connector. The insert shall accept ½” American Standard Thread. Continuity between all inserts installed in the box sections shall be checked and verified prior to shipping by manufacturer / supplier.

6. BOX SECTION FOR SPECIAL APPLICATIONS

1. Four 4” and two 6” diameter PVC conduit terminators through each end wall.
2. Two 1” diameter PVC conduit through each end wall.
3. Two steel pulling eyes in the floor.

4. A 9" diameter x 2" deep sump pump recess with 2" diameter duct terminator in the middle of the floor. Per T & D Standards: Bow Co. Industries Inc. Part# T2000 or equivalent.
5. Two hot dipped galvanized steel unistruts (P3200HGx84") located on opposite walls.
   NOTE: Unistrut to be clear of any concrete, slip or other debris prior to shipment.
6. 36" (W) x 84" (L) inside dimensions with tolerances of ± 1".
7. Two ½" grounding inserts nuts, one in each end wall, to be located 4" below unistrut.

INSTALLATION REQUIREMENTS

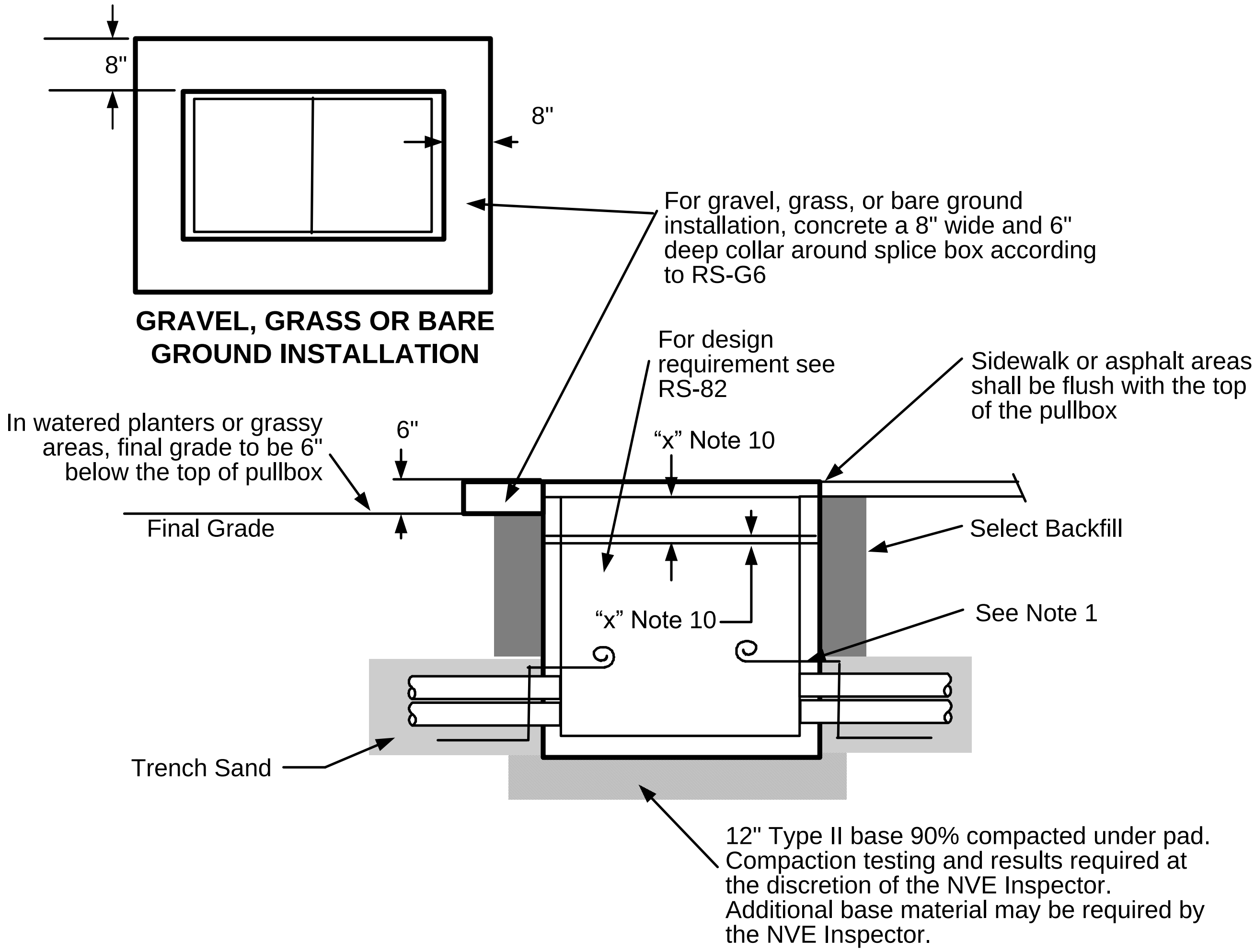


Figure 8. RS-82 Installation Requirements

NOTES:

1. Ground wires shall be installed through a 1" PVC conduit in the structures end walls. Grounding by customer shall consist of the following:
   - A. 2-50' lengths of #2-7 stranded bare copper wire in the bottom of the conduit trench in opposite directions.
   - B. An additional 5' of the ground wire will be left in the box.
   - C. Exceptions are not permitted.
2. This box can handle up to 3 primary cables including 3-4 way modules (see UJ-101 or 201 for installation).
3. 2" conduit(s) shall be installed utilizing knockouts on the property or field side of the RS-82 box.
4. If the final grade is unknown, it's preferable to make the top of the pull box too low, rather than too high.
5. If the designer specifies additional conduit openings, the contractor shall core drill the holes as required.
6. The bottom surface of the box shall be level.

7. If the ground water level is at least 3’ below the bottom of the splice box, the 2” diameter knockout in the sump pump recess shall be removed.
8. Two ½” spring nuts shall be installed by NVE for each module.
9. Intentionally Omitted.
10. All new installations to be set to final grade. Grade changes prior to cable installation will require the box to be raised or lowered. If any final grade adjustment is needed after the cable is pulled, take the actions listed in Table 1.

Table 1. Adjustment Requirements

Adjustment	Action
-6” to +5”	NVE contractor shall exchange existing 12” extension with 6” to 17” high extension ordered from the original manufacturer.
+6” to +12”	NVE contractor may order one additional 6” to 12” height extension from original manufacturer.
Below -6” & above 12”	Any extension shorter than 6” or exceeding 12” in height shall be subject to T&D Standard’s department approval.

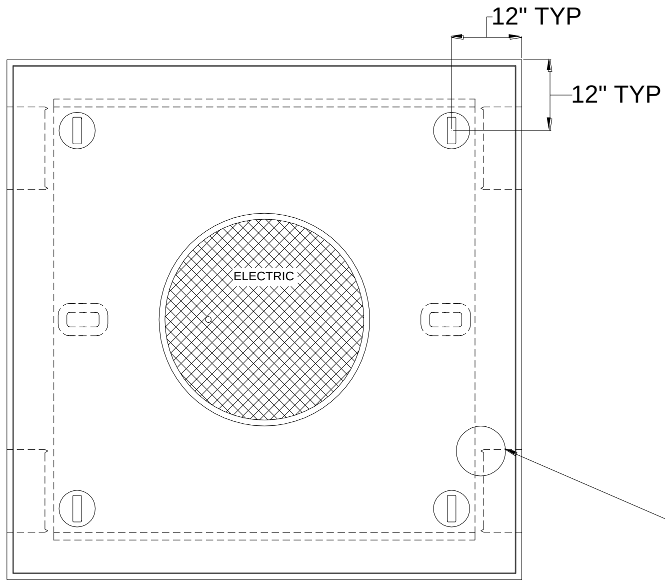
11. This box shall be installed in non-traffic areas only.

    NOTE: For traffic areas (e.g. streets, roads, etc.), use the RS-83 box.
12. There shall be a minimum 6’ clearance from RS-82 box to the centerline of a fire hydrant.
13. Retaining wall required when grade from the top of the lid rises or lowers more than 1’ in 5’ horizontally or when required by developer as perimeter wall. See RS-5 for details.
14. Conduits for new construction shall be installed in terminators nearest the property line whenever possible; future conduit stubouts shall be installed in terminators nearest the street whenever possible.
15. NV Energy lineman shall install # 2 bare copper bus to grounding inserts and attach all bonding wires.

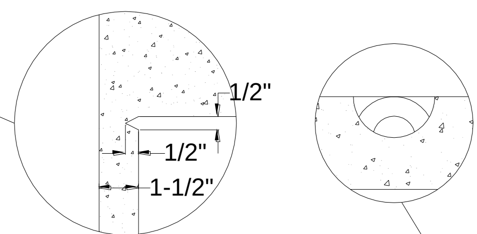
THIS PAGE INTENTIONALLY LEFT BLANK

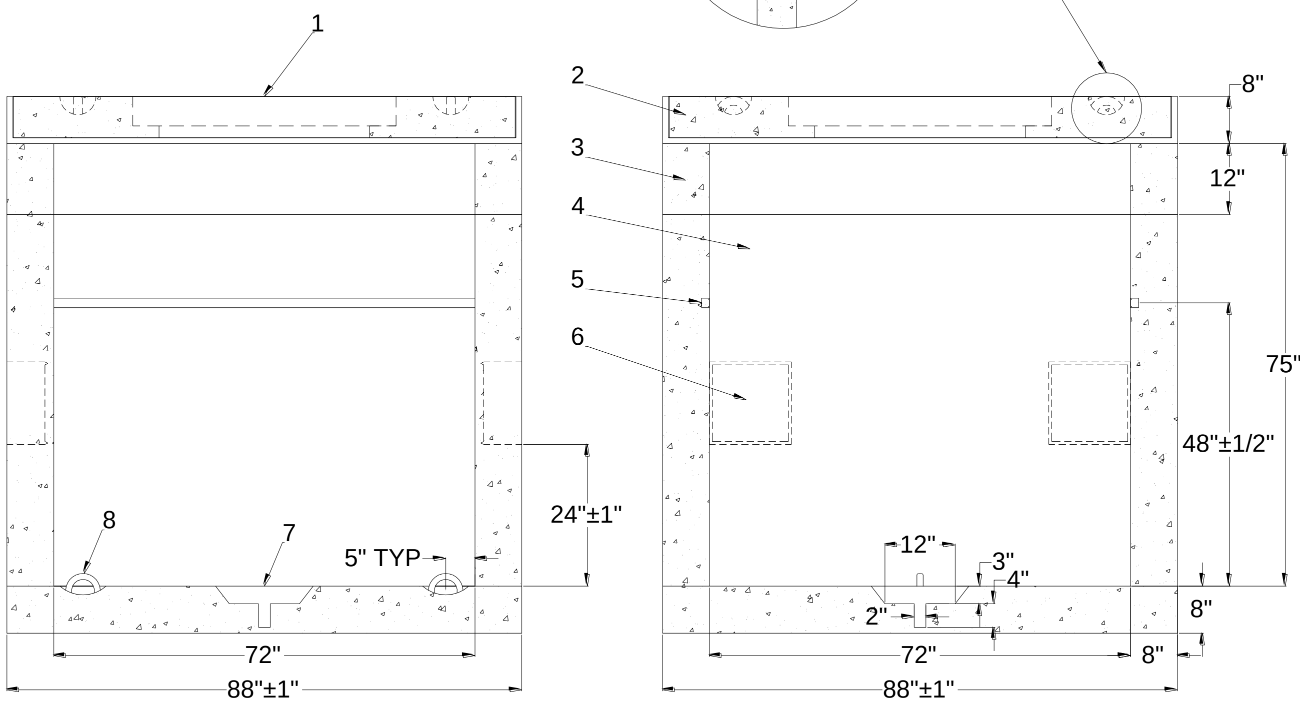
DESIGN REQUIREMENTS

APPROVED STRUCTURE	
MANUFACTURER	PULLBOX
JENSEN PRECAST	J-RS-83



LEGEND:
1. TRAFFIC LID & RING
2. TOP SECTION
3. BOX EXTENSION
4. BOX SECTION
5. UNISTRUT
6. MOLDED KNOCKOUT
7. SUMP PUMP RECESS
8. PULLING EYE

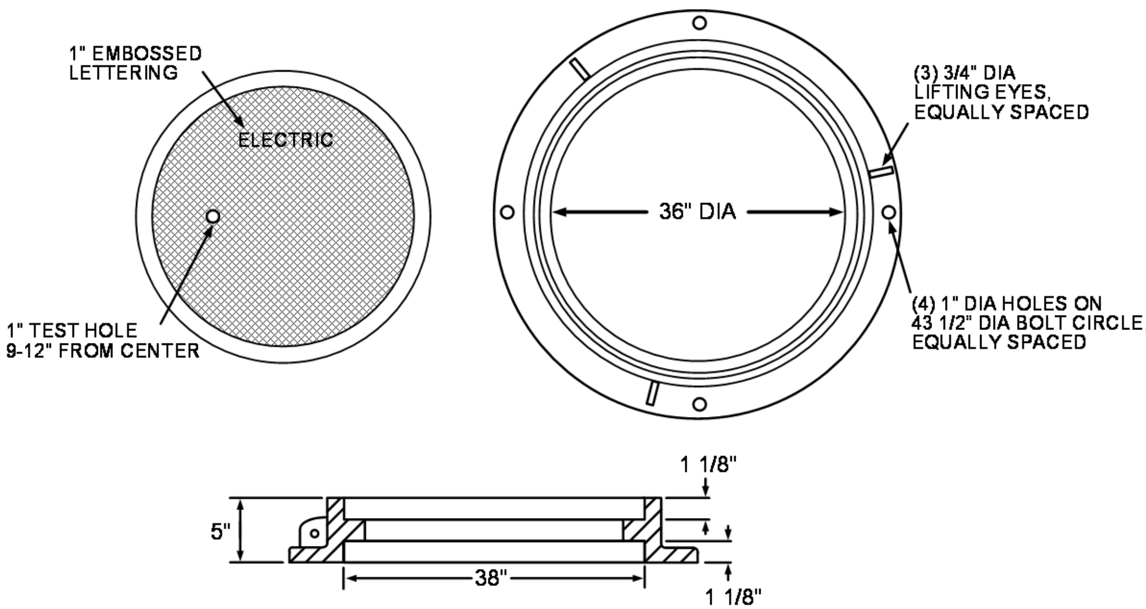




RS-83 INTERCEPT PULLBOX

1. THE RING AND LID

1. All traffic rings and lids require NVE approval.
2. Traffic rings and lids shall be made in USA and meet AASHTO-H20.44 specification. Conform to H-20 wheel loading, ASTM A-48, and class 35B.
3. Lid shall have a 1” diameter lifting hole (through the thickness of the lid located 9” to 12” from the center of the lid.
4. Lid shall have the word “ELECTRIC” in 1” letters, embossed in the top.
5. Frame to be reversible.
6. Ring and lid to have indexing provisions to assist with bolt-hole alignment.



2. TOP SECTION

1. A 36” inside diameter cast traffic frame (with lid) centered and molded into top section.
2. Four lifting provisions not extended above the top of the pad.
3. Pad (with an entrance hole of a 36” min. diameter) that can be easily lifted.

3. BOX EXTENSION

1. Be 12” in height.
2. Have an anchor at each corner of the steel frame.

4. BOX SECTION

1. Two hot dip galvanized steel unistruts (P3200HG x 72”) located in opposite walls.
2. Unistrut shall have a foam barrier installed during manufacture.

   NOTE: A final QA/QC check of all unistrut prior to shipping/delivery shall be conducted to ensure no grout or concrete material is contained within the unistrut. If any grout or concrete material is found at time of inspection it shall be removed
3. Two molded knockouts, 14” (W) x 14” (H) in two walls without unistrut, each knockout shall have a ½” notch around each knockout per detail “A” on page 1.
4. 72” (W) x 72” (L) inside dimensions with tolerances of ±1”.
5. Two steel pulling eyes in the floor.
6. A 12” diameter x 3” deep sump pump recess with a 2” diameter knockout in the middle of the floor.

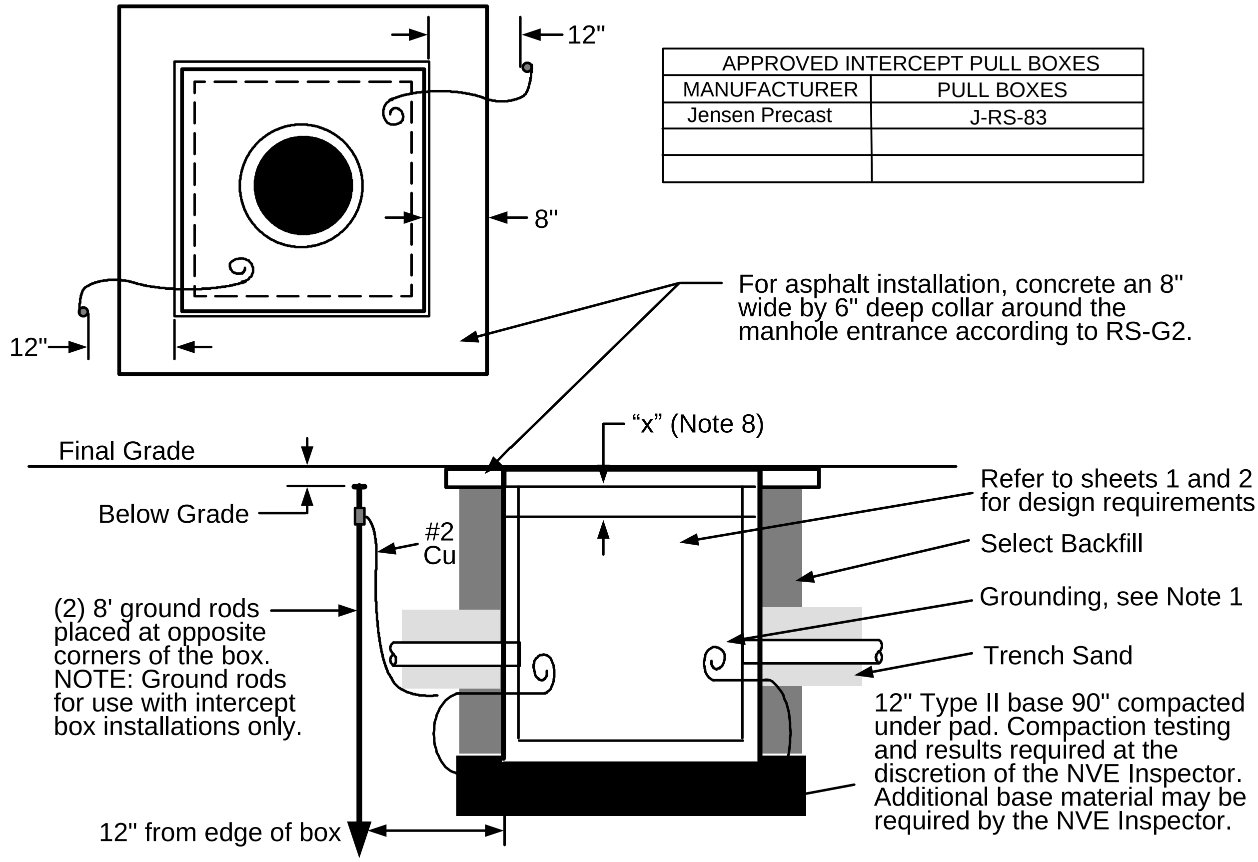
5. ENTIRE STRUCTURE

1. Shall meet RS-G2, RS-G4, and RS-G5.
2. Shims of any type are not allowed for the installation of this box.

   NOTE: Only this box may be installed directly under street traffic area and be utilized as a splice or pull box.

INSTALLATION REQUIREMENTS

APPROVED INTERCEPT PULL BOXES	
MANUFACTURER	PULL BOXES
Jensen Precast	J-RS-83



NOTES:

1. Grounding by customer, shall be one of the following:
   - A. 2-50' lengths of #2-7 stranded bare copper wire laid in trench with 5' tails in the box.
   - B. Only at the discretion of the NVE Inspector, two ½" x 8' copper clad ground rods placed at opposite corners of the box may be installed.
   - C. No exceptions allowed.

   ***Grounding in accordance with the latest edition/revision of the NESC.**
2. The bottom surface of the pull box shall be level.
3. If the ground water level is at least 3' below the bottom of the pull box, the 2" diameter knockout in the sump pump recess shall be removed.
4. A 4" split conduit shall be placed over the direct buried 1/0 cable before grouting the box to protect the cable.
5. Two of ½" -13 UNC spring nuts shall be installed by NVE for each module.
6. Intentionally Omitted.
7. Knockouts shall be removed from the inside of the structure.
8. If any final grade adjustment "x" is needed, take the actions listed in Table 1.

Table 1. Adjustment Requirements

Adjustment	Action
-6” to +5”	NVE contractor shall exchange existing 12” extension with 6” to 17” high extension ordered from the original manufacturer.
+6” to +12”	NVE contractor may order one additional 6” to 12” height extension from original manufacturer.
Below -6” & above 12”	Any extension shorter than 6” or exceeding 12” in height shall be subject to T&D Standard’s department approval.

9. If this box will be used as a switching box, the top section (4,200#) shall be lifted by a crane for the hot stick operation.
10. This box shall be used if installation directly under street traffic area is required.
11. Retaining wall required when grade from top of the lid rises or lowers more than 1’ in 5’ horizontally or when required by developer as perimeter wall. See RS-5 for details.
12. Shims of any type are not allowed for installation of this box.
13. Top section/grade ring may require a custom pour to meet final grade slope.
14. **Designer** – Must be approved by DF or team leader.

THIS PAGE INTENTIONALLY LEFT BLANK

DESIGN REQUIREMENTS

APPROVED INTERCEPT SLICE BOXES	
Manufacturer	Intercept Boxes
Jensen Precast	J-RS-84
Olson Precast	O-RS-84

TOLERANCES:

a = +1/2" , -1/2"

b = +0" , -1"

c = +0" , -1/16"

LEGEND:

1. BOX EXTENSION
2. MOLDED KNOCKOUT
3. SUMP PUMP RECESS
4. PULLING EYE
5. BOX SECTION
6. MASTIC
7. RS-80H

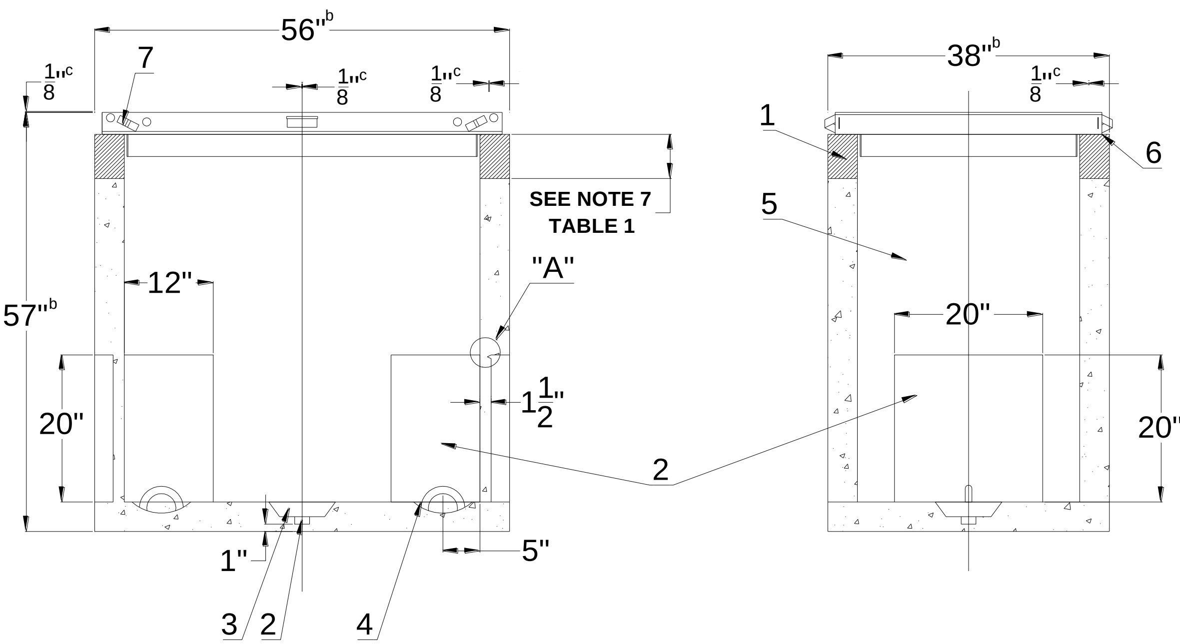
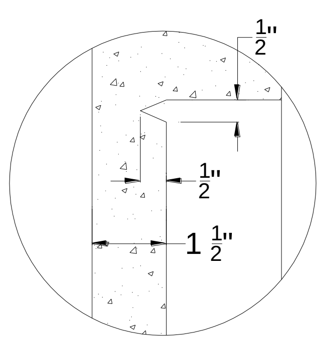


Figure 1. RS-84 Intercept Splice Box



"A"

NV Energy	Electric Service Requirements	RS-84
	Intercept Splice Box: 30” x 48” x 48”	

Drawn:	Eng:	Appr:	Date:	Revision: 6A
JR	JR	DA	9/19	Page 1 of 5

1. RS-80 HATCH

1. See RS-H for design requirements.
2. The gap between the precast structure and the lid shall be sealed with mastic or similar material approved by NVE (see Figure 1).

2. BOX EXTENSION

1. 30” (W) x 48” (L) inside dimensions with tolerances of ±1”.

3. BOX SECTION

1. Two 12” (W) x 20” (H) molded knockouts in each side wall.
2. One 20” (W) x 20” (H) molded knockouts in each end wall.
3. A 9” diameter x 2” deep sump pump recess with 2” diameter knockout in the middle of the floor.
4. All knockouts with ½” notch around each knockout in middle section per detail “A” on page 1.
5. 30” (W) x 48” (L) inside dimensions with tolerances of ±1”.
6. Two steel pulling eyes in the floor.

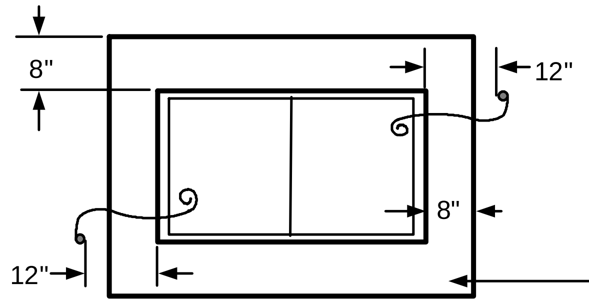
4. ENTIRE STRUCTURE

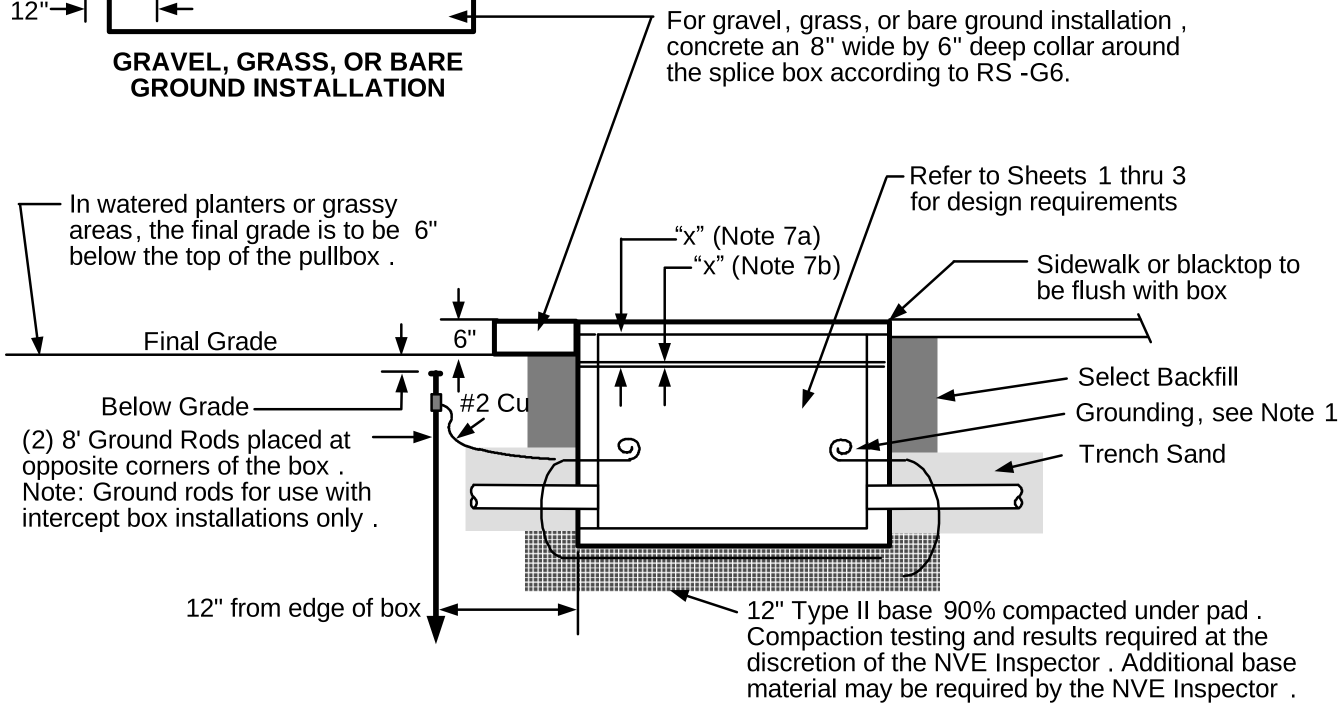
1. All exposed steel shall be hot dip galvanized after fabrication, except torsion bars.
2. Torsion bars shall be spray galvanized.
3. Shall meet RS-G2 and RS-G4.

NOTE: For traffic areas, (e.g., streets, roads, etc) use the RS-83 box.

INSTALLATION REQUIREMENTS

APPROVED INTERCEPT SPLICE BOXES	
MANUFACTURER	INTERCEPT BOXES
Jensen Precast	J-RS-84
Olson Precast	O-RS-84





NOTES:

1. Grounding by customer, shall be one of the following:
   - A. 2-50' lengths of #2-7 stranded bare copper wire laid in trench with 5' tails in the box.
   - B. Only at the discretion of the NVE Inspector, two ½" x 8' copper clad ground rods placed at opposite corners of the box may be installed.
   - C. No exceptions allowed.
   - * Grounding in accordance with the latest edition/revision of the NESC.
2. The bottom surface of the manhole shall be level.
3. If the ground water level is at least 3' below the bottom of the pull box, the 2" diameter knockout in the sump pump recess shall be removed.
4. To protect the cable, a 4" split conduit shall be placed over the direct buried 1/0 cable before grouting the box.
5. Intentionally Omitted.

6. Knockouts shall be removed from the inside of the structure.
7. If any final grade adjustments “x” are needed, take the actions listed in Table 1.

Table 1. Adjustment Requirements

Adjustment	Action
-6” to +5”	NVE contractor shall exchange existing 12” extension with 6” to 17” high extension ordered from the original manufacturer.
+6” to +12”	NVE contractor may order one additional 6” to 12” height extension from original manufacturer.
Below -6” & above 12”	Any extension shorter than 6” or exceeding 12” in height shall be subject to T&D Standard’s department approval.

8. This box may be installed in sidewalks or in delivery alleys behind commercial developments.
   NOTE: For traffic areas, (e.g. streets, roads, etc.) use the RS-83 box.
9. There shall be a minimum 6’ clearance from the RS-84 box to the centerline of a fire hydrant.
10. Retaining wall required when grade from the top of the lid rises or lowers more than 1’ in 5’ horizontally or when required by developer as perimeter wall. See RS-5 for details.

THIS PAGE INTENTIONALLY LEFT BLANK

DESIGN REQUIREMENTS

APPROVED STRUCTURE	
MANUFACTURER	INTERCEPT BOX
JENSEN PRECAST	J-RS-85
OLSON PRECAST	O-RS-85

TOLERANCES:

a = +1/2" , -1/2"

b = +0" , -1"

c = +0" , -1/16"

LEGEND:

1. BOX EXTENSION
2. UNISTRUT
3. MOLDED KNOCKOUT
4. SUMP PUMP RECESS
5. PULLING EYE
6. BOX SECTION
7. MASTIC
8. RS-82A HATCH
9. BOX EXTENSION

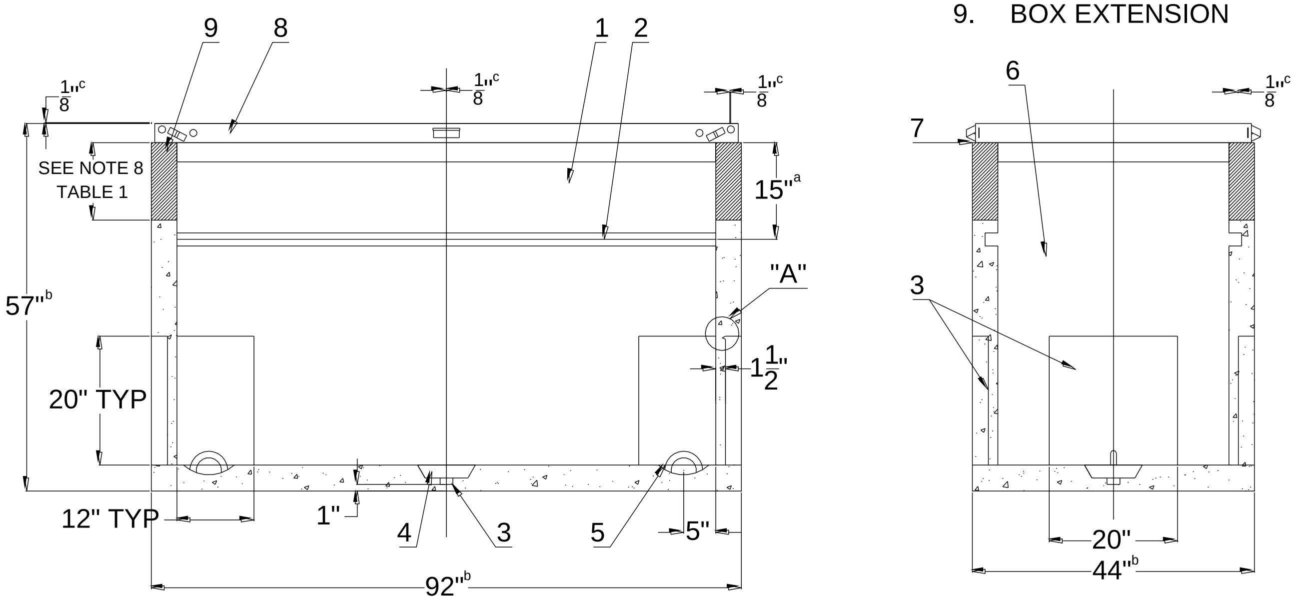
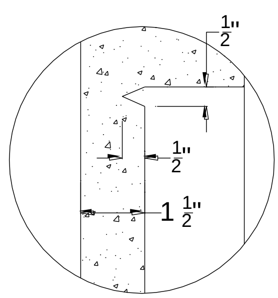


Figure 1. RS-85 Intercept Box



"A"

NVEnergy				Electric Service Requirements	RS-85
				Intercept Box: 36" x 84" x 48"	
Drawn:	Eng:	Appr:	Date:		Revision: 7
JJ	JR	DA	10/18		Page 1 of 5

1. RS-82A HATCH

1. See RS-H for design requirements.
2. The gap between the precast structure and the lid shall be sealed with mastic or similar material approved by NVE (see Figure 1).

2. BOX EXTENSION

1. 36” (W) x 84” (L) inside dimensions with tolerances of ±1”.

3. BOX SECTION

1. Two 12” (W) x 20” (H) molded knockouts in each side wall.
2. Two 20” (W) x 20” (H) molded knockouts in each end wall.
3. All knockouts with ½” notch around each knockout in middle section per detail “A” on page 1.
4. Two hot dip galvanized unistruts (P3200HG x 84”) located in opposite walls (stainless steel spring nuts shall be installed by NVE).
5. Unistrut shall have a foam barrier installed during manufacture.

   NOTE: A final QA/QC check of all unistrut prior to shipping/delivery shall be conducted to ensure no grout or concrete material is contained within the unistrut. If any grout or concrete material is found at time of inspection it shall be removed

5. 36” (W) x 84” (L) inside dimensions with tolerances of ±1”.
6. Two steel pulling eyes in the floor.
7. A 9” diameter x 2” deep sump pump recess with 2” diameter knockout in the middle of the floor.

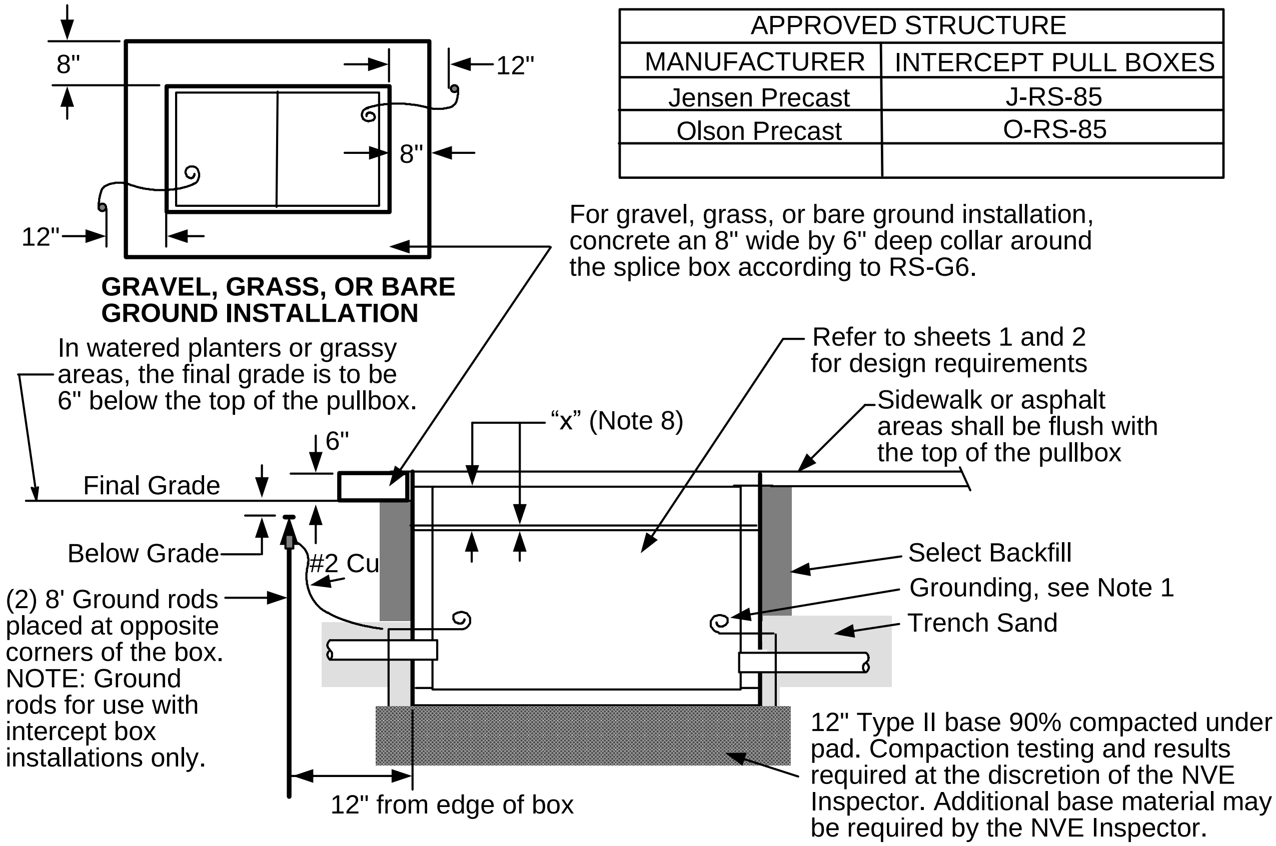
4. ENTIRE STRUCTURE

1. All exposed steel shall be hot dip galvanized after fabrication, except torsion bars.
2. Torsion bars shall be spray galvanized.
3. Shall meet RS-G2 and RS-G4.

   NOTE: For traffic areas, (e.g. streets, roads, etc.) use the RS-83 box.

INSTALLATION REQUIREMENTS

APPROVED STRUCTURE	
MANUFACTURER	INTERCEPT PULL BOXES
Jensen Precast	J-RS-85
Olson Precast	O-RS-85



NOTES:

1. Grounding by customer, shall be one of the following:
   A. 2-50' lengths of #2-7 stranded bare copper wire laid in trench with 5' tails in the box.
   B. Only at the discretion of the NVE Inspector, two ½" x 8' copper clad ground rods placed at opposite corners of the box may be installed.
   C. No exceptions allowed.

   ***Grounding in accordance with the latest edition/revision of the NESC.
2. The bottom surface of the manhole shall be level
3. If the ground water level is at least 3' below the bottom of the pull box, the 2" diameter knockout in the sump pump recess shall be removed.
4. To protect the cable, a 4" split conduit shall be placed over the direct buried 1/0 cable before grouting the box.
5. Intentionally Omitted.
6. Knockouts shall be removed from the inside of the structure.
7. Two ½" – 13 UNC pentahead stainless steel bolts and spring nuts shall be installed by NVE for each module.

8. If any final grade adjustment "x" is needed, take the actions listed in Table 1.

Table 1. Adjustment Requirements

Adjustment	Action
-6" to +5"	NVE contractor shall exchange existing 12" extension with 6" to 17" high extension ordered from the original manufacturer.
+6" to +12"	NVE contractor may order one additional 6" to 12" height extension from original manufacturer.
Below -6" & above 12"	Any extension shorter than 6" or exceeding 12" in height shall be subject to T&D Standard's department approval.

9. The box may be installed in sidewalks and non traffic areas; for installations in delivery alleys behind commercial developments specify an RS-82B three piece lid.

   NOTE: For traffic areas (e.g. streets, roads, etc.), use the RS-83 box.

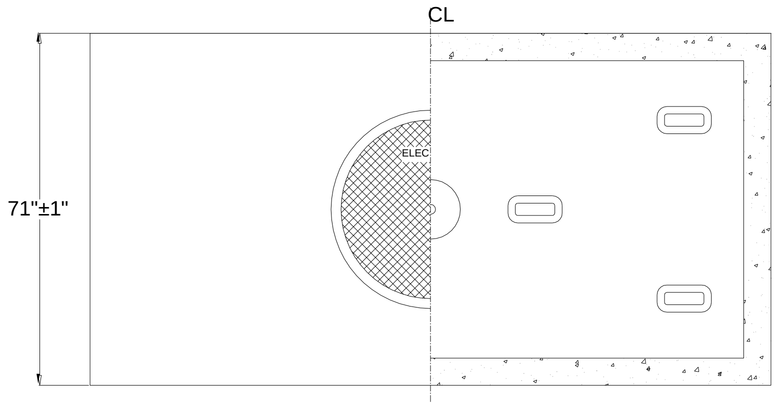
10. There shall be a minimum 6' clearance from the RS-85 box to the centerline of a fire hydrant.

11. Retaining wall required when grade from the top of the lid rises or lowers more than 1' in 5' horizontally or when required by developer as perimeter wall.

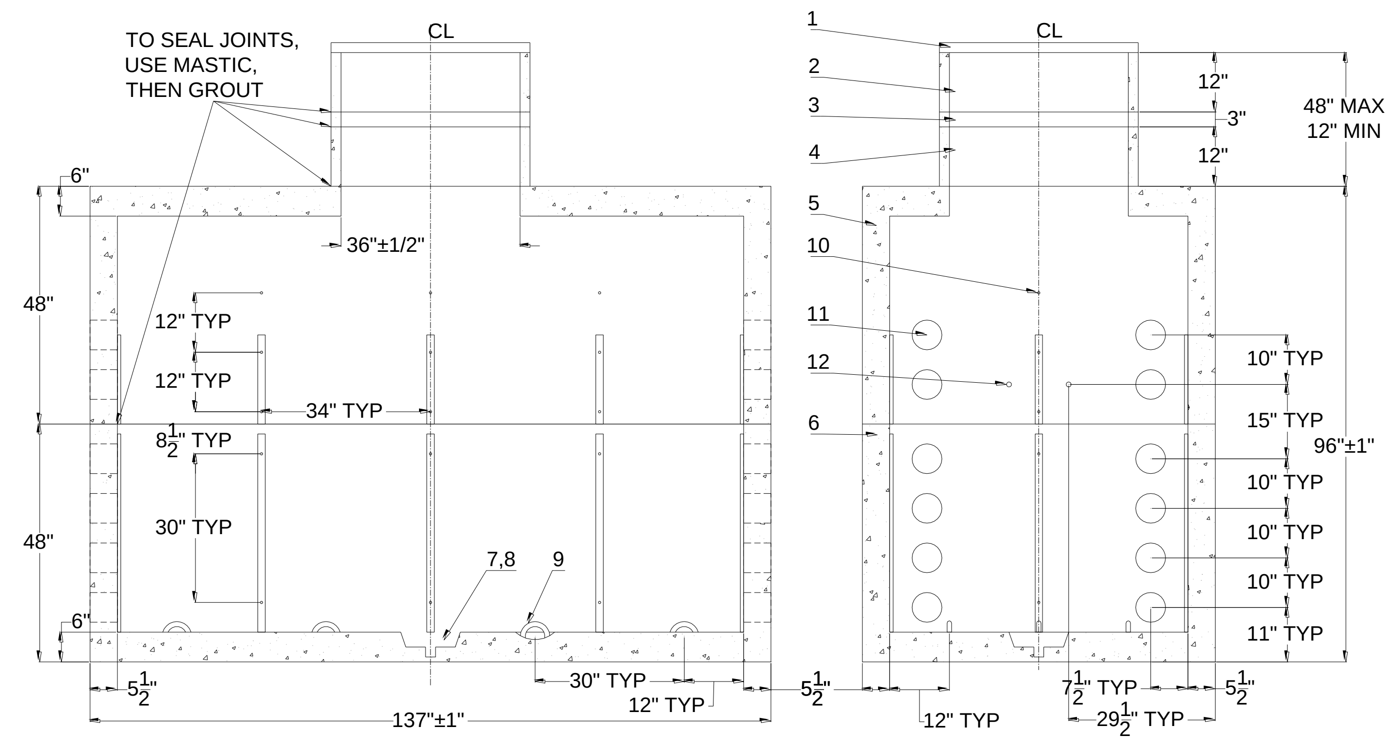
THIS PAGE INTENTIONALLY LEFT BLANK

DESIGN REQUIREMENTS

APPROVED STRUCTURE	
MANUFACTURER	MANHOLE
JENSEN PRECAST	J-RS-94
OLSON PRECAST	O-RS-94



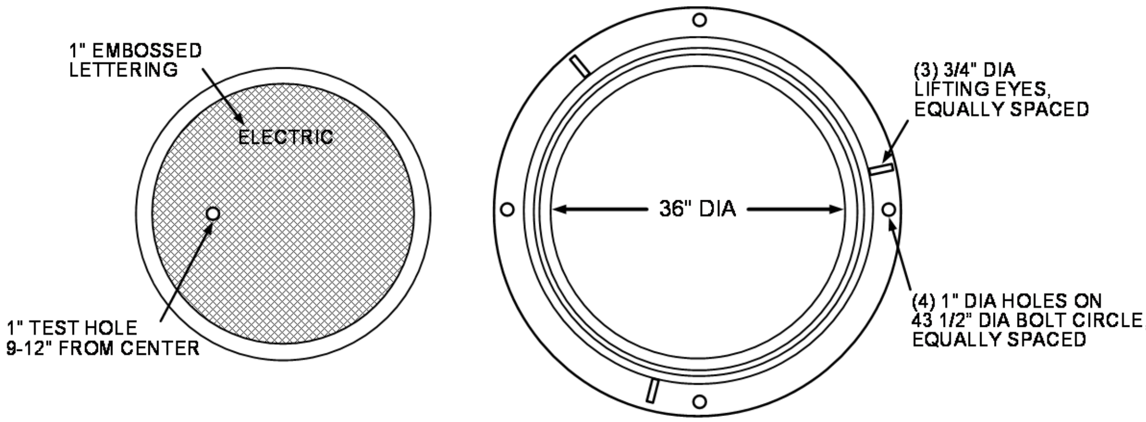
LEGEND:
1. TRAFFIC LID & RING
2. TOP NECK
3. EXTENSION NECK
4. BOTTOM NECK
5. TOP SECTION
6. BOTTOM SECTION
7. MOLDED KNOCKOUT
8. SUMP PUMP RECESS
9. PULLING EYE
10. 1/2"-13 UNC GROUNDING INSERTS
11. 6" CONDUIT TERMINATOR
12. 1" PVC GROUND WIRE CONDUIT

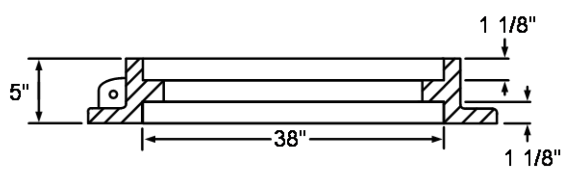


RS-94 MANHOLE

1. The Ring and Lid

1. All traffic rings and lids require NVE approval.
2. Traffic rings and lids shall be made in USA and meet AASHTO-H20.44 specification. Conform to H-20 wheel loading, ASTM A-48, and class 35B.
3. Lid shall have a 1” diameter lifting hole (through the thickness of the lid located 9” to 12” from the center of the lid.
4. Lid shall have the word “ELECTRIC” in 1” letters, embossed in the top.
6. Frame to be reversible.
7. Ring and lid to have indexing provisions to assist with bolt-hole alignment.





2. Neck Tunnel

1. A 36” diameter cast traffic frame centered and mounted on the top of the 12” high top neck.
2. 3” extension neck.
3. 12” high bottom neck.

3. Top Section

1. Nine 1/2” grounding insert nuts in each side wall and three in each end wall.
2. A 1” diameter PVC conduit through the end walls.
3. Four 6” diameter PVC conduit terminators through the end walls.
4. 60” (W) x 126” (L) x 42” (H) inside dimensions with tolerances of ± 1”.
5. Three 18” steel racks, Inwesco 10A07 or approved equivalent, installed on each side wall and one on each end wall.

4. Bottom Section

1. Six 1/2” grounding insert nuts in each side wall and two in each end wall, located on two levels per drawing on page 1.
2. Six steel pulling eyes in the floor shall be hot dip galvanized.
3. A 12” diameter x 3” deep sump pump recess with a 2” diameter knockout in the middle of the floor.
4. Eight 6” diameter PVC conduit terminators through each end wall.
5. 60” (W) x 126” (L) x 42” (H) inside dimensions with tolerances of $\pm$ 1”.
6. Three 40” steel racks, Inwesco 10A13 or approved equivalent, installed on each side wall and one on each end wall.

5. Entire Structure

1. Shall meet RS-G2, RS-G4, and RS-G5.

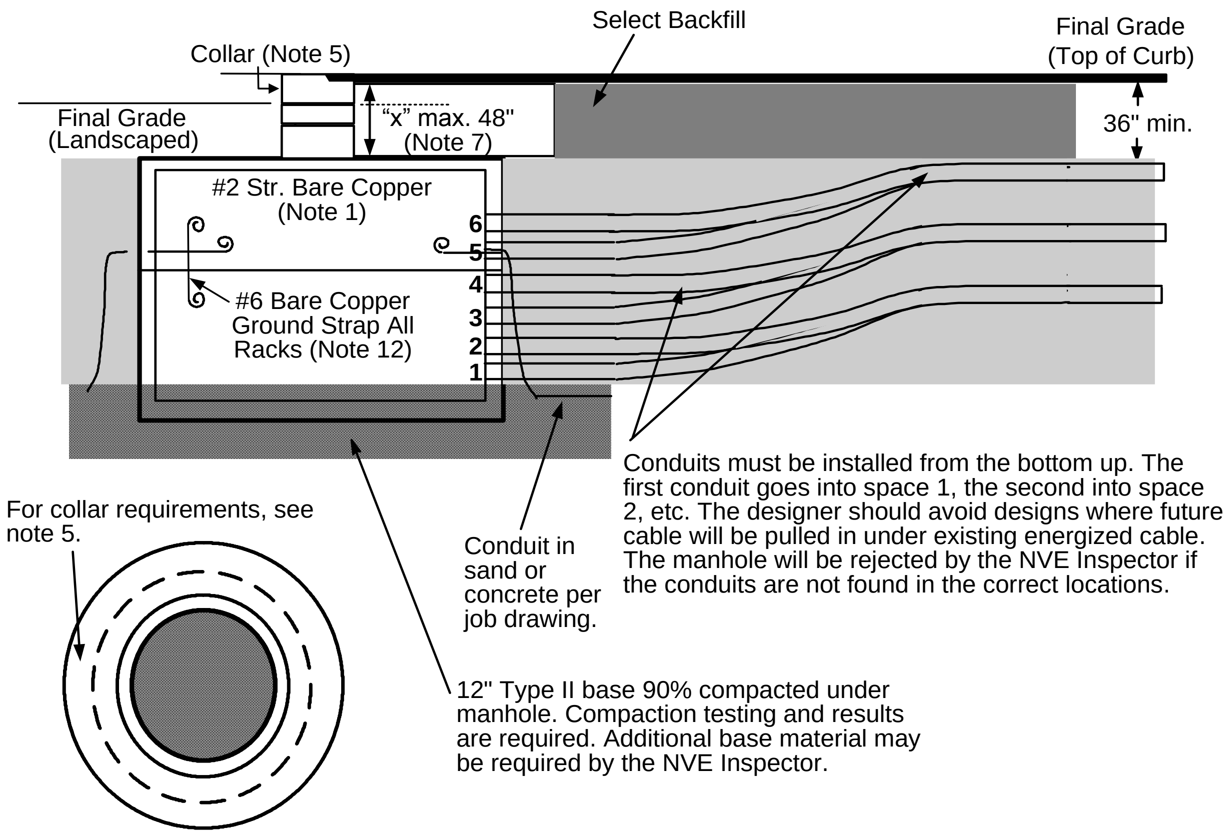
   NOTE: Only this manhole may be installed directly under street traffic area.
2. Shims of any type are not allowed for the installation of this box.

6. Grounding

1. Manholes shall have grounding inserts on all walls around the inside perimeter as shown on Page 1. The inserts shall be spaced in accordance with this specification drawing. Inserts to be attached to the internal manhole rebar by spot welding or approved connector. The insert shall accept 1/2”-13 UNC thread. Continuity between all inserts installed in the manhole sections shall be checked and verified prior to shipping by manufacturer/supplier.

INSTALLATION REQUIREMENTS

APPROVED STRUCTURE	
MANUFACTURER	MANHOLE
Jensen Precast	J-RS-94
Olson Precast	O-RS-94



NOTES:

1. Grounding by customer shall be 2-50' #2-7 stranded bare copper ground wires laid in the bottom of the conduit trench in opposite directions with 2-5' trails left in the box. Ground wires shall be installed through a 1" PVC conduit in the structures end walls and attached to the 2/0 copper grounding bus.
   A. No exceptions allowed.
2. The bottom surface of the manhole shall be level.
3. If the ground water level is at least 3' below the bottom of the splice box, the 2" diameter knockout in the sump pump recess shall be removed.
4. If the designer specifies additional conduit openings, the contractor shall core drill the holes as required.
5. Collar Requirements:
   A. All manholes located in roadways, including bike lanes, shall have a collar 12" in width and 8" in depth surrounding the ring and lid. Additionally, one #4 rebar will be centered in collar per Regional Transportation Commission Uniform Standard Drawing 408.S1.

B. All other manholes shall have a collar 8” in width and 6” in depth surrounding ring and lid.

6. Provide minimum cover of no less than 12” native soil or approved backfill.
7. If any final grade adjustment “X” is needed, take the following actions listed in table 1:

Table 1. Adjustment Requirements

Adjustment	Action
15” – 48”	The NVE contractor shall order up to 48” high neck sections from the original manufacturer.
Above 48”	Raise the entire box. No neck extensions shall exceed 48”.

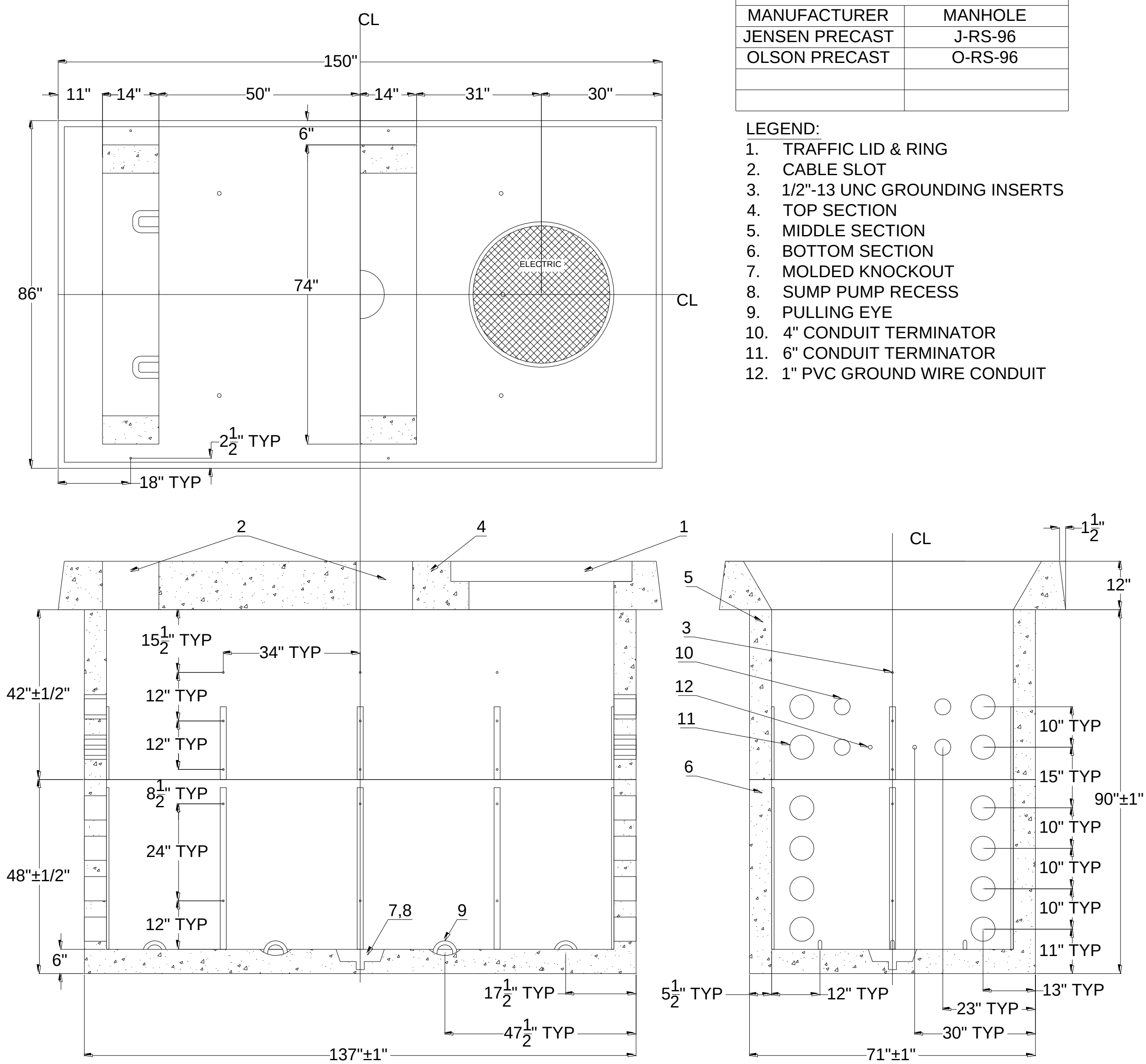
8. Extensions between the top and bottom sections of the box will not be allowed.
9. No more than four neck extensions are allowed to reach the final grade.
10. This manhole shall be used if installation is required directly under street traffic area.
11. There shall be a minimum 6’ clearance from the RS-94 box to the centerline of a fire hydrant.
12. In wet, planter, or grassy areas, final grade to be 6” below the top of entrance to the manhole.
13. NVE lineman shall install #6 bare copper to upper and lower steel racks to bond top and bottom box sections.
14. Shims of any type are not allowed for installation of this box.
15. Top section/grade ring may require a custom pour to meet final grade slope.

THIS PAGE INTENTIONALLY LEFT BLANK

DESIGN REQUIREMENTS

APPROVED STRUCTURE	
MANUFACTURER	MANHOLE
JENSEN PRECAST	J-RS-96
OLSON PRECAST	O-RS-96

LEGEND:
1. TRAFFIC LID & RING
2. CABLE SLOT
3. 1/2"-13 UNC GROUNDING INSERTS
4. TOP SECTION
5. MIDDLE SECTION
6. BOTTOM SECTION
7. MOLDED KNOCKOUT
8. SUMP PUMP RECESS
9. PULLING EYE
10. 4" CONDUIT TERMINATOR
11. 6" CONDUIT TERMINATOR
12. 1" PVC GROUND WIRE CONDUIT



RS-96 MANHOLE

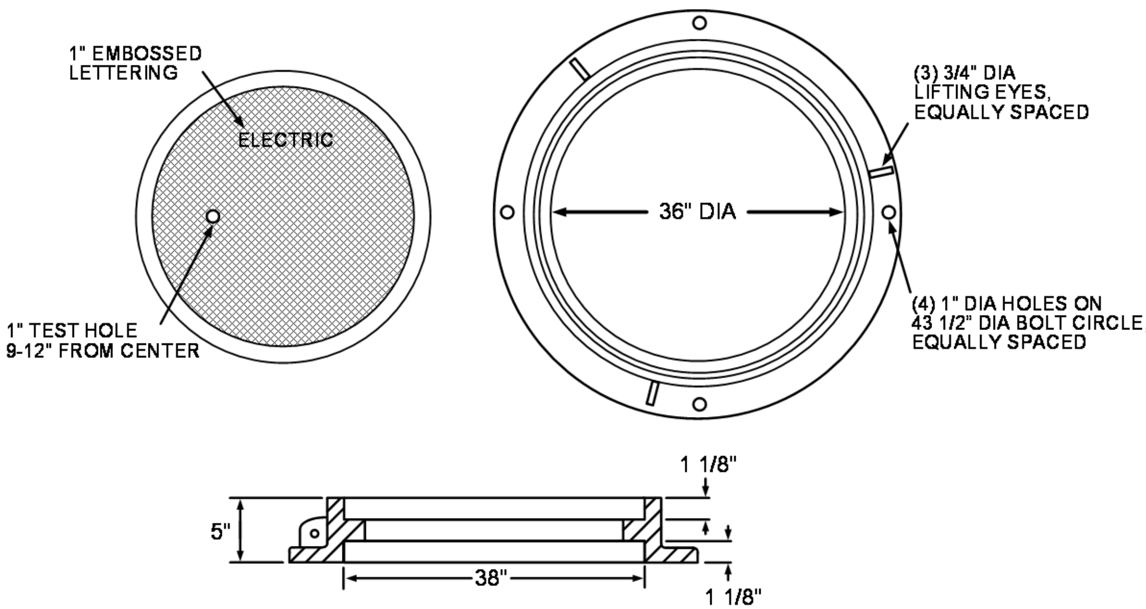
ALL RS-110 TO RS-113

NV Energy	Electric Service Requirements	RS-96
	Manhole: Switch/Fuse Cabinet, 25kV	Revision: 01

Drawn:	Eng:	Appr:	Date:
JR	JR	DA	10/18

1. Ring and Lid

1. All traffic rings and lids require NVE approval.
2. Traffic rings and lids shall be made in USA and meet AASHTO-H20.44 specification. Conform to H-20 wheel loading, ASTM A-48, and class 35B.
3. Lid shall have a 1” diameter lifting hole (through the thickness of the lid), located 9” to 12” from the center of the lid.
4. Lid shall have the word “ELECTRIC” in 1” letters, embossed in the top.
5. Frame to be reversible.
6. Ring and lid to have indexing provisions to assist with bolt-hole alignment.



2. Top Pad Section

1. Two 14” x 74” cable slots.
2. Four 1/2”-13 UNC insert.
3. Four 1” lifting inserts placed at manufacturer’s discretion for safe lifting.
4. 1-1/2” taper all around top of pad.
5. 36” diameter cast iron traffic frame mounted in the concrete.

3. Middle Section:

1. Nine 1/2” grounding insert nuts in each side wall and three in each end wall, located on the same level.
2. A 1” diameter PVC conduit through the end walls.
3. Four 6” and four 4” diameter PVC conduit terminators through each end wall.
4. 60” (W) x 126 “(L) x 42” (H) inside dimensions with tolerances of ±1”.
5. Three 18” steel racks, Inwesco 10A07 or approved equivalent, installed on each side wall and one on each end wall.

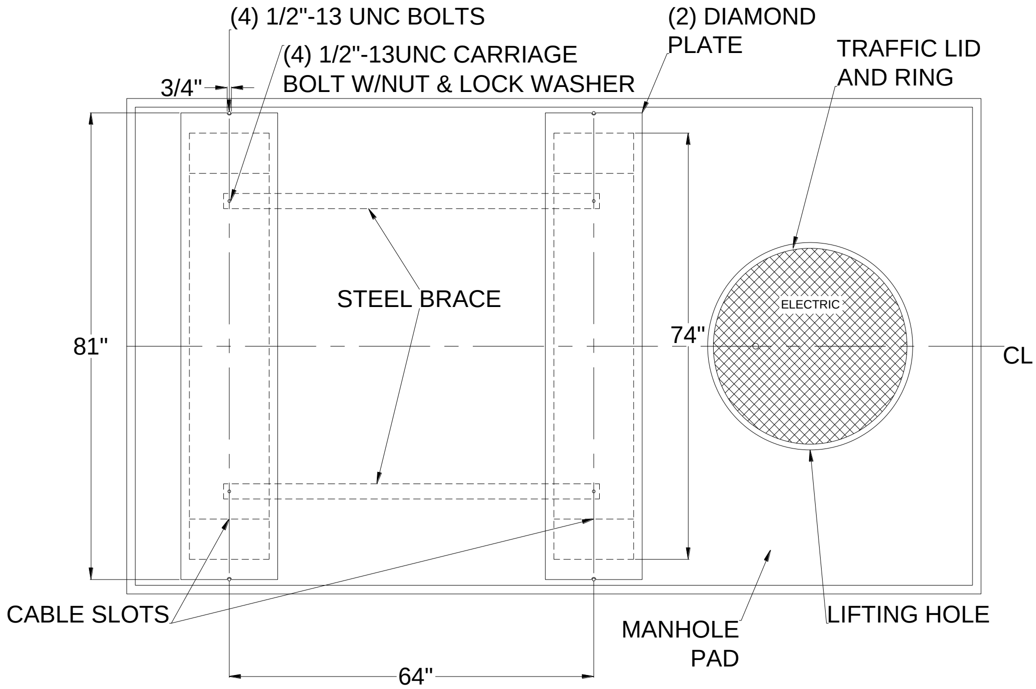
4. Bottom Section:

1. Six 1/2” grounding insert nuts in each side wall and two in each end wall, located on two levels per drawing on page 1.
2. Six steel pulling eyes in the floor (hot dip galvanized).
3. A 12” diameter x 3” deep sump pump recess with a 2” diameter knockout in the middle of the floor.
4. Eight 6” diameter PVC conduit terminators through each end wall.
5. 60” (W) x 126” (L) x 42” (H) inside dimensions with tolerances of $\pm$1”.
6. Three 40” steel racks, Inwesco 10A13 or approved equivalent, installed on each side wall and one on each end wall.

5. Entire Structure:

1. Shall meet RS-G2, RS-G4, and RS-G5.

   NOTE: In the case of road expansion, this structure shall not be adapted for placement under the road without NVE T & D Standards approval.
2. Shims of any type are not allowed for the installation of this box.



RS-96 MANHOLE

ALL RSI-110 TO RSI-113
SAFETY REQUIREMENTS

6. Diamond Plates

1. Every Top Pad shall have both cable slots covered with 1/4” x 17” x 81” steel diamond plates per above drawing. Each plate shall be fastened to the pad with two 1/2” – 13UNC hex head bolts and secured with two steel braces made from angle iron or unistrut on the bottom of the pad. Braces shall be fastened to the plate with 1/2”-13UNC carriage bolts, nuts, and lock washers.
2. Removal of the Steel Diamond Plate without immediate installation of the Cabinet is prohibited.

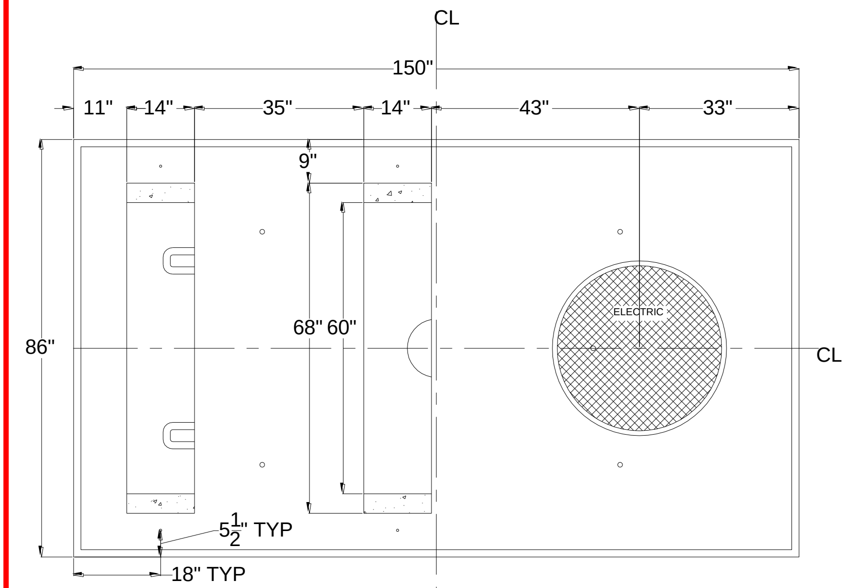
7. Grounding

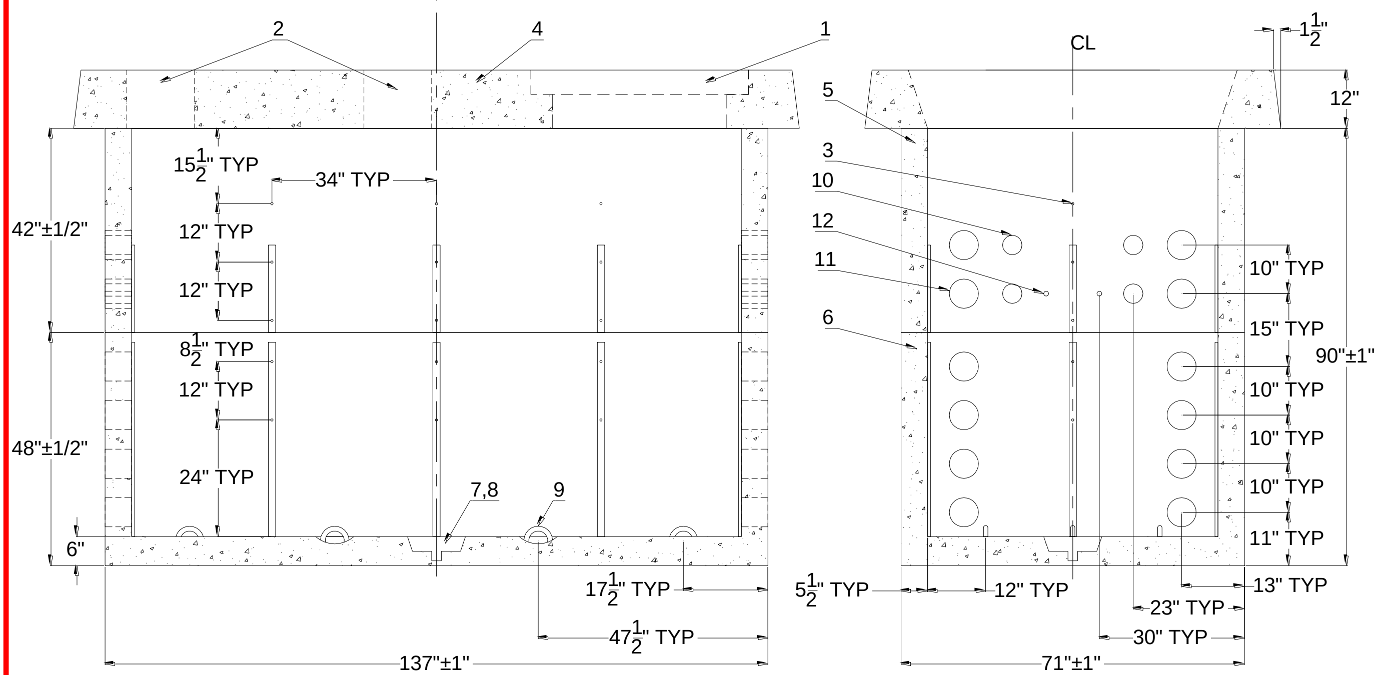
Manholes shall have grounding inserts on all walls around the inside perimeter as shown on Page 1. The inserts shall be spaced in accordance with this specification drawing. Inserts to be attached to the internal manhole rebar by spot welding or approved connector. The insert shall accept 1/2” American Standard thread. Continuity between all inserts installed in manhole sections shall be checked and verified prior to shipping by manufacturer/supplier.

DESIGN REQUIREMENTS

APPROVED STRUCTURE	
MANUFACTURER	MANHOLE
JENSEN PRECAST	J-RS-97
OLSON PRECAST	O-RS-97

LEGEND:
1. TRAFFIC LID & RING
2. CABLE SLOT
3. 1/2"-13 UNC GROUNDING INSERTS
4. TOP SECTION
5. MIDDLE SECTION
6. BOTTOM SECTION
7. MOLDED KNOCKOUT
8. SUMP PUMP RECESS
9. PULLING EYE
10. 4" CONDUIT TERMINATOR
11. 6" CONDUIT TERMINATOR
12. 1" PVC GROUND WIRE CONDUIT



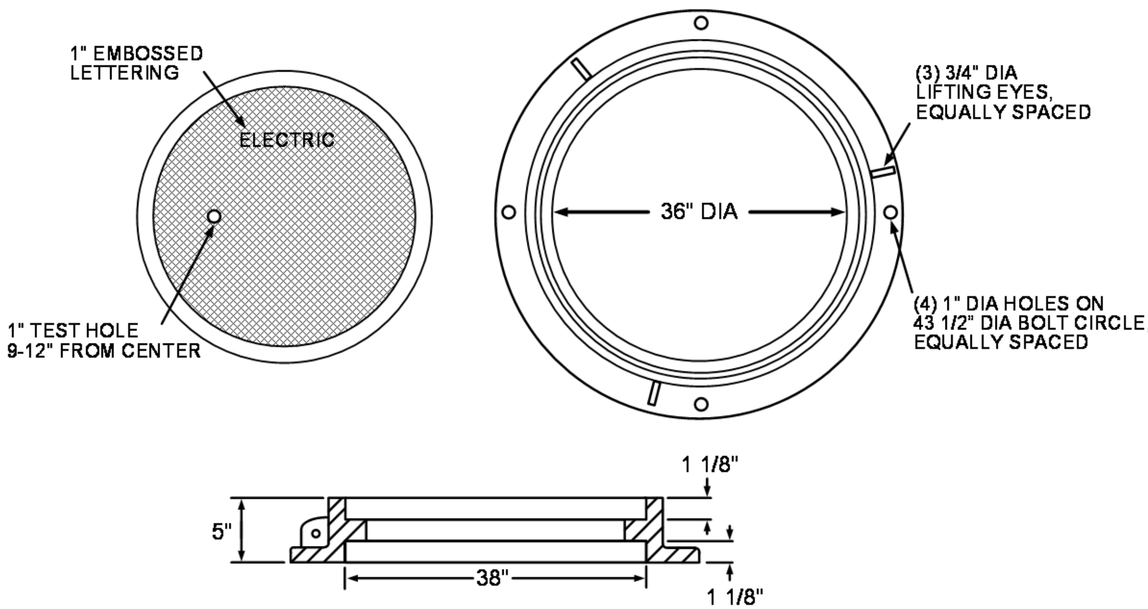


RS-97 MANHOLE

ALL RS-98 TO RS-101, RS116

1. Ring and Lid

1. All traffic rings and lids require NVE approval.
2. Traffic rings and lids shall be made in USA and meet AASHTO-H20.44 specification. Conform to H-20 wheel loading, ASTM A-48, and class 35B.
3. Lid shall have a 1” diameter lifting hole (through the thickness of the lid), located 9” to 12” from the center of the lid.
4. Lid shall have the word “ELECTRIC” in 1” letters, embossed in the top.
5. Frame to be reversible.
7. Ring and lid to have indexing provisions to assist with bolt-hole alignment.



2. Top Pad Section

1. Two 14” x 68” cable slots.
2. Four 1/2”-13 UNC inserts.
3. Four 1” lifting inserts placed at manufacturer’s discretion for safe lifting.
4. 1-1/2” Taper all around top of pad.
3. 36” diameter cast iron traffic frame mounted in the concrete.

3. Middle Section:

1. Nine 1/2” grounding insert nuts in each side wall and three in each end wall, located on the same level.
2. A 1” diameter PVC conduit through the end walls.
3. Four 6” and four 4” diameter PVC conduit terminators through each end wall.
4. 60” (W) x 126 “(L) x 42” (H) inside dimensions with tolerances of ±1”.
5. Three 18” steel racks, Inwesco 10A07 or approved equivalent, installed on each side wall and one on each end wall.

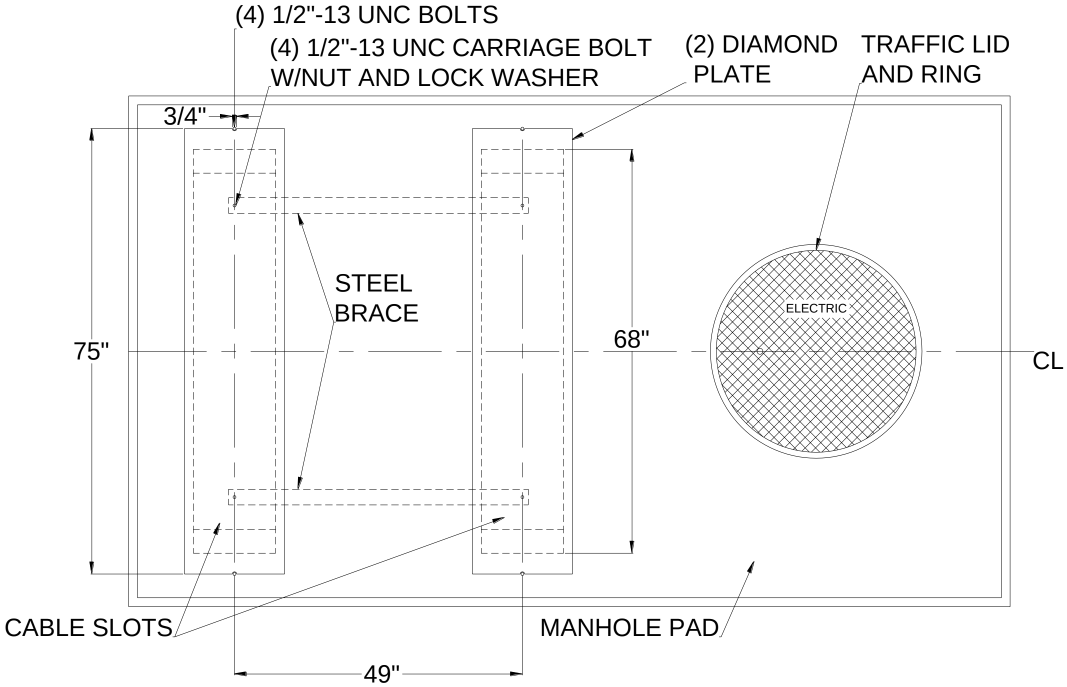
4. Bottom Section:

1. Six 1/2" grounding insert nuts in each side wall and two in each end wall, located on two levels per drawing on page 1.
2. Six steel pulling eyes in the floor (hot dip galvanized).
3. A 12" diameter x 3" deep sump pump recess with a 2" diameter knockout in the middle of the floor.
4. Eight 6" diameter PVC conduit terminators through each end wall.
5. 60" (W) x 126" (L) x 42" (H) inside dimensions with tolerances of $\pm$1".
6. Three 40" steel racks, Inwesco 10A13 or approved equivalent, installed on each side wall and one on each end wall.

5. Entire Structure:

1. Shall meet RS-G2, RS-G4, and RS-G5.

   NOTE: In the case of road expansion, this structure shall not be adapted for placement under the road without NVE T & D Standards approval.
2. Shims of any type are not allowed for the installation of this box.



RS-97 MANHOLE

ALL RSI-98 TO RSI-101, RS-116

SAFETY REQUIREMENTS

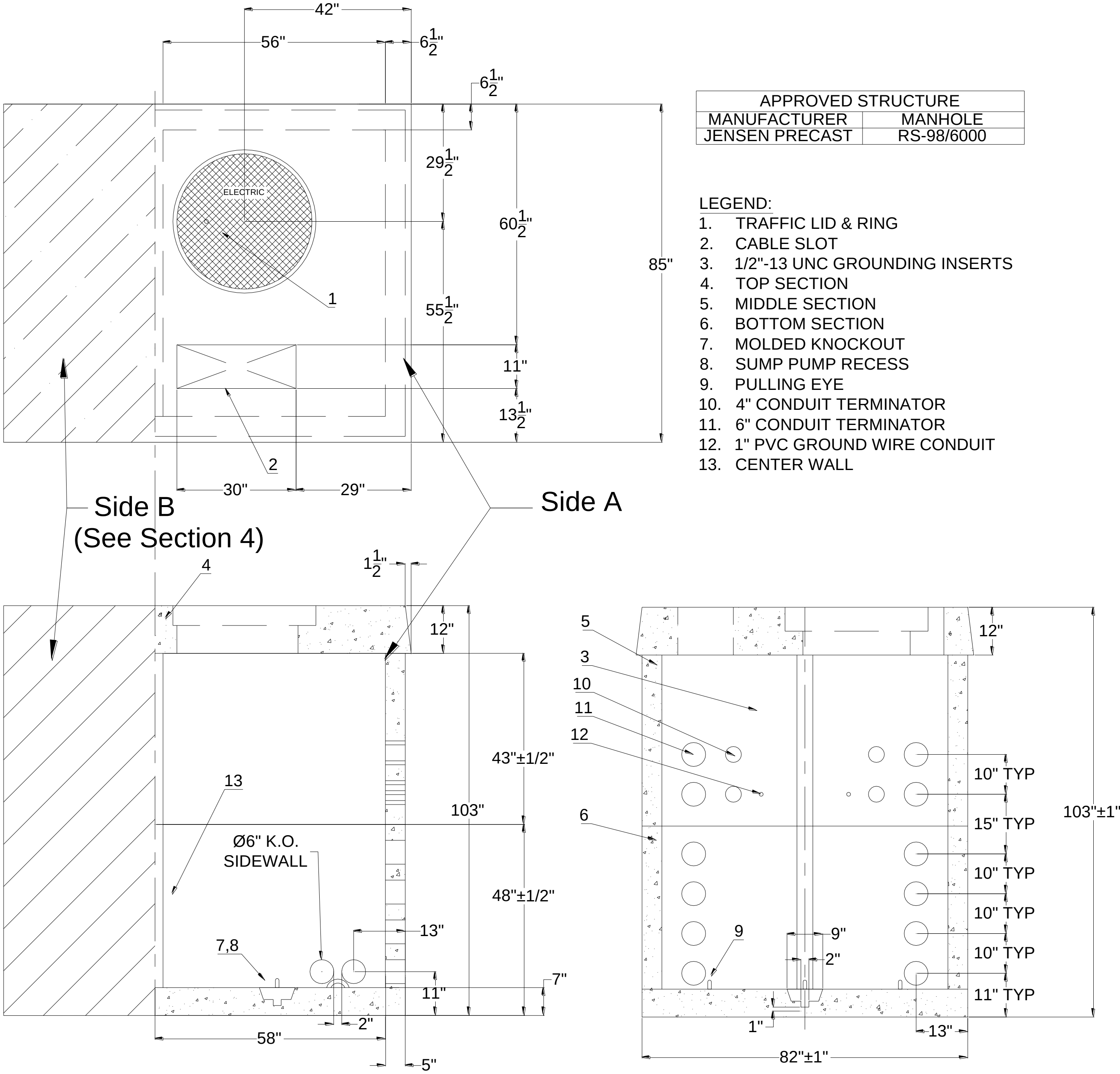
6. Diamond Plates

1. Every Top Pad shall have both cable slots covered with 1/4” x 17” x 75” steel diamond plates per above drawing. Each plate shall be fastened to the pad with two 1/2” – 13UNC hex head bolts and secured with two steel braces made from angle iron or unistrut on the bottom of the pad. Braces shall be fastened to the plate with 1/2”-13UNC carriage bolts, nuts, and lock washers.
2. Removal of the Steel Diamond Plate without immediate installation of the Cabinet is prohibited.

7. Grounding

Manholes shall have grounding inserts on all walls around the inside perimeter as shown on Page 1. The inserts shall be spaced in accordance with this specification drawing. Inserts to be attached to the internal manhole rebar by spot welding or approved connector. The insert shall accept 1/2” American Standard thread. Continuity between all inserts installed in manhole sections shall be checked and verified prior to shipping by manufacturer/supplier.

THIS PAGE INTENTIONALLY LEFT BLANK



APPROVED STRUCTURE	
MANUFACTURER	MANHOLE
JENSEN PRECAST	RS-98/6000

LEGEND:

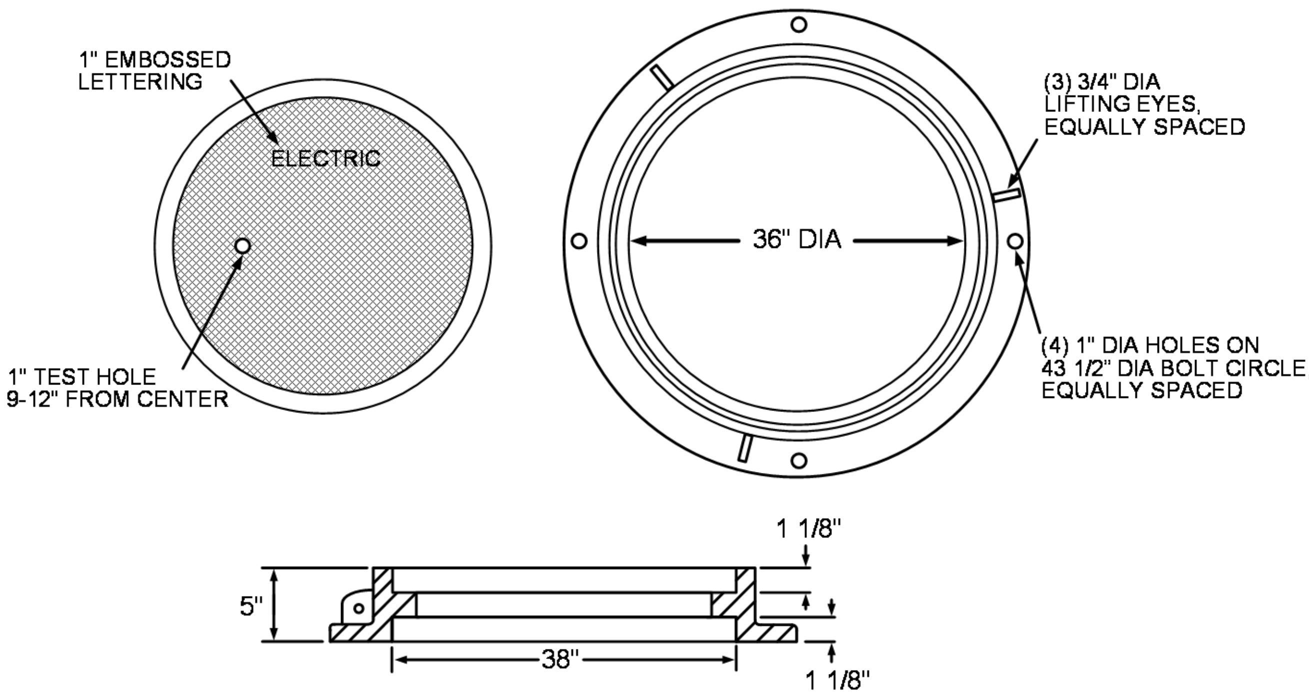
1. TRAFFIC LID & RING
2. CABLE SLOT
3. 1/2"-13 UNC GROUNDING INSERTS
4. TOP SECTION
5. MIDDLE SECTION
6. BOTTOM SECTION
7. MOLDED KNOCKOUT
8. SUMP PUMP RECESS
9. PULLING EYE
10. 4" CONDUIT TERMINATOR
11. 6" CONDUIT TERMINATOR
12. 1" PVC GROUND WIRE CONDUIT
13. CENTER WALL

RS-97C MANHOLE

ALL RS-98 TO RS-101, RS116

1. Ring and Lid

1. All traffic rings and lids require NVE approval.
2. Traffic rings and lids shall be made in USA and meet AASHTO-H20.44 specification. Conform to H-20 wheel loading, ASTM A-48, and class 35B.
3. Lid shall have a 1” diameter lifting hole (through the thickness of the lid), located 9” to 12” from the center of the lid.
4. Lid shall have the word “ELECTRIC” in 1” letters, embossed in the top.
5. Ring and lid to have indexing provisions to assist with bolt-hole alignment.



1. Top Pad Section

1. One 30” x 11” cable slot.
2. 36” diameter cast iron traffic frame mounted in the concrete.

2. Middle Section:

1. Three steel grounding insert nut in each end wall, located on the same level.
2. 2 1” diameter PVC conduit through the end walls.
3. Four 6” and four 4” diameter PVC conduit terminators through each end wall.
4. Side A shall have 72” (W) x 58 “(L) x 43” (H) inside dimensions with tolerances of ±1”.

5. Three 18” steel racks installed on each side wall and one on each end wall.

3. Bottom Section:

1. Side A shall have two steel grounding insert nuts in each end wall, located on two levels per drawing on page 1.
2. Pulling eyes in the floor (hot dip galvanized) for safe lifting determined by manufacturer.
3. A 12” diameter x 3” deep sump pump recess with a 2” diameter knockout in the middle of the floor.
4. Eight 6” diameter PVC conduit terminators through each end wall.
5. 72” (W) x 58 “(L) x 48” (H) inside dimensions with tolerances of $\pm$1”.
6. Three 40” steel racks installed on each side wall and one on each end wall.
7. Two 6” knockouts in the bottom corner of the side wall.

4. Entire Structure:

1. Shall meet RS-G2 and RS-G4.

   NOTE: In the case of road expansion, this structure shall not be adapted for placement under the road without NVE T&D Standards approval.
2. Shims of any type are not allowed for the installation of this box.
3. The customer side (B) and NVE side (A) shall be divided by a 4” minimum baffle wall.
4. Side B per customer specification.

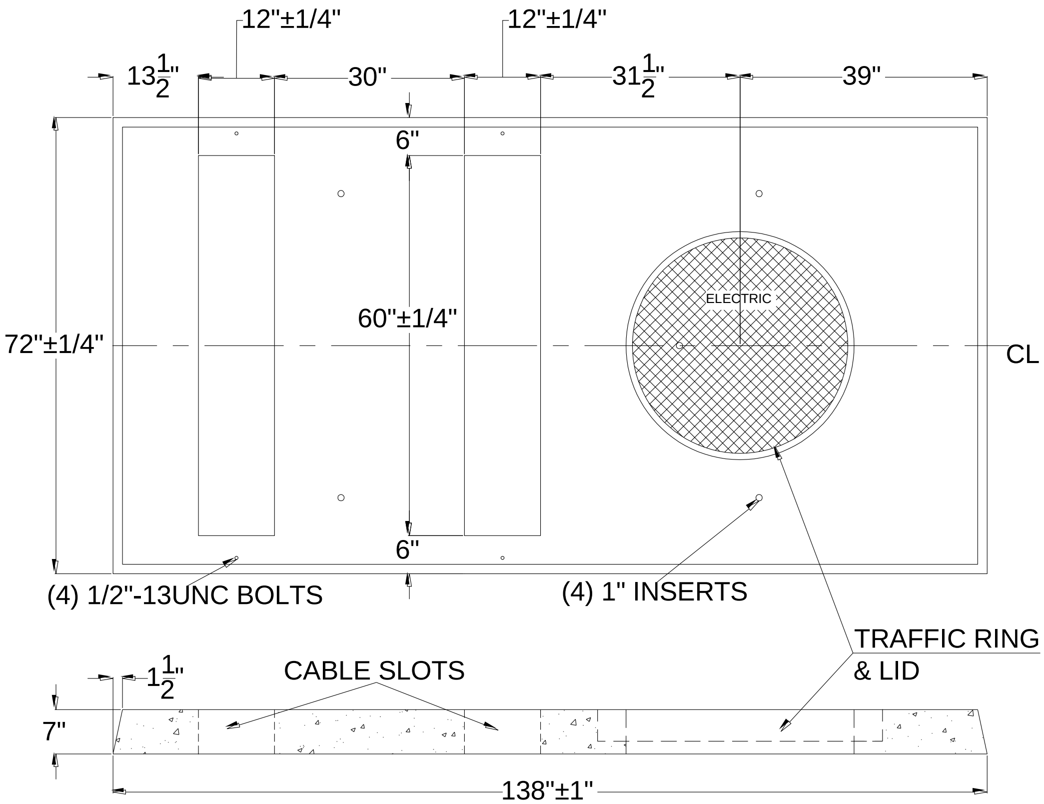
5. Grounding

Manholes shall have grounding inserts on all walls around the inside perimeter as shown on Page 1. The inserts shall be spaced in accordance with this specification drawing. Inserts to be attached to the internal manhole rebar by spot welding or approved connector. The insert shall accept 1/2” American Standard thread. Continuity between all inserts installed in manhole sections shall be checked and verified prior to shipping by manufacturer/supplier.

THIS PAGE INTENTIONALLY LEFT BLANK

DESIGN REQUIREMENTS

APPROVED STRUCTURE	
MANUFACTURER	MANHOLE
JENSEN PRECAST	PDRS97M



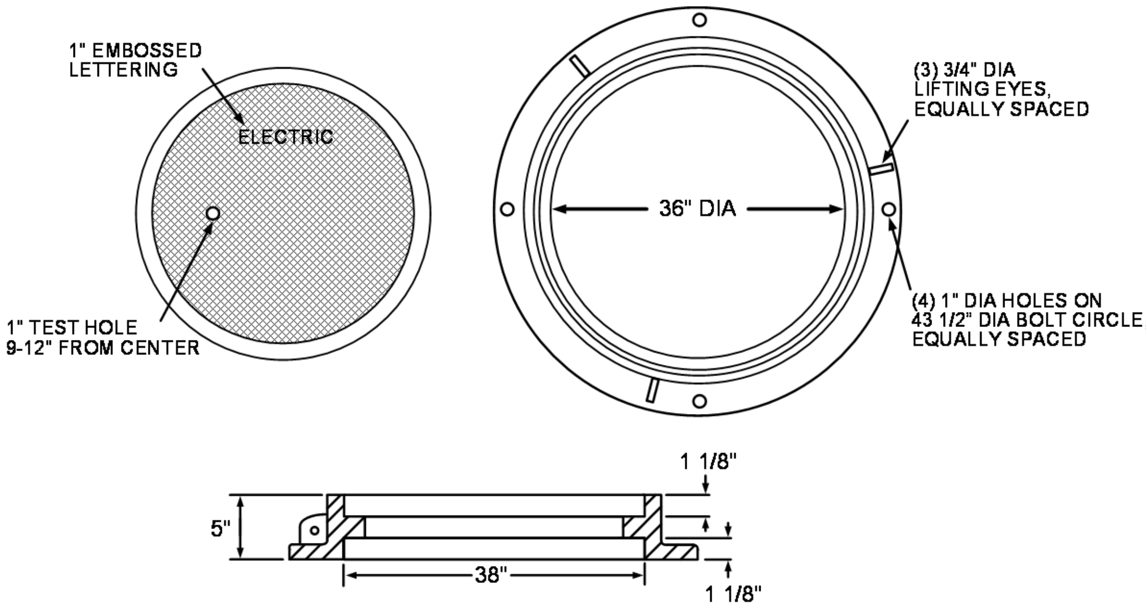
<u>RS-97M PAD</u>

NOTE:

1. Not for new construction
2. FOR MAINTENANCE ONLY.

1. RING AND LID

1. All traffic rings and lids require NVE approval.
2. Traffic rings and lids shall be made in USA and meet AASHTO-H20.44 specification. Conform to H-20 wheel loading, ASTM A-48, and class 35B.
3. Lid shall have a 1” diameter lifting hole (through the thickness of the lid located 9” to 12” from the center of the lid.
4. Lid shall have the word “ELECTRIC” in 1” letters, embossed in the top.
5. Frame to be reversible.
6. Ring and lid to have indexing provisions to assist with bolt-hole alignment.

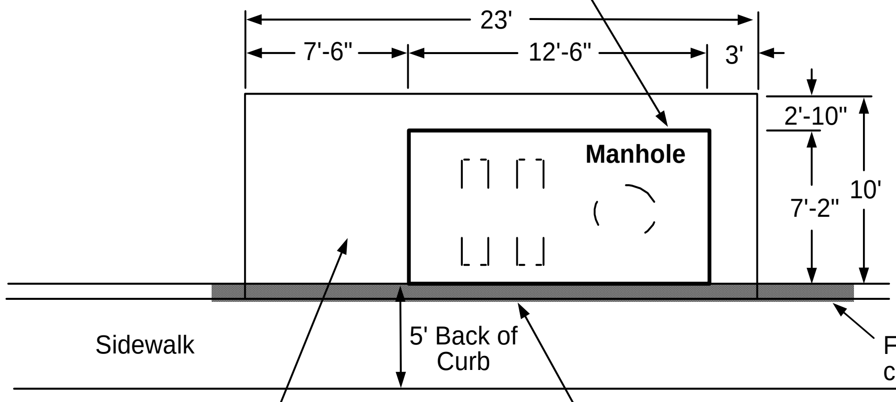


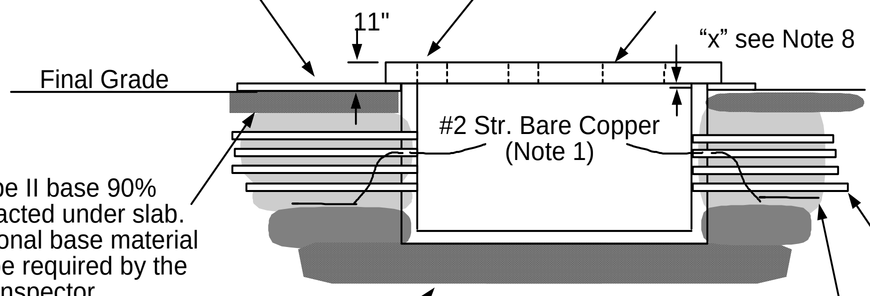
2. TOP PAD SECTION

1. Two 12” x 60” cable slots.
2. Four ½”-13 UNC inserts.
3. Four 1” lifting inserts placed at manufacturer’s discretion for safe lifting.
4. 1-1/2” Taper all around top of pad.
5. 36” diameter cast iron traffic frame mounted in the concrete.
6. RS-97M shall meet RS-G2, RS-G4, and RS-G5
7. Shims of any type are not allowed for the installation of this box.

NOTE: In the case of road expansion, this structure shall not be adapted for placement under the road without NVE T&D Standards approval.

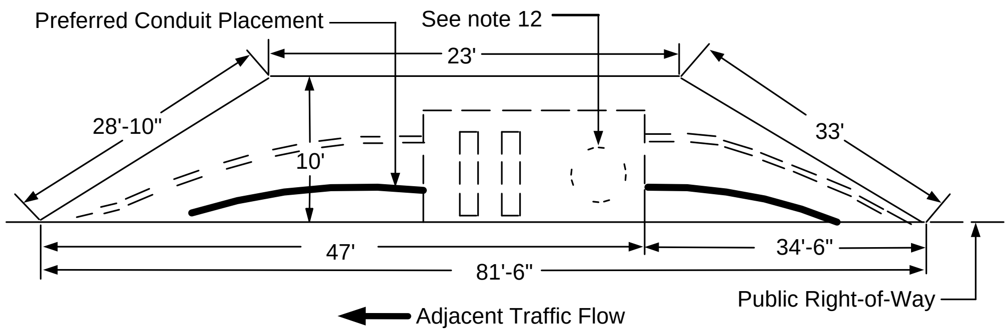
INSTALLATION REQUIREMENTS





NOTES:

1. Grounding by customer shall be 2-50’ #2-7 stranded bare copper wires laid in the bottom of the conduit trench in opposite directions with 2-5’ tails left in the box.
   A. No exceptions allowed.
   NOTE: Ground wires shall be installed through a 1” PVC conduit in the structures end walls.
2. For location and clearances to other structures, see RS-5.
3. Retaining wall required when grade from bottom of pad rises or lowers more than 1’ in 5’ horizontally or when required by developer as perimeter wall. See RS-5 for details.
4. Required easement:



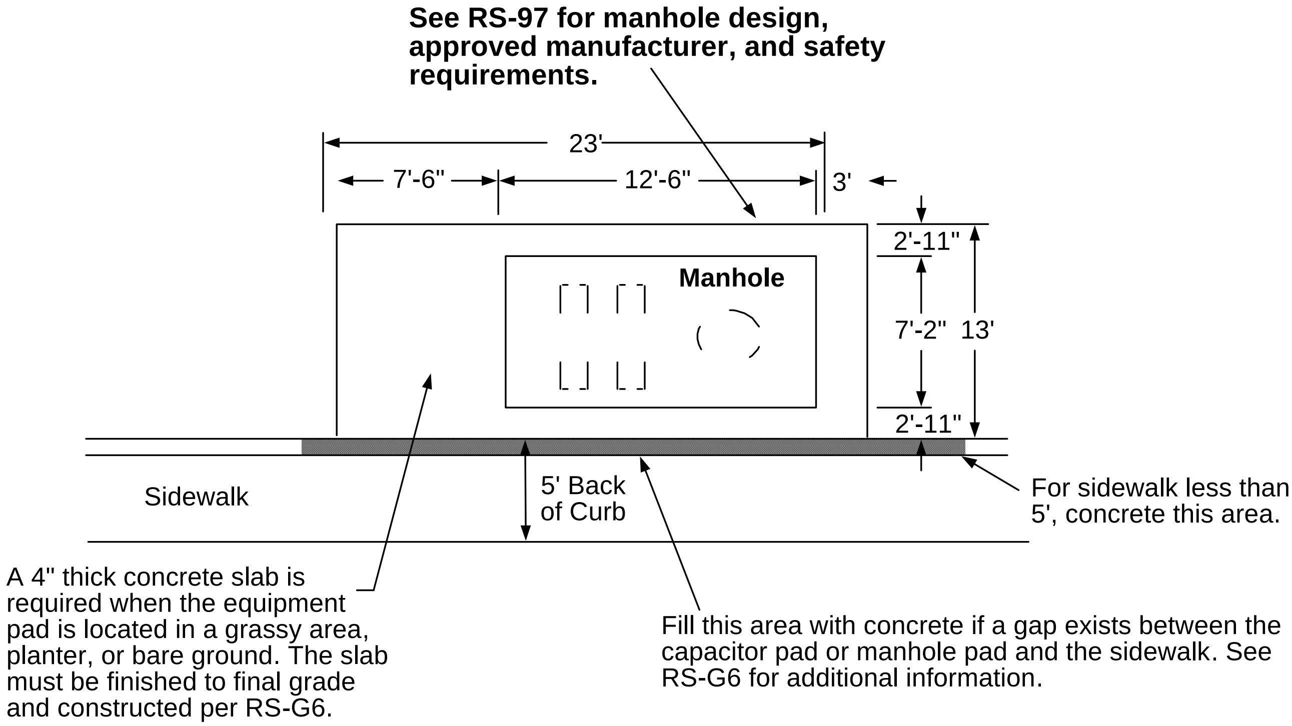
5. If the designer specifies additional conduit openings, the contractor shall core drill the hole as required.
6. The bottom surface of the manhole shall be level.
7. If the ground water level is at least 3’ below the bottom of the pull box, the 2” diameter knockout in the sump pump recess shall be removed.
8. If any final grade adjustment “x” is needed, take the actions listed in table 1.

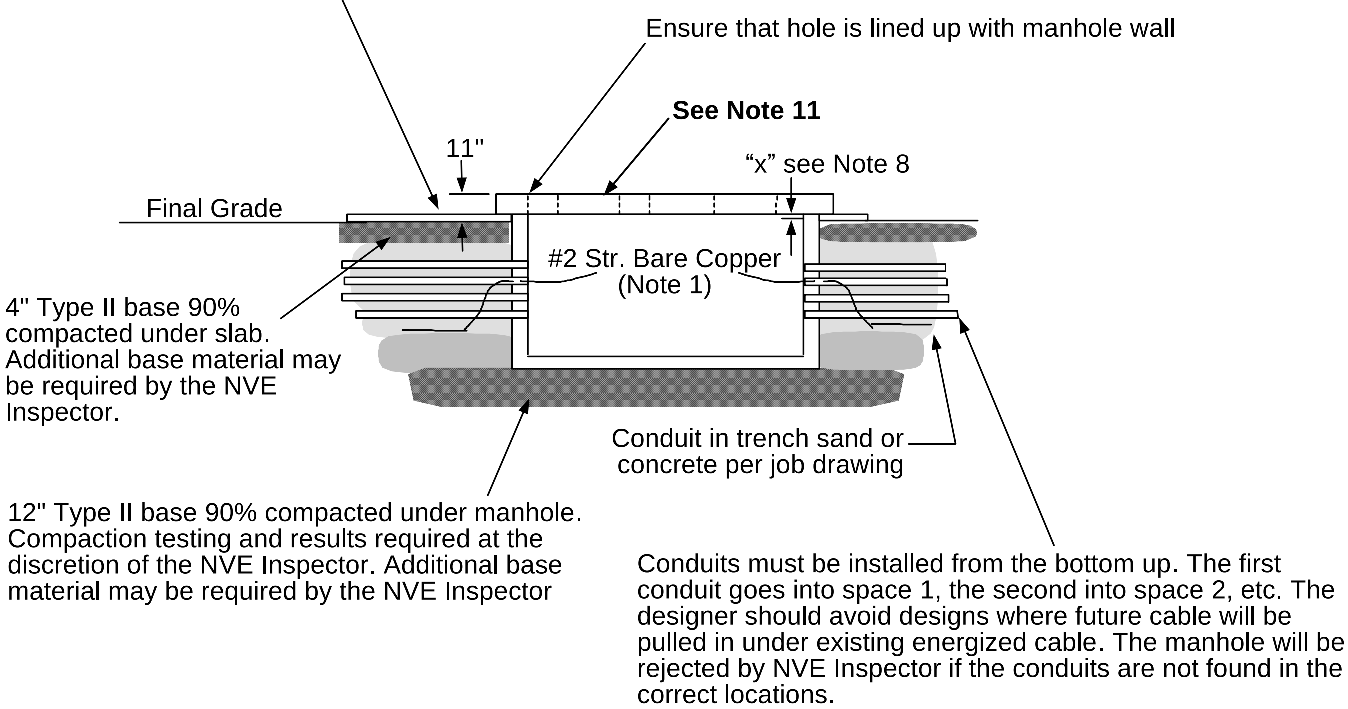
Table 1. Adjustment Requirements

Adjustment	Action
0” – 6”	The top of the pad has to clear the final grade 11” to min. 5”
6” – 24”	The NVE contractor shall order one extension from the original manufacturer.
Above 24”	Any extension exceeding 24” shall be subject to T & D Standards approval

9. If bottom of the manhole pad is located 1” to 24” above a final ground level, the NVE contractor shall make a concrete collar that fills the space under the outside dimensions of the pad.
10. If bottom of the manhole pad is located more than 24” above or below ground level, the proposed adjustment shall be subject to T & D Standard’s approval.
11. This manhole may be installed next to sidewalks, but never under traffic areas.
    NOTE: For heavy frequency traffic areas, (e.g., streets, roads, etc.) use the RS-94 manhole.
12. All pads shall be installed with the manhole facing oncoming traffic.

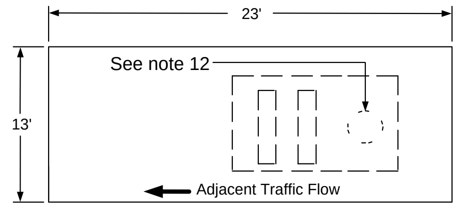
INSTALLATION REQUIREMENTS





NOTES:

1. Grounding by customer shall be 2-50’ #2-7 stranded bare copper ground wires laid in the bottom of the conduit trench in opposite directions with 2-5’ tails left in the box.
   A. No exceptions allowed.
2. For location and clearances to other structures, see RS-5.
3. Retaining wall required when grade from bottom of pad rises or lowers more than 1” in 5’ horizontally.
4. Required easement (conduit may require As-Built easement):



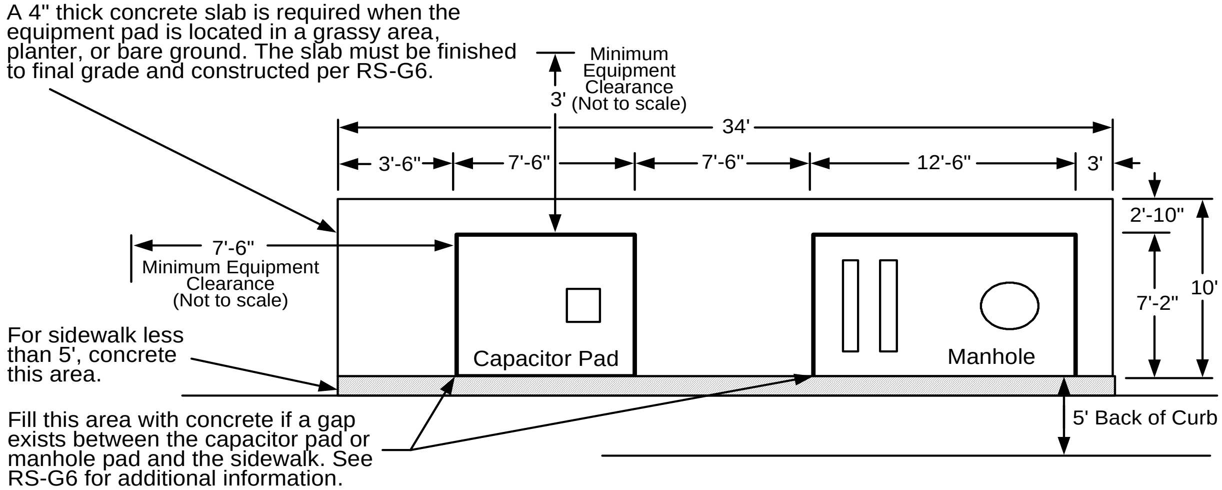
5. If the designer specifies additional conduit openings, the contractor shall core drill the holes as required.
6. The bottom surface of the manhole shall be level.
7. If the ground water level is at least 3’ below the bottom of the pull box, the 2” diameter knockout in the sump pump recess shall be removed.
8. If any final grade adjustment “x” is needed, take the actions listed in table 1.

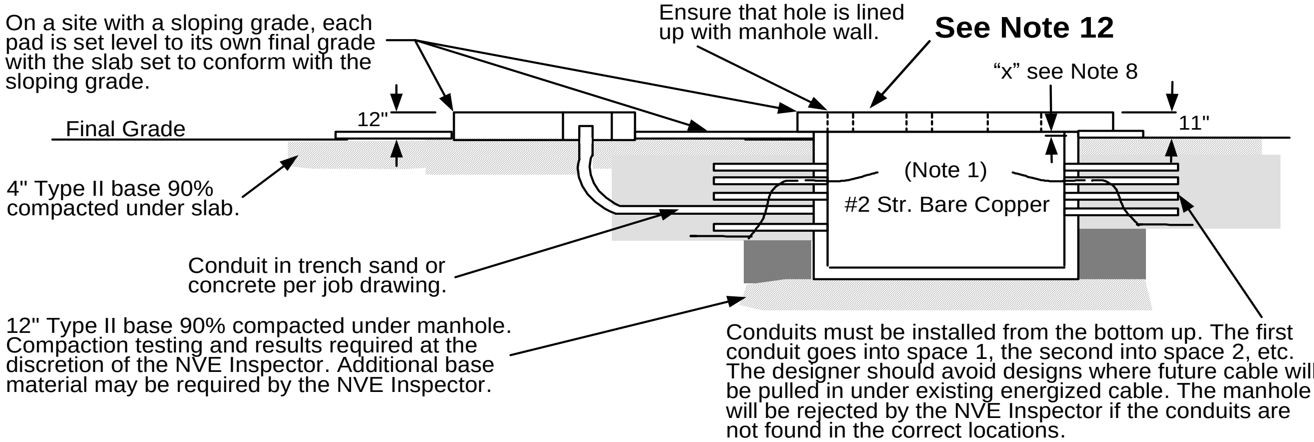
Table 1. Adjustment Requirements

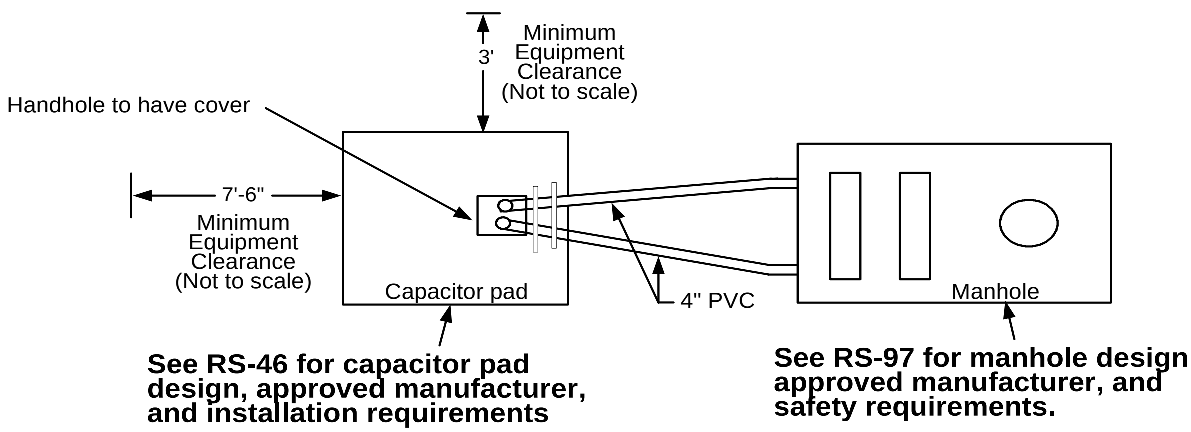
Adjustment	Action
0” – 6”	The top of the pad has to clear the final grade 11” to min. 5”
6” – 24”	The NVE contractor shall order one extension from the original manufacturer.
Above 24”	Any extension exceeding 24” shall be subject to T & D Standards approval

9. If bottom of the manhole pad is located 1” to 24” above or below ground level, the proposed adjustment shall be subject to T & D Standards approval.
10. This manhole may be installed next to sidewalks, but never under traffic areas.
    NOTE: For heavy frequency traffic areas, (e.g. streets, road, etc.) use the RS-94 manhole.
11. All pads shall be installed with the manhole facing oncoming traffic.

INSTALLATION REQUIREMENTS







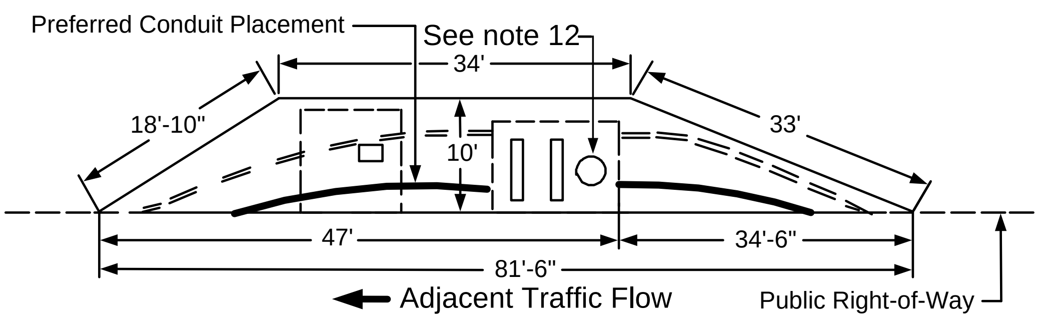
Note: When PM switch is installed, then a Cap. Bank (UC-1) or Dummy Cap. Bank (UCD-101) must also be installed.

NVEnergy				Electric Service Requirements	RS-100
				12kV Manhole Pad and Capacitor Pad: Adjacent to Public R.O.W.	
Drawn:	Eng:	Appr:	Date:		Revision: 05
MP	JR	DA	12/19		Page 1 of 2

NOTES:

1. Grounding by customer shall be 2-50' #2-7 stranded bare copper ground wires laid in the bottom of the conduit trench in opposite directions with 2-5' tails left in the box.
   A. No exceptions allowed.

   NOTE: Ground wires shall be installed through a 1" PVC conduit in the structures end walls.
2. For location and clearances to other structures, see: RS-5.
3. Retaining wall required when grade from bottom of pad rises or lowers more than 1' in 5' horizontally. See RS-5 for details.
4. Required easement:



5. If the designer specifies additional conduit openings, the contractor shall core drill the holes as required.
6. The bottom surface of the manhole shall be level.
7. If the ground water level is at least 3' below the bottom of the pull box, the 2" diameter knockout in the sump pump recess shall be removed.
8. If any final grade adjustment "x" is needed, take the actions listed in Table 1.

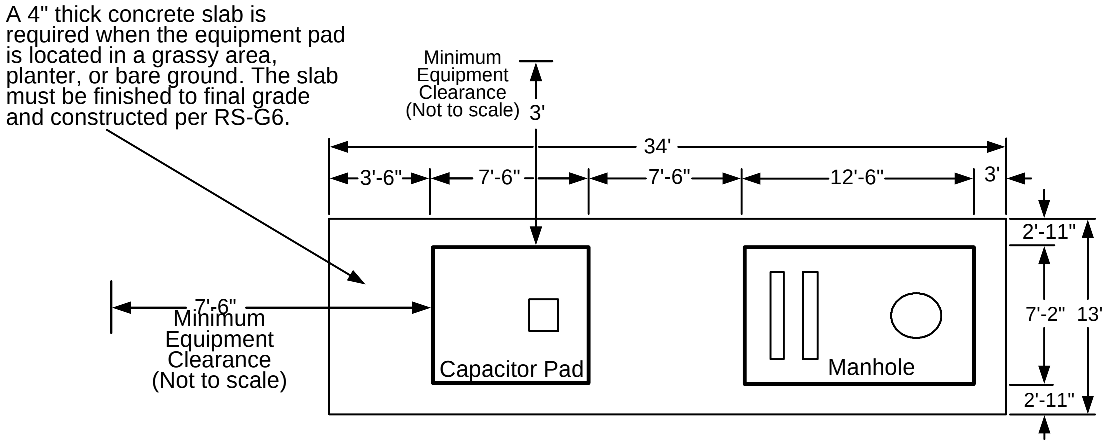
Table 1. Adjustment Requirements

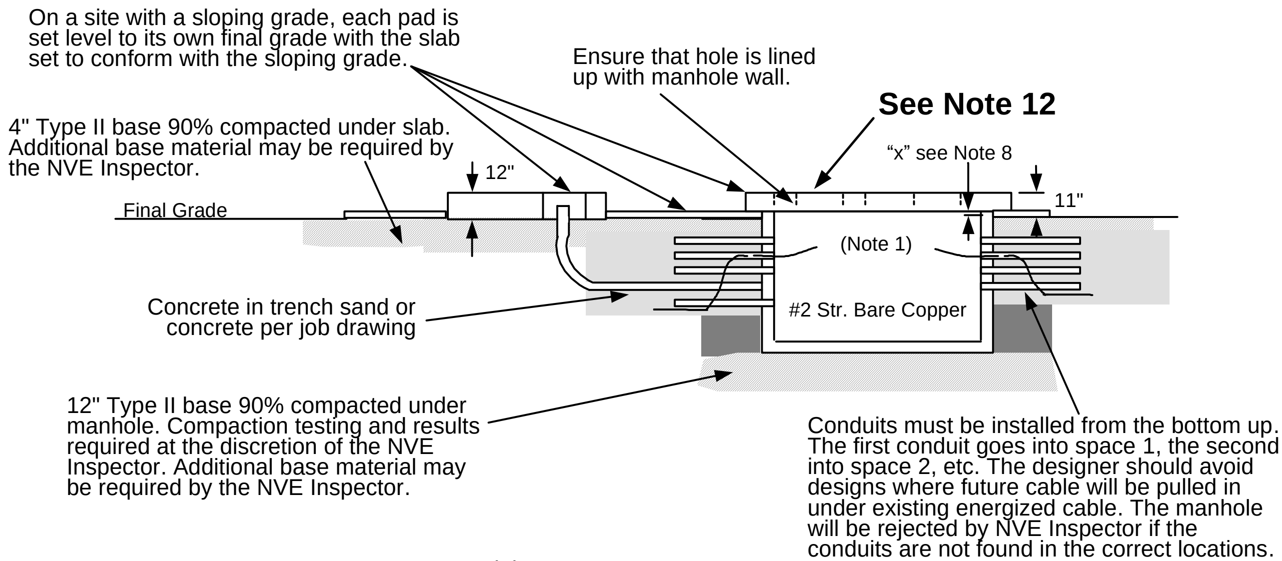
Adjustment	Action
0" – 6"	The top of the pad has to clear the final grade 11" to min. 5"
6" – 24"	The NVE contractor shall order one extension from the original manufacturer.
Above 24"	Any extension exceeding 24" shall be subject to T & D Standards approval

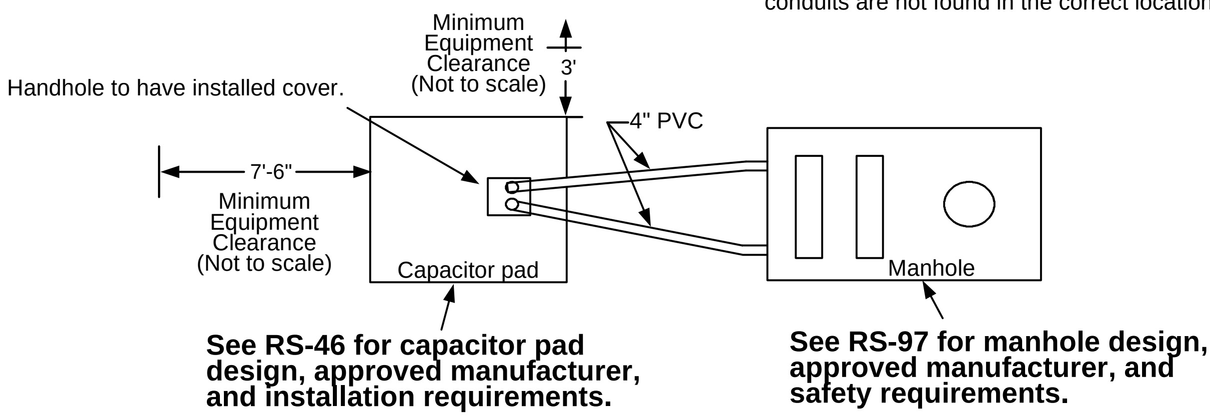
9. If bottom of the manhole pad is located 1" to 24" above final ground level, the NVE contractor shall make a concrete collar that fills the space under the outside dimensions of the pad.
10. If bottom of the manhole pad is located more than 24" above or below Ground level, the proposed adjustment shall be subject to Regional Standards approval.
11. This manhole may be installed next to sidewalks, but never under traffic areas.

    NOTE: For heavy frequency traffic areas, (e.g. streets, roads, etc.) use the RS-94 manhole.
12. All pads shall be installed with the manhole facing oncoming traffic.

INSTALLATION REQUIREMENTS



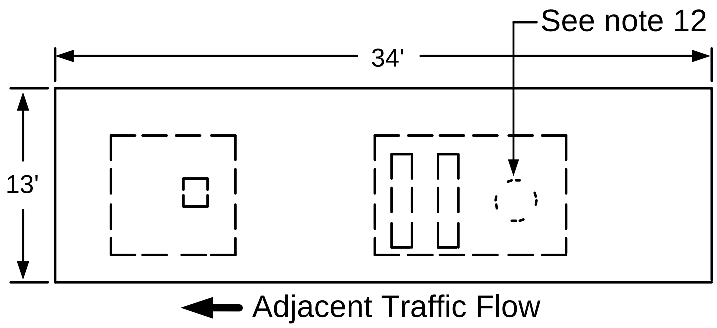




Note: When PM switch is installed, then a Cap. Bank (UC-1) or Dummy Cap. Bank (UCD-101) must also be installed.

NOTES:

1. Grounding by customer shall be 2-50’ #2-7 stranded bare copper ground wires laid in the bottom of the conduit trench in opposite directions with 2-5’ tails left in the box.
   A. No exceptions allowed.
   NOTE: Ground wires shall be installed through a 1” PVC conduit in the structures end walls.
2. For location and clearances to other structures, see RS-5.
3. Retaining wall required when grade from bottom of pad rises or lowers more than 1’ in 5’ horizontally.
4. Required easement (conduit may require As–Built easement):



5. If the designer specifies additional conduit openings, the contractor shall core drill the holes as required.
6. The bottom surface of the manhole shall be level.
7. If the ground water level is at least 3’ below the bottom of the pull box, the 2” diameter knockout in the sump pump recess shall be removed.
8. If any final grade adjustment “x” is needed, take the actions listed in Table 1.

Table 1. Adjustment Requirements

Adjustment	Action
0” – 6”	The top of the pad has to clear the final grade 11” to min. 5”
6” – 24”	The NVE contractor shall order one extension from the original manufacturer.
Above 24”	Any extension exceeding 24” shall be subject to Regional Standards approval.

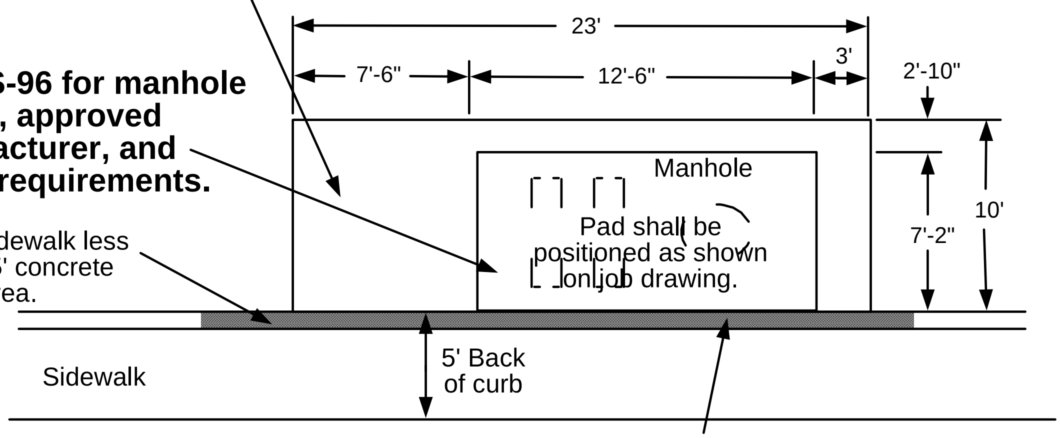
9. If bottom of the manhole pad is located 1” to 24” above final ground level, the NVE contractor shall make a concrete collar that fills the space under the outside dimensions of the pad.
10. If bottom of the manhole pad is located more than 24” above or below Ground level, the proposed adjustment shall be subject to Regional Standards approval.
11. This manhole may be installed next to sidewalks, but never under traffic areas.
    NOTE: For heavy frequency traffic areas, (e.g. streets, roads, etc.) use the RS-94 manhole.
12. All pads shall be installed with the manhole facing oncoming traffic.

INSTALLATION REQUIREMENTS

A 4" thick concrete slab is required when the equipment pad is located in a grassy area, planter, or bare ground. The slab must be finished to final grade and constructed per RS-G6.

See RS-96 for manhole design, approved manufacturer, and safety requirements.

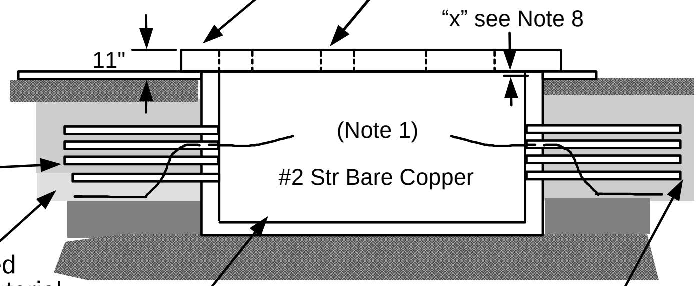
For sidewalk less than 5' concrete this area.



Fill this area with concrete if a gap exists between the capacitor pad or manhole pad and the sidewalk. See RS-G6 for additional information.

Ensure that hole is lined up with manhole wall.

See Note 12



Conduits in trench sand or concrete per job drawing.

4" Type II base 90% compacted under slab. Additional base material may be required by the NPC Inspector.

12" Type II base 90% compacted under manhole. Compaction testing and results required at the discretion of the NVE Inspector. Additional base material may be required by the NVE Inspector.

Conduits must be installed from the bottom up. The first conduit goes into space 1, the second into space 2, etc. The designer avoid designs where future cable will be pulled in under existing energized cable. The manhole will be rejected by the NVE Inspector if the conduits are not found in the correct locations.

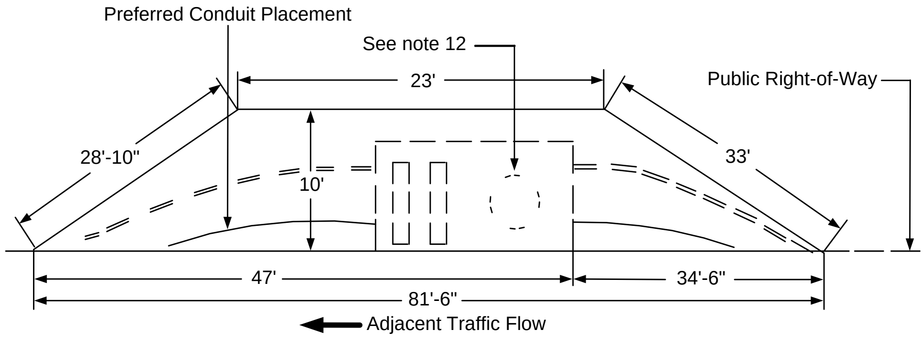
NOTES:

1. Grounding by customer shall be 2-50' #2-7 stranded bare copper wires laid in the bottom of the conduit trench in opposite directions with 2-5' tails left in the box.

   B. No exceptions allowed.

   NOTE: Ground wires shall be installed through a 1" PVC conduit in the structures end walls.

2. For location and clearances to other structures, see RS-5.
3. Retaining wall required when grade from bottom of pad rises or lowers more than 1' in 5' horizontally or when required by developer as perimeter wall. See RS-5 for details.
4. Required easement:



5. If the designer specifies additional conduit openings, the contractor shall core drill the holes as required.
6. The bottom surface of the manhole shall be level.
7. If the ground water level is at least 3' below the bottom of the pull box, the 2" diameter knockout in the sump pump recess shall be removed.
8. If any final grade adjustment "x" is needed, take the actions listed in Table 1.

Table 1. Adjustment Requirements

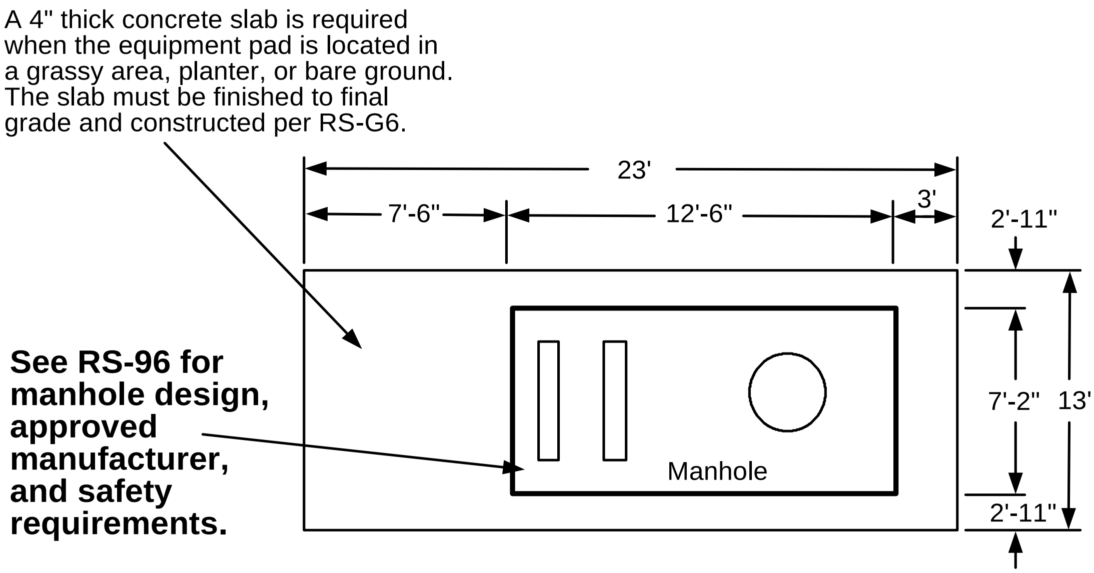
Adjustment	Action
0" – 6"	The top of the pad has to clear the final grade 11" to min. 5"
6" – 24"	The NVE contractor shall order one extension from the original manufacturer.
Above 24"	Any extension exceeding 24" shall be subject to T & D Standards approval

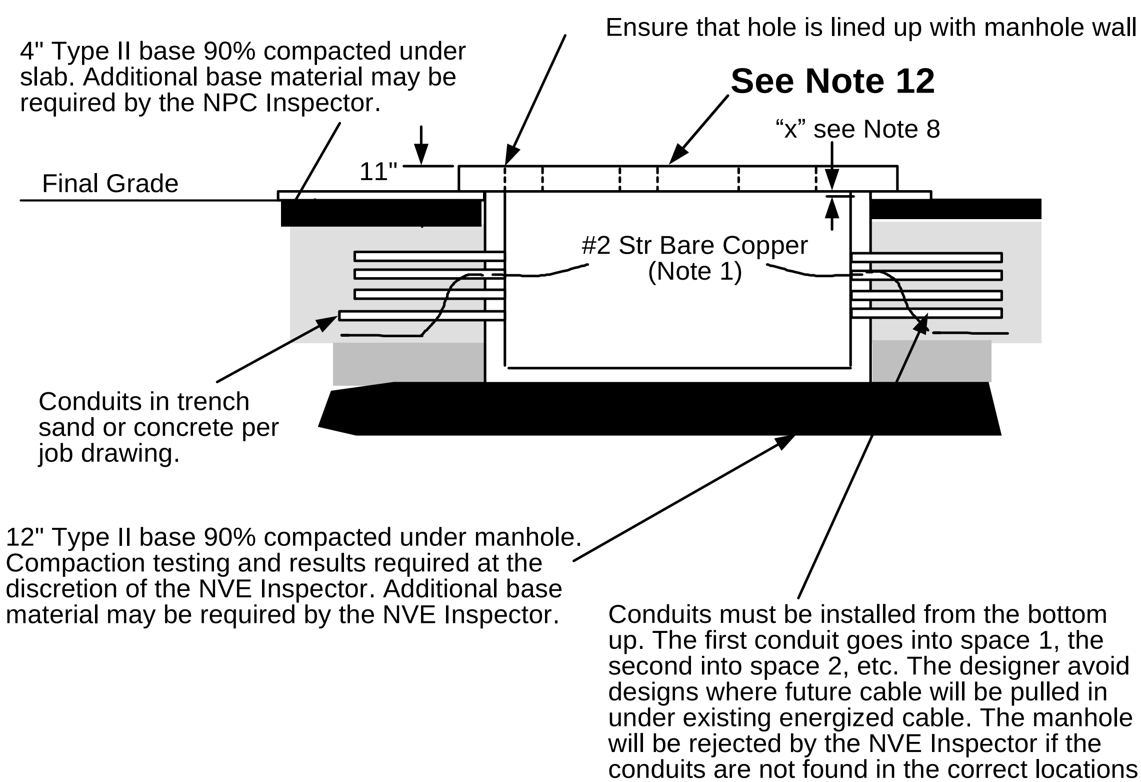
9. If bottom of the manhole pad is located 1" to 24" above a final ground level, the NVE contractor shall make a concrete collar that fills the space under the outside dimensions of the pad.
10. If bottom of the manhole pad is located more than 24" above or below ground level, the proposed adjustment shall be subject to T & D Standard's approval.
11. This manhole may be installed next to sidewalks, but never under traffic areas.

    NOTE: For heavy frequency traffic areas, (e.g., streets, roads, etc.) use the RS-94 manhole.

12. All pads shall be installed with the manhole facing oncoming traffic.

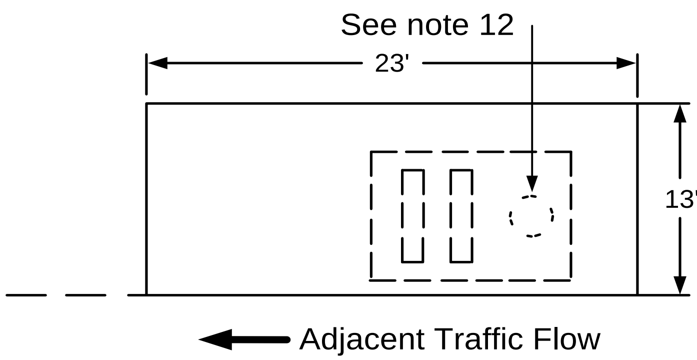
INSTALLATION REQUIREMENTS





NOTES:

1. Grounding by customer shall be 2-50’ #2-7 stranded bare copper ground wires laid in the bottom of the conduit trench in opposite directions with 2-5’ tails left in the box.
   A. No exceptions allowed.
2. For location and clearances to other structures, see RS-5.
3. Retaining wall required when grade from bottom of pad rises or lowers more than 1’ in 5’ horizontally or when required by developer as perimeter wall. See RS-5 for details.
4. Required easement, (conduit may require As-Built easement):



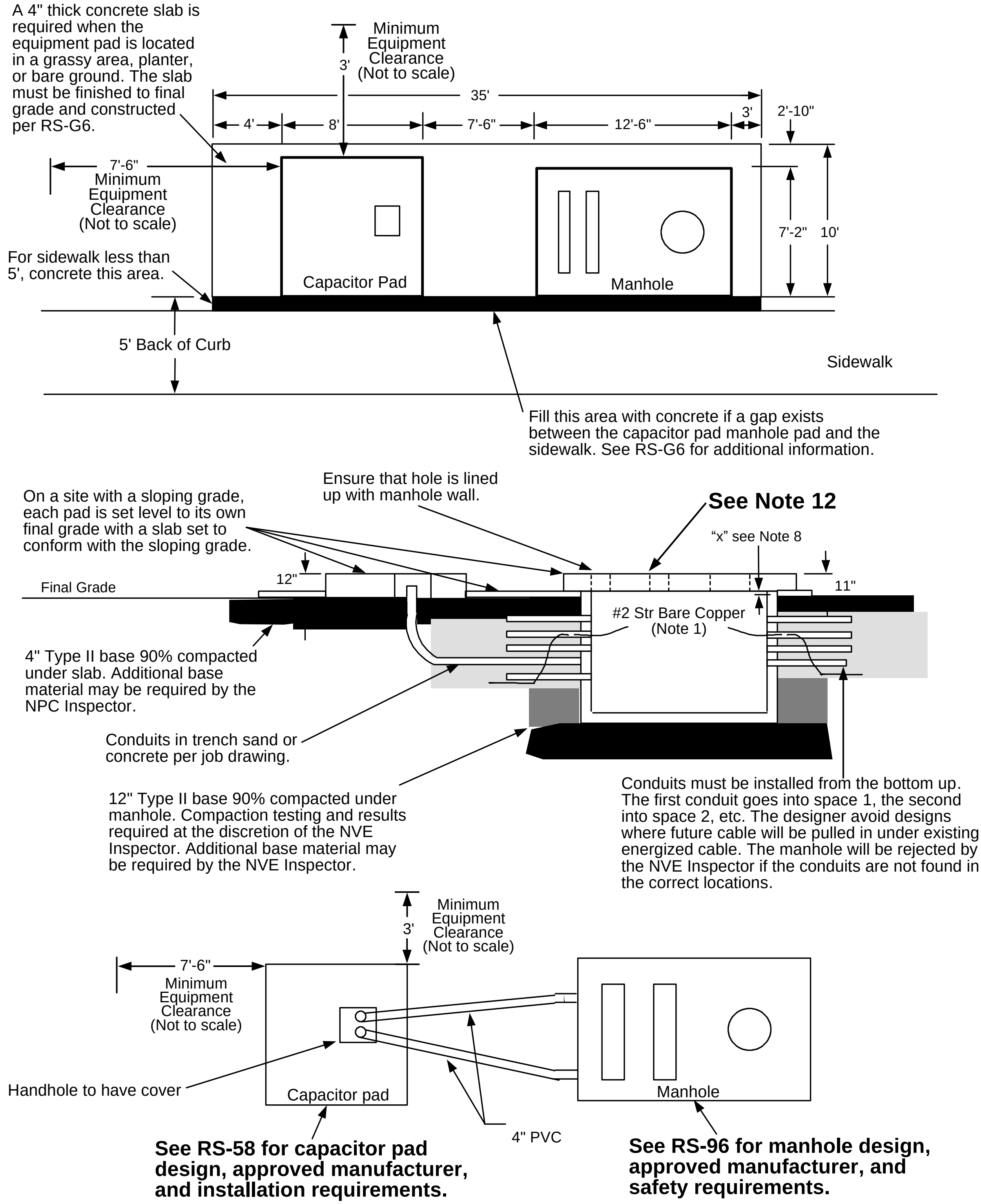
5. If the designer specifies additional conduit openings, the contractor shall core drill the holes as required.
6. The bottom surface of the manholes shall be level.
7. If the ground water level is at least 3’ below the bottom of the pull box, the 2” diameter knockout in the sump pump recess shall be removed.
8. If any final grade adjustment “x” is needed, take the actions listed in Table 1.

Table 1. Adjustment Requirements

Adjustment	Action
0” – 6”	The top of the pad has to clear the final grade 11” to min. 5”
6” – 24”	The NVE contractor shall order one extension from the original manufacturer.
Above 24”	Any extension exceeding 24” shall be subject to T & D Standards approval

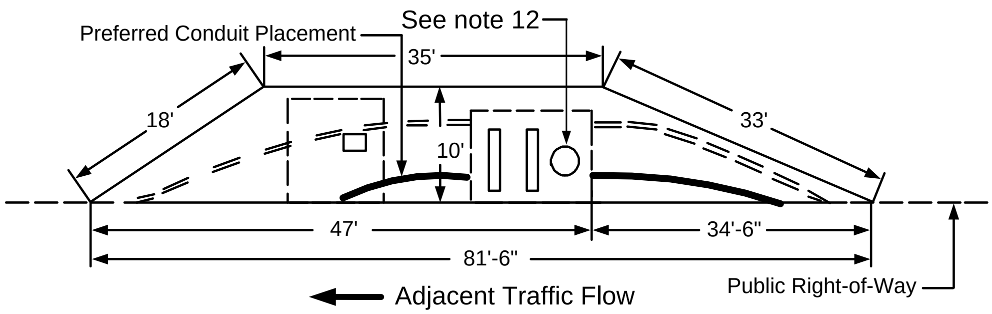
9. If bottom of the manhole pad is located 1” to 24” above final ground level, the NVE contractor shall make a concrete collar that fills the space under the outside dimensions of the pad.
10. If bottom of the manhole pad is located more than 24” above or below ground level, the proposed adjustment shall be subject to T & D Standard’s approval.
11. This manhole may be installed next to sidewalks, but never under traffic areas.
    NOTE: For heavy frequency traffic areas, (e.g. streets, roads, etc.) use the RS-94 manhole.
12. All pads shall be installed with the manhole facing oncoming traffic.

INSTALLATION REQUIREMENTS



NOTES:

1. Grounding by customer shall be 2-50' #2-7 stranded bare copper ground wires laid in the bottom of the conduit trench in opposite directions with 2-5' tails left in the box.
   A. No exceptions allowed.
   NOTE: Ground wires shall be installed through a 1" PVC conduit in the structures end walls.
2. For location and clearances to other structures, see RS-5.
3. Retaining wall required when grade from bottom of pad rises or lowers more than 1' in 5' horizontally or when required by developer as perimeter wall. See RS-5 for details.
4. Required easement:



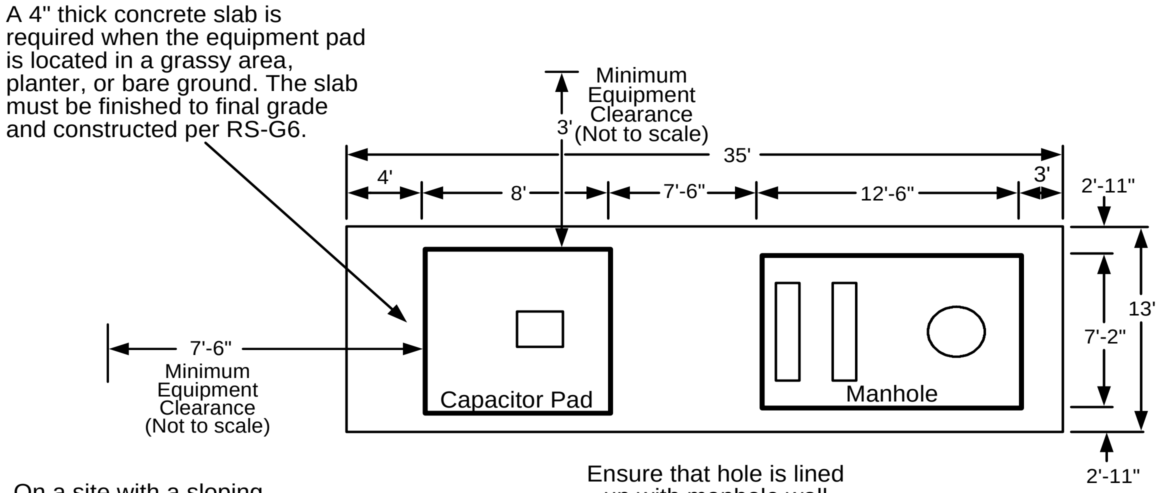
5. If the designer specifies additional conduit openings, the contractor shall core drill the holes as required.
6. The bottom surface of the manhole shall be level.
7. If the ground water level is at least 3' below the bottom of the pull box, the 2" diameter knockout in the sump pump recess shall be removed.
8. If any final grade adjustment "x" is needed, take the actions listed in Table 1.

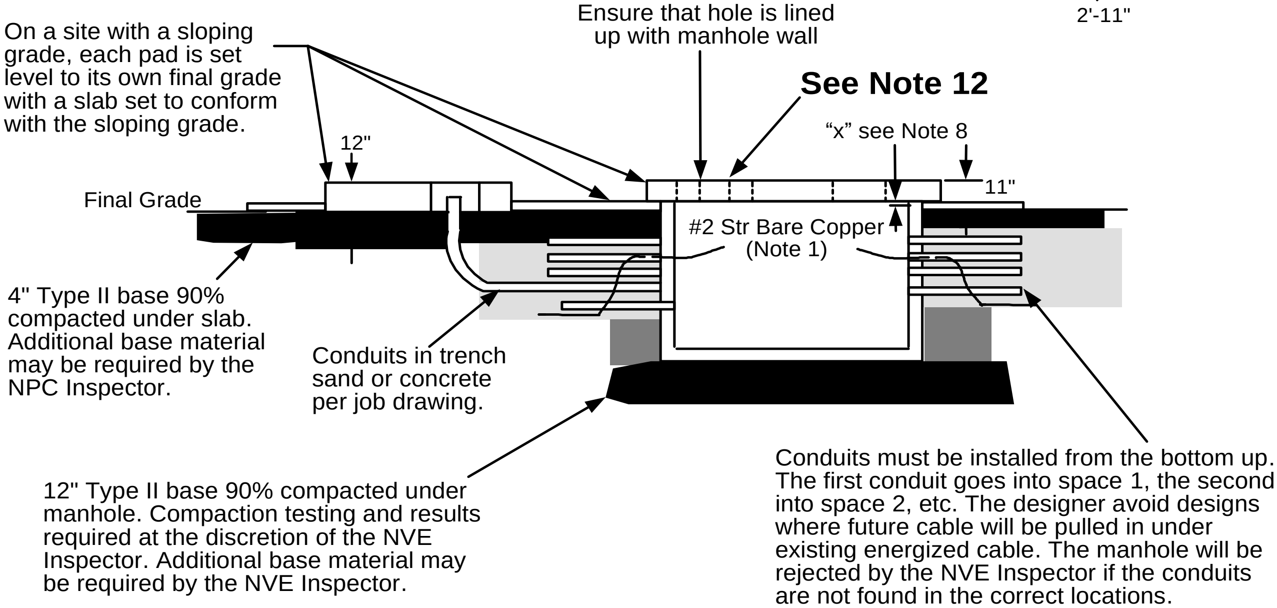
Table 1. Adjustment Requirements

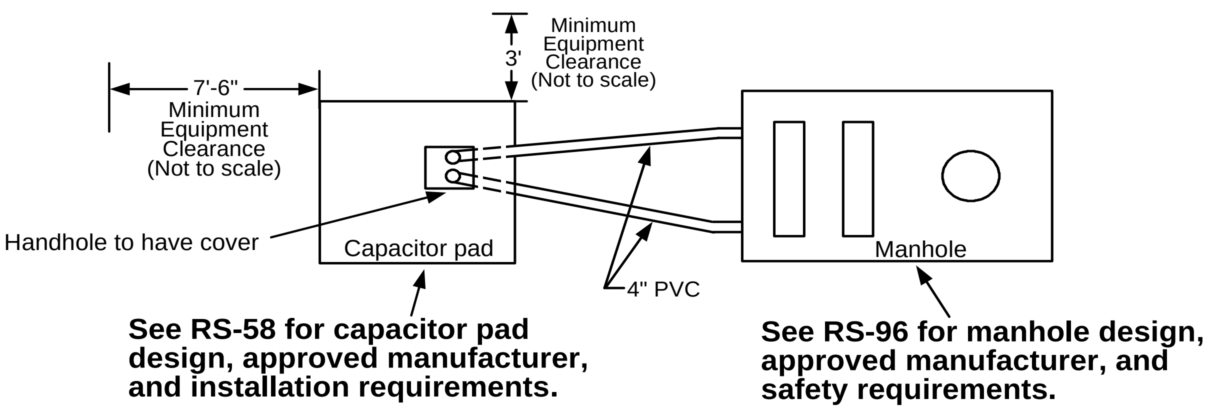
Adjustment	Action
0" – 6"	The top of the pad has to clear the final grade 11" to min. 5"
6" – 24"	The NVE contractor shall order one extension from the original manufacturer.
Above 24"	Any extension exceeding 24" shall be subject to T & D Standards approval

9. If bottom of the manhole pad is located 1" to 24" above final ground level, the NVE contractor shall make a concrete collar that fills the space under the outside dimensions of the pad.
10. If bottom of the manhole pad is located more than 24" above or below Ground level, the proposed adjustment shall be subject to Regional Standards approval.
11. This manhole may be installed next to sidewalks, but never under traffic areas.
    NOTE: For heavy frequency traffic areas, (e.g. streets, roads, etc.) use the RS-94 manhole.
12. All pads shall be installed with the manhole facing oncoming traffic.

INSTALLATION REQUIREMENTS



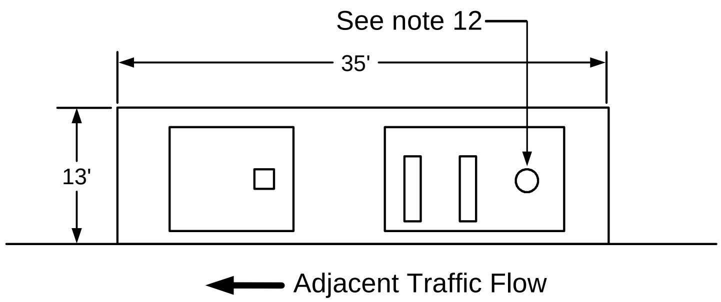




NVEnergy				Electric Service Requirements	RS-113
				25kV Manhole Pad and Capacitor Pad: Not Adjacent to Public R.O.W.	
Drawn:	Eng:	Appr:	Date:		Revision: 5
MP	JR	DA	1/20		Page 1 of 2

NOTES:

1. Grounding by customer shall be 2-50’ #2-7 stranded bare copper ground wires laid in the bottom of the conduit trench in opposite directions with 2-5’ tails left in the box.
   A. Exceptions not allowed.
2. For location and clearances to other structures, see RS-5.
3. Retaining wall required when grade from bottom of pad rises or lowers more than 1’ in 5’ horizontally. See RS-5 for details.
4. Required easement, (conduit may require an As-Built Easement):



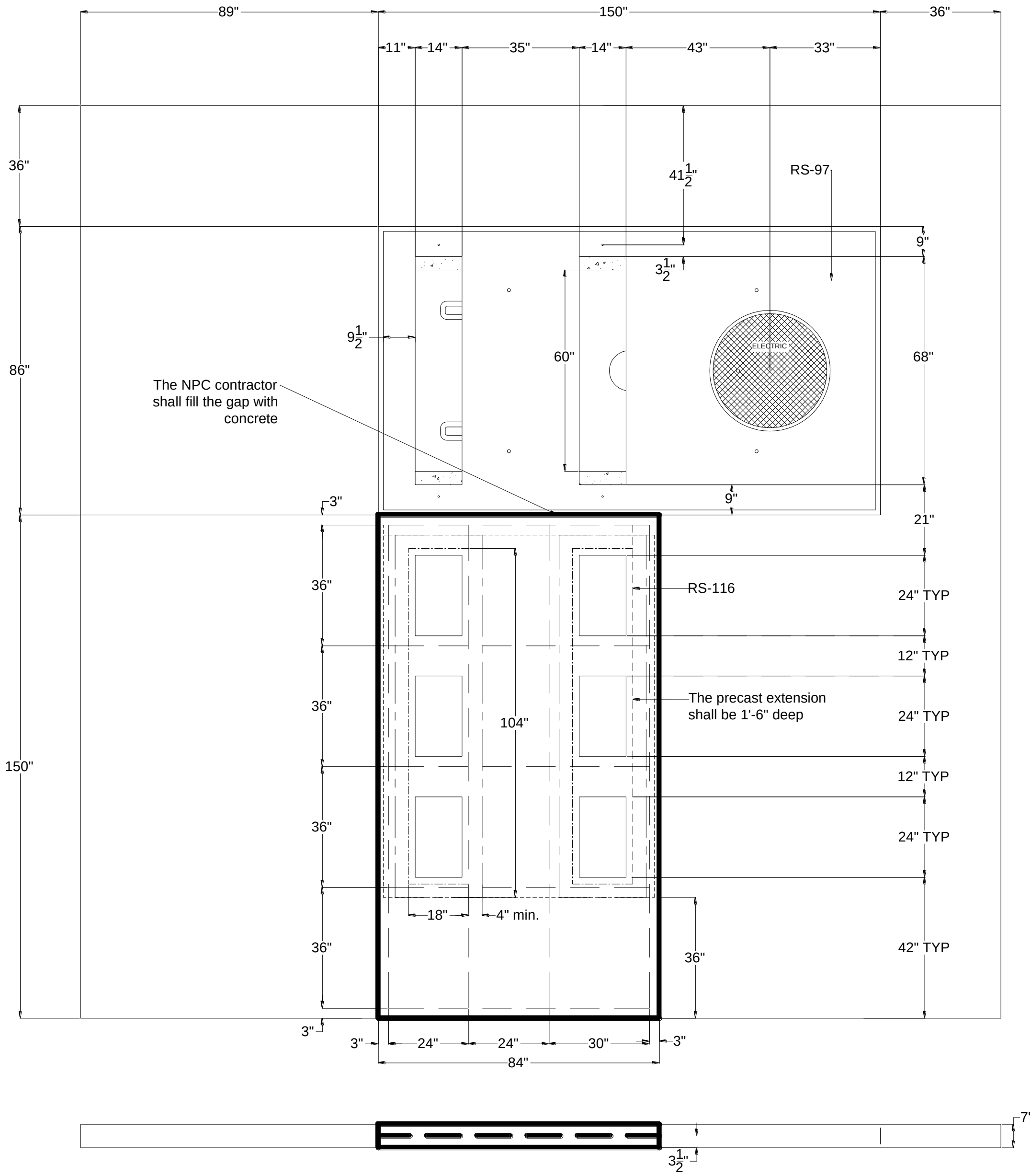
5. If the designer specifies additional conduit openings, the contractor shall core drill the holes as required.
6. The bottom surface of the manhole shall be level.
7. If the ground water level is at least 3’ below the bottom of the pull box, the 2” knockout in the sump pump recess shall be removed.
8. If any final grade adjustment “x” is needed, take the actions listed in Table 1.

Table 1. Adjustment Requirements

Adjustment	Action
0” – 6”	The top of the pad has to clear the final grade 11” to min. 5”
6” – 24”	The NVE contractor shall order one extension from the original manufacturer.
Above 24”	Any extension exceeding 24” shall be subject to T & D Standards approval

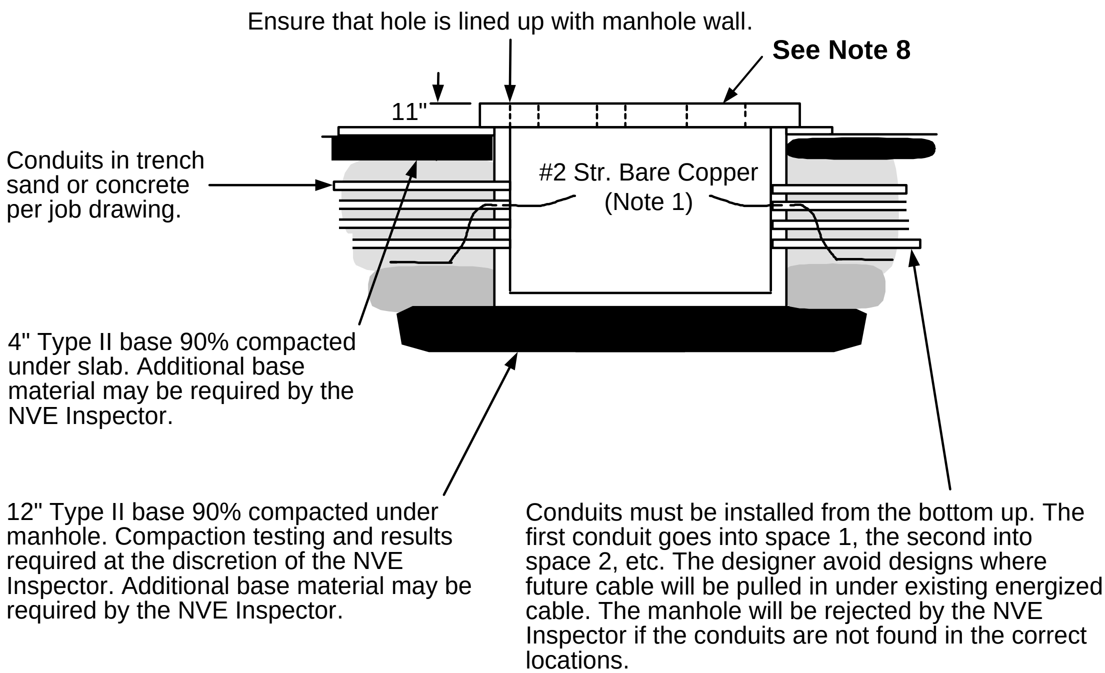
9. If bottom of the manhole pad is located 1” to 24” above a final ground level, the NVE contractor shall make a concrete collar that fills the space under the outside dimensions of the pad
10. If bottom of the manhole pad is located more than 24” above or below ground level, the proposed adjustment shall be subject to Regional Standards approval
11. This manhole may be installed next to sidewalks, but never under traffic areas.
    NOTE: For heavy frequency traffic areas, (e.g. streets, roads, etc.) use the RS-94 manhole.
12. All pads shall be installed with the manhole facing oncoming traffic.

APPROVED STRUCTURE			
MANUFACTURER	MANHOLE	PAD	PRECAST EXTENSION
JENSEN PRECAST	J-RS-97	J-RS-116	J-RSE-116



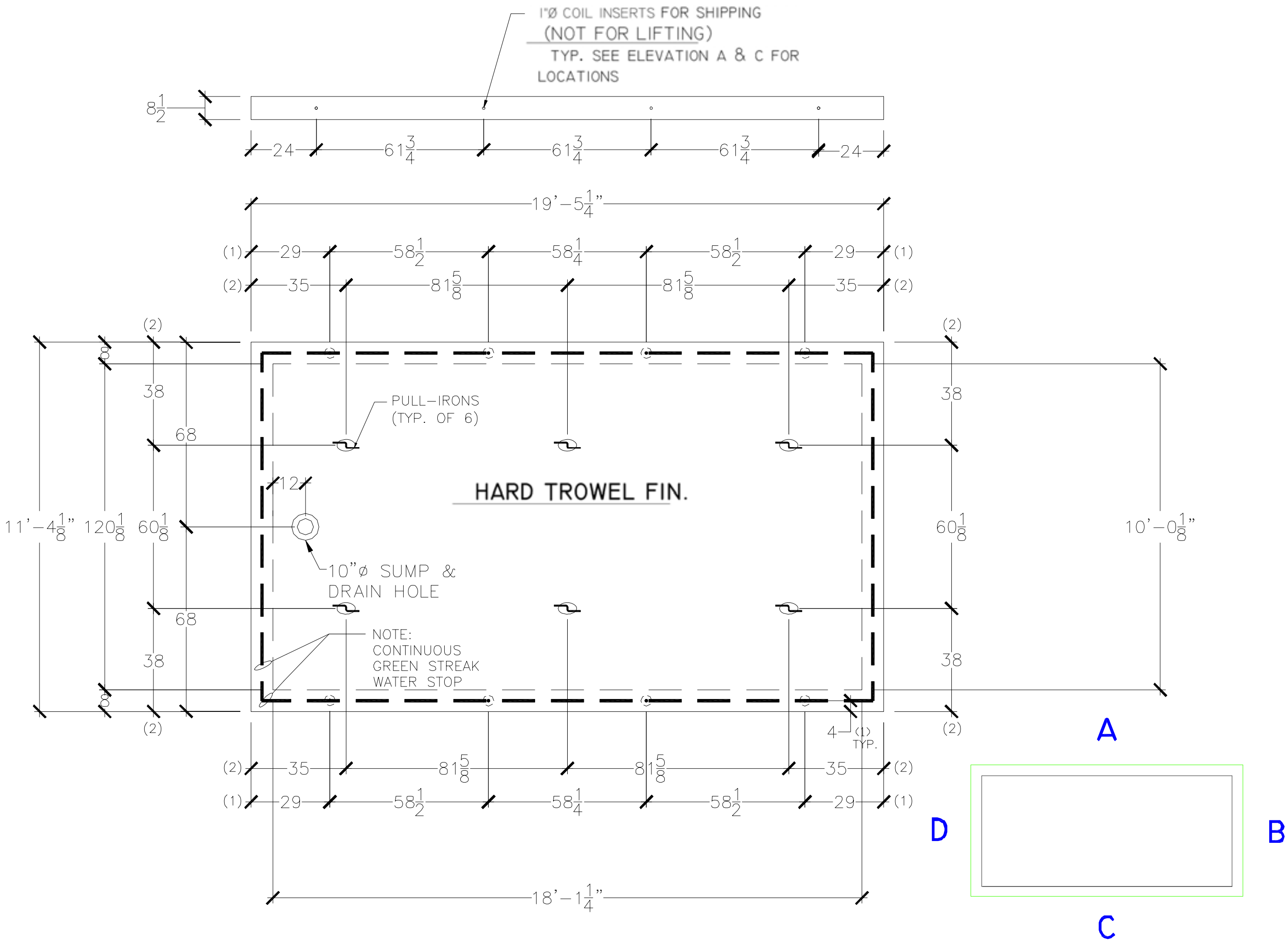
NOTES:

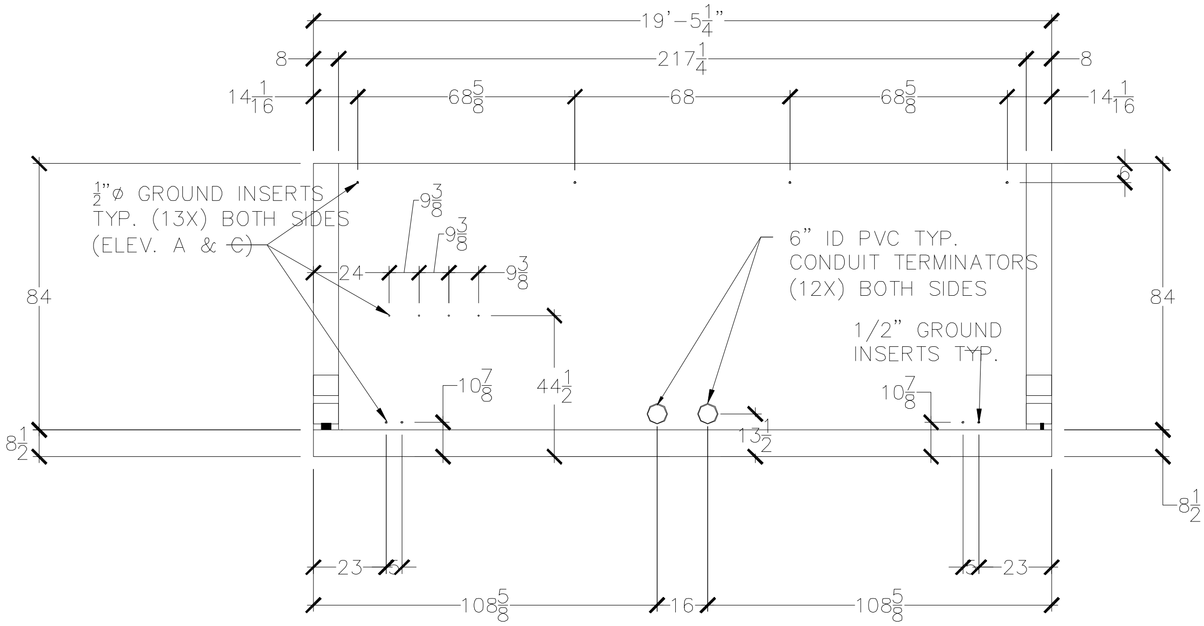
1. Both the RS-97 top section pad and the RS-116 pad are used to support the LFM-6 cabinet.
2. The top of the pads shall be at the same level.
3. Rebar shall be minimum #4 and placed according to above drawing.
4. The ground under the RS-116 pad must be 12” type II 90% compacted.
5. The RS-116 pad shall meet the RS-G3 requirements.



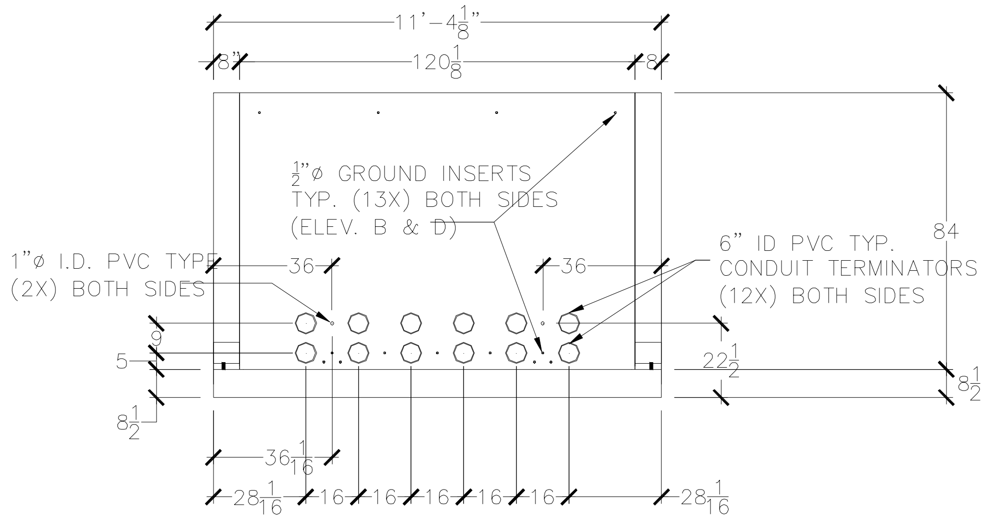
NOTES:

1. Grounding by customer shall be 2-50’ #2-7 stranded bare copper ground wires laid in the bottom of the conduit trench in opposite directions with 2-5’ tails left in the box.
   A. No exceptions allowed.
2. For location and clearances to other structures, see: RS-5.
3. Retaining wall required when grade from bottom of pad rises or lowers more than 1’ in 5’ horizontally or when required by developer as perimeter wall. See RS-5 for details.
4. If the designer specifies additional conduit openings, the contractor shall core drill the holes as required.
5. The bottom surface of the manhole shall be level.
6. If the ground water level is at least 3’ below the bottom of the pull box, the 2” diameter knockout in the sump pump recess shall be removed.
7. For design and safety requirements, see RS-97.
8. All pads shall be installed with the manhole facing oncoming traffic.

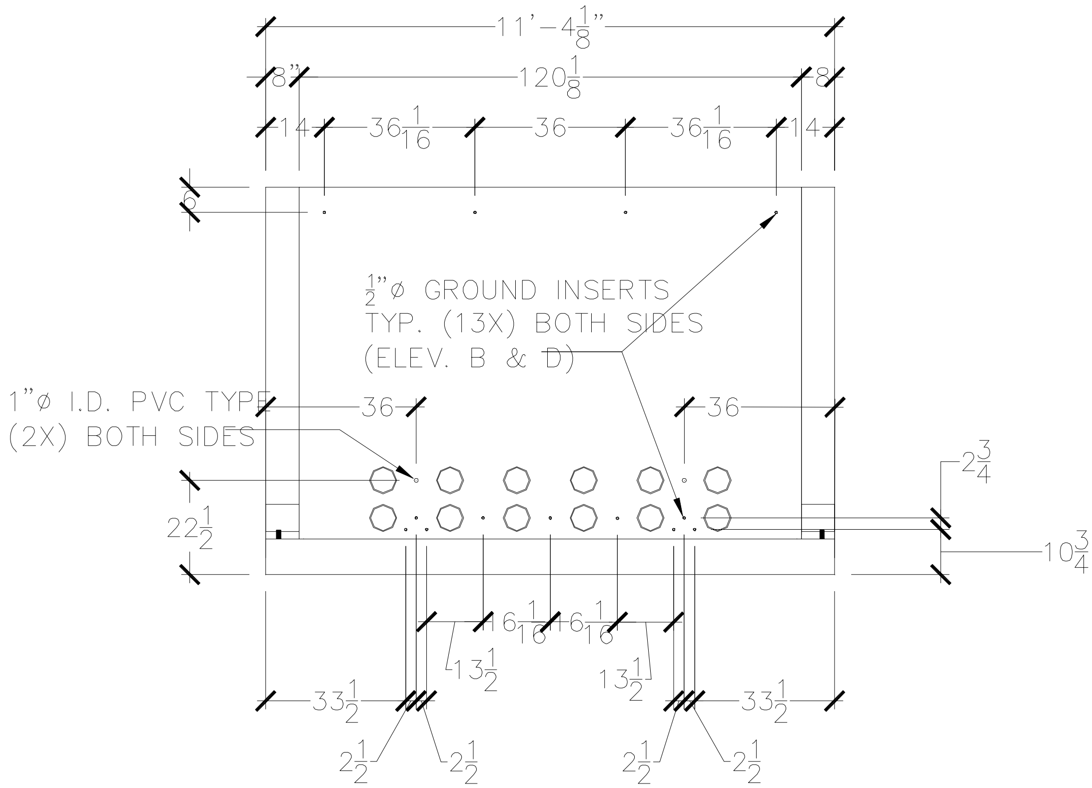

1"Ø COIL INSERTS FOR SHIPPING
(NOT FOR LIFTING)
TYP. SEE ELEVATION A & C FOR LOCATIONS
HARD TROWEL FIN.
PULL–IRONS (TYP. OF 6)
10"Ø SUMP & DRAIN HOLE
NOTE: CONTINUOUS GREEN STREAK WATER STOP
19'–5 1/4"
18'–1 1/4"
11'–4 1/8"
10'–0 1/8"
A
B
C
D



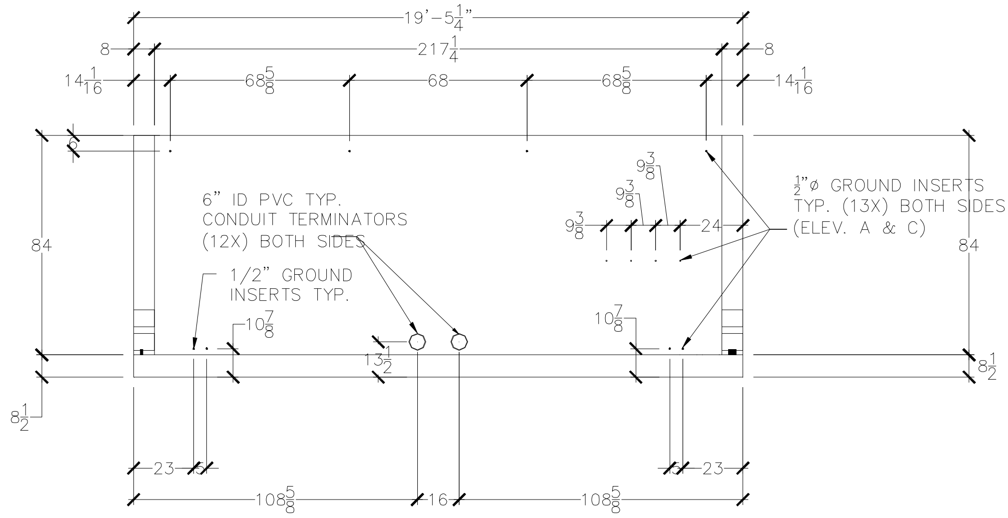
ELEVATION "A" PLAN AND ½" GROUND INSERTS LOCATION



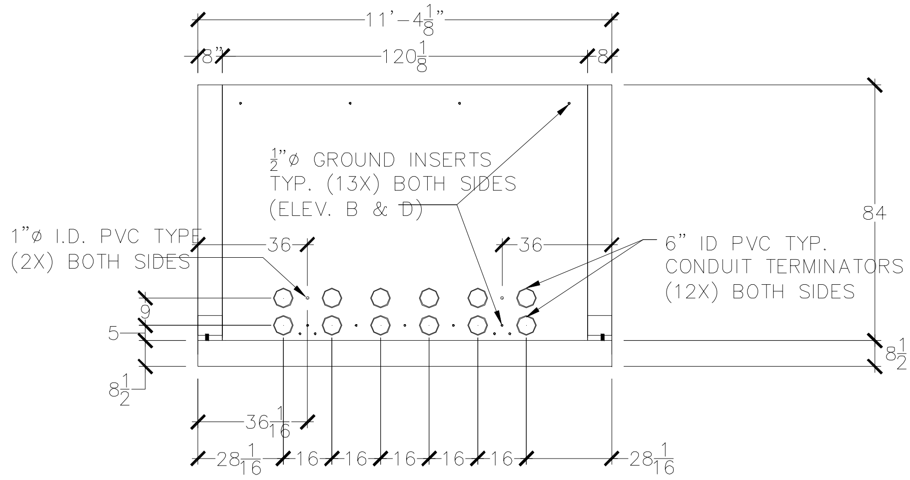
ELEVATION "B" PLAN



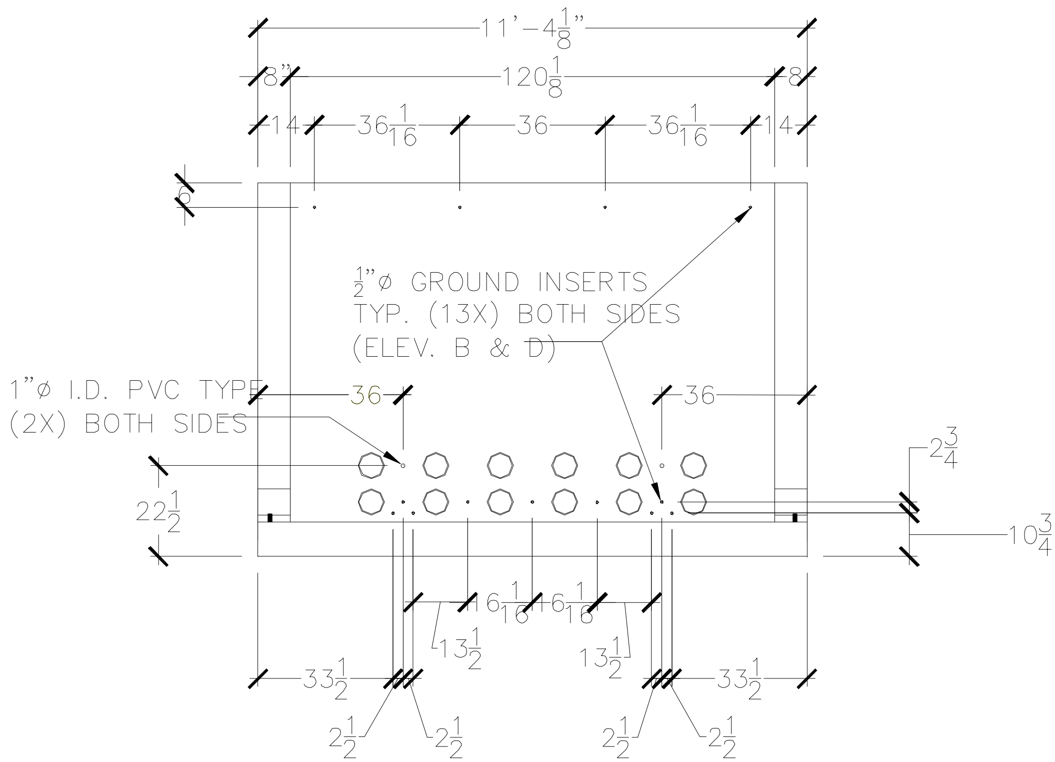
$\frac{1}{2}$" GROUND INSERTS LOCATION



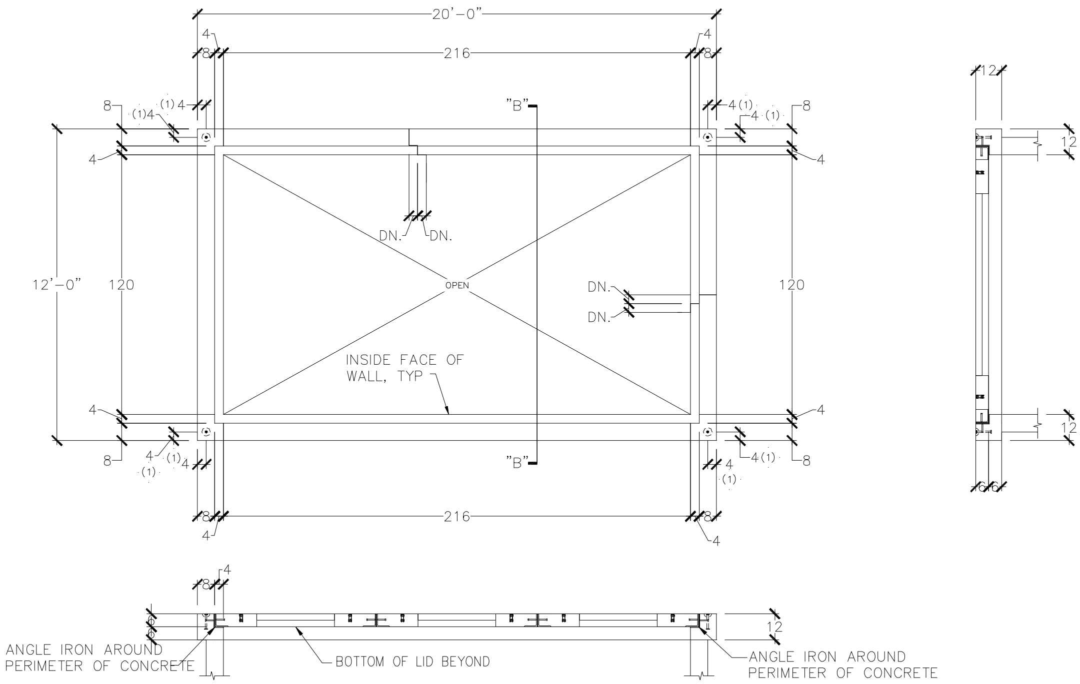
ELEVATION "C" PLAN AND $\frac{1}{2}$" GROUND INSERTS LOCATION



ELEVATION "D" PLAN

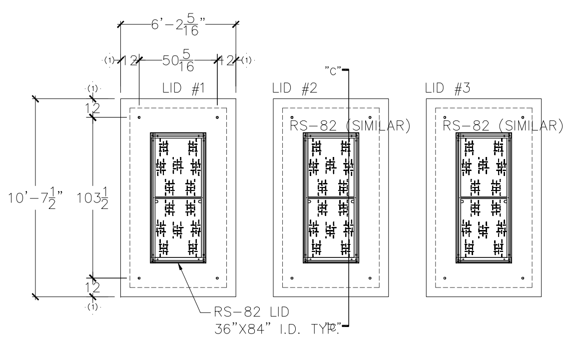


1/2" GROUND INSERTS LOCATION

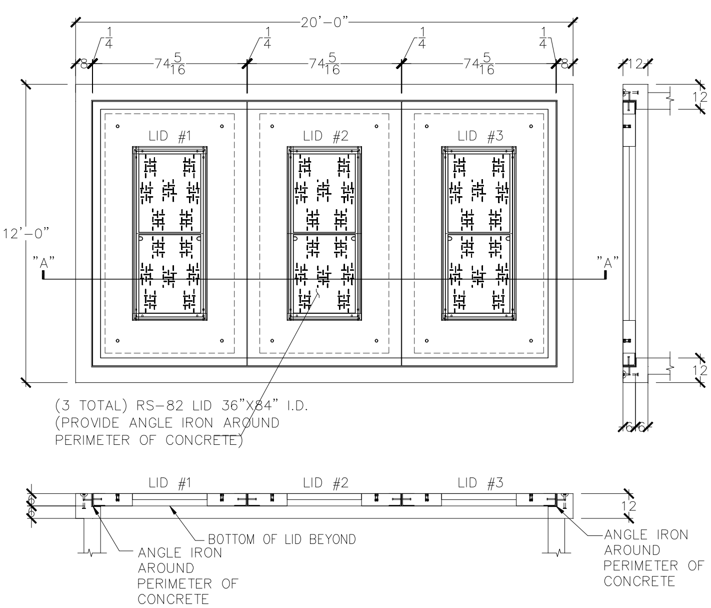


CONCRETE: 5,000 psi

LID PLAN

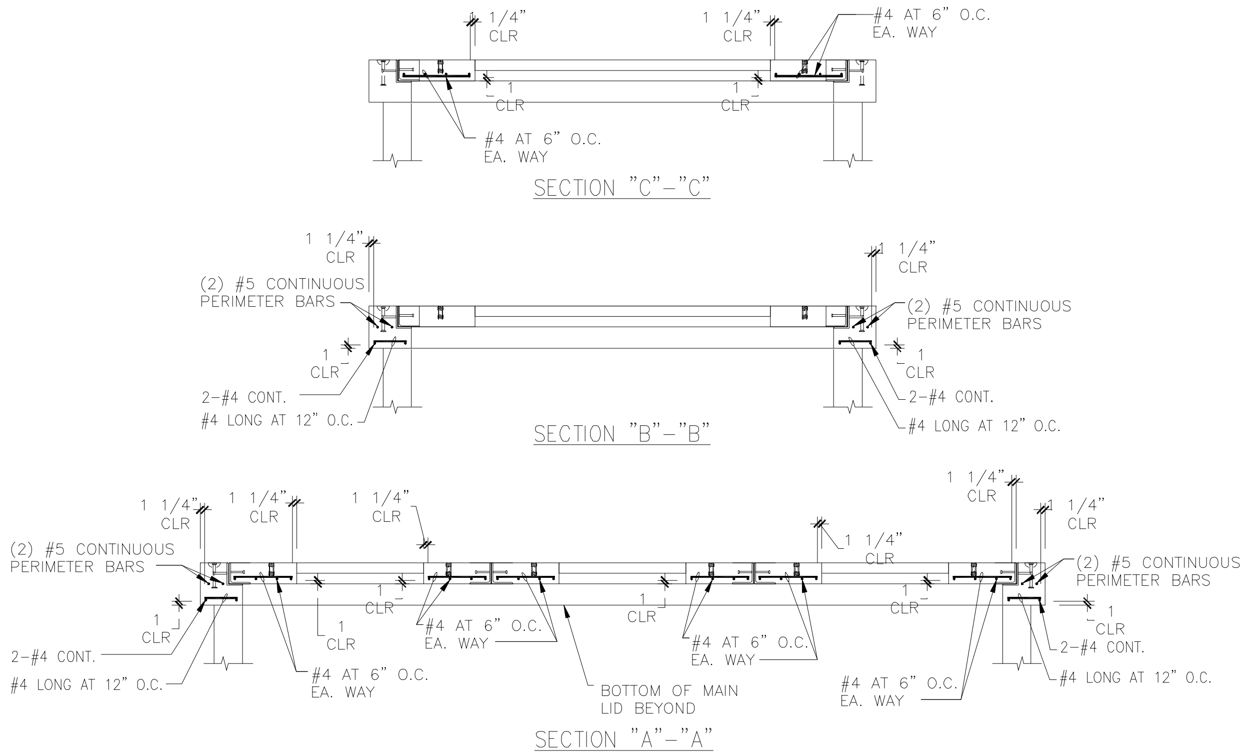


CAST IN RS-82 LID PLAN

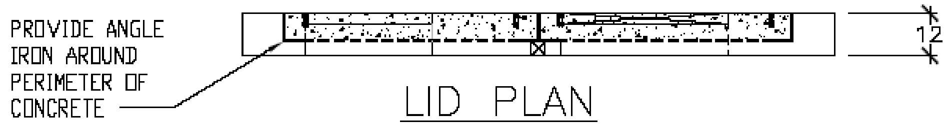


RS-82 LID PLAN

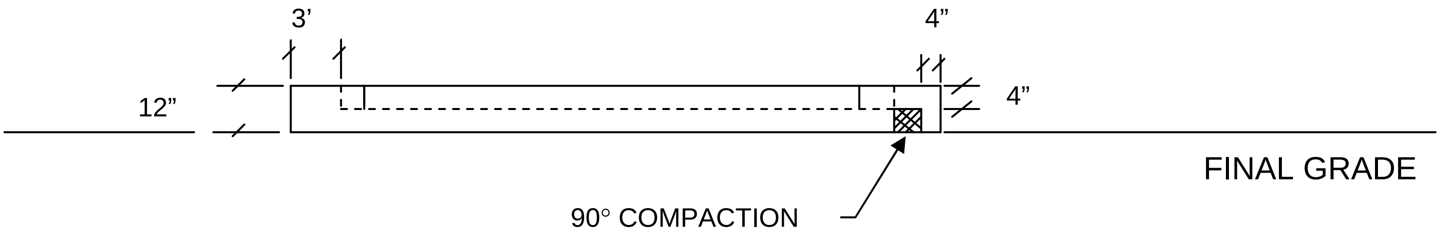
NV Energy				Electric Service Requirements	RS-117
				Subsurface Switch Vault, 15kV	
Drawn:	Eng:	Appr:	Date:		Revision: 3
SC	TA	DA	01/13		

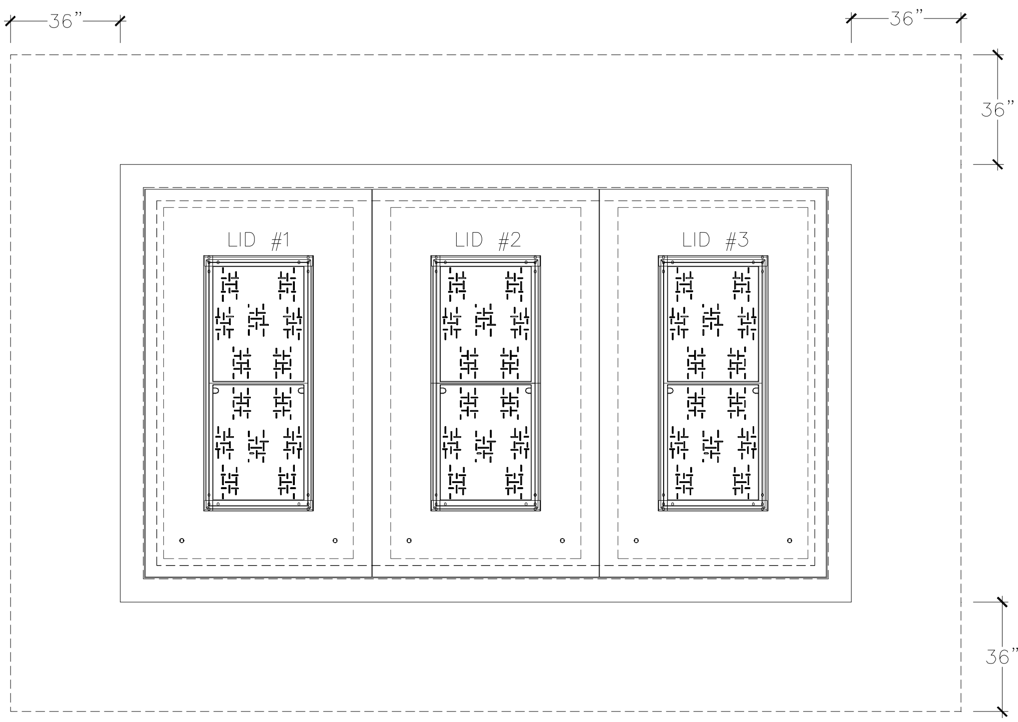


SECTIONS
CONCRETE: 5,000 psi



LID PLAN





Apron Layout

1. Lid Section

1. Four ton dog bone lifting device, one in each corner of the lid section.
2. Three RS-82 lids, 36” x 84”.
3. Angle iron around perimeter of both RS-82 lids.

2. Vault Section

1. 96” (W) x 96” (L) x 84” (H) inside dimensions with tolerances of ±1/2”.
2. Upper platform 1/4” x 1” stainless steel bar grating, 1 3/16” on center.
3. Switch gear support 1/2” x 2” stainless steel angle.
4. Cable support 3/8” x 1 1/2” stainless steel.
5. Steel galvanized ladder.
6. Lower platform 3/16” x 1 1/4” stainless steel bar grating, 1 3/16” on center.
7. For each end wall 6” PVC conduit terminators shall be located 8” from inside wall and 16” on center.
8. Two 6” PVC conduit terminators shall be centered on each side wall.
9. Conduit terminators to be centered.
10. 1” PVC conduit through each end wall.
11. 1/2” diameter ground inserts per illustration.

3. Entire Structure

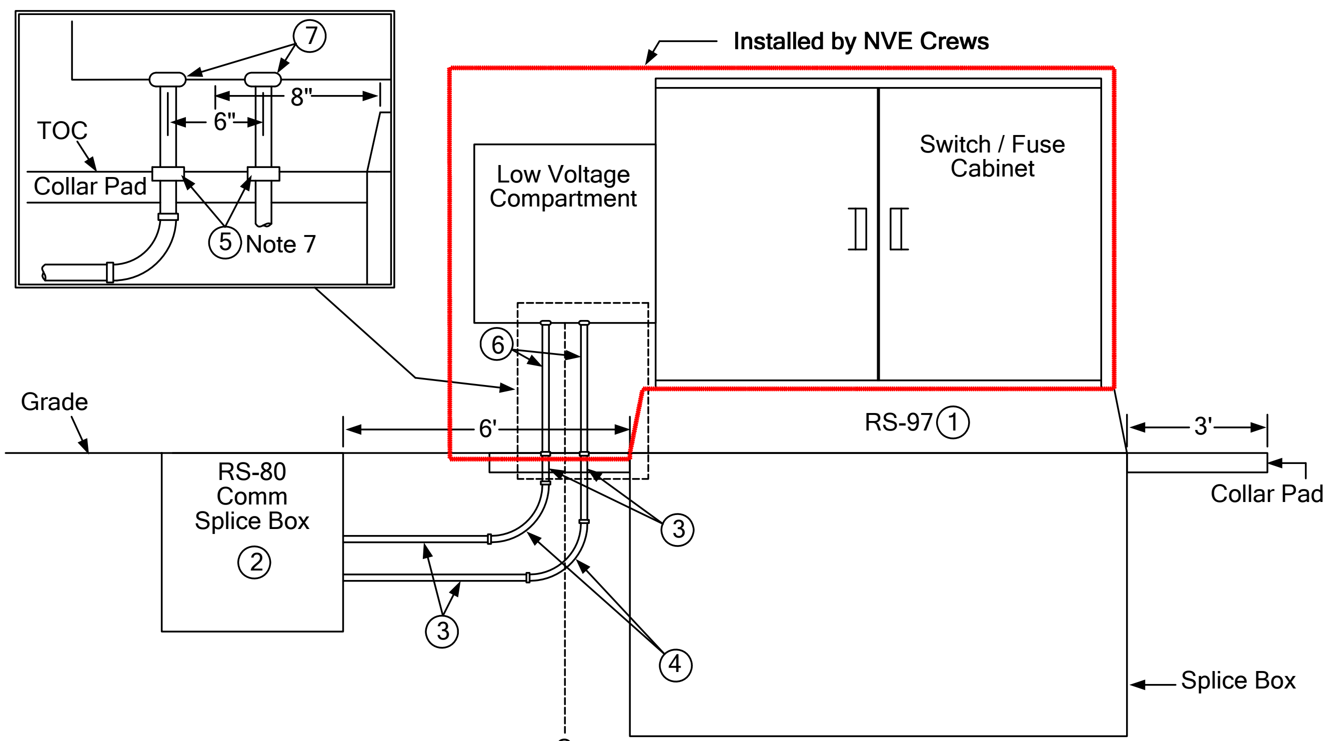
1. Install mastic between each section.
2. Shall meet RS-G2 and RS-G4.
3. Unless otherwise noted, all platforms, supports, and hardware shall be stainless steel.
4. Not to be installed in traffic areas.
5. Top of lid section and apron shall be 12” above final grade.

NOTES:

1. Contact T&D Standards before and during the design process.
2. Use only switches NVE Stock No. 253896 (11) or 253898 (9).
3. A RS-94 manhole shall be installed within 100’ of subsurface vault for ease of cable installation.
4. Apron to extend 3 feet from lid (all four sides) and shall be 12” above final grade.
5. Vault dimensions are subject to change (at the sole discretion of NV Energy, T&D Standards Department) to ensure the highest level of safety and ease of operations and maintenance.
6. The bottom surface of the manhole shall be level.

THIS PAGE INTENTIONALLY LEFT BLANK

Bill of Materials		
Item	**Description**	**Qty.**
1	RS-97	1
2	RS-80	1
3	Conduit, 2" DB120	6 ft
4	Elbow, 90° 36"R x 2"	2
5	PVC Rigid Adapter	2
6	48" Rigid Conduit	4 ft
7	Locknuts / Bushings	2 / 2

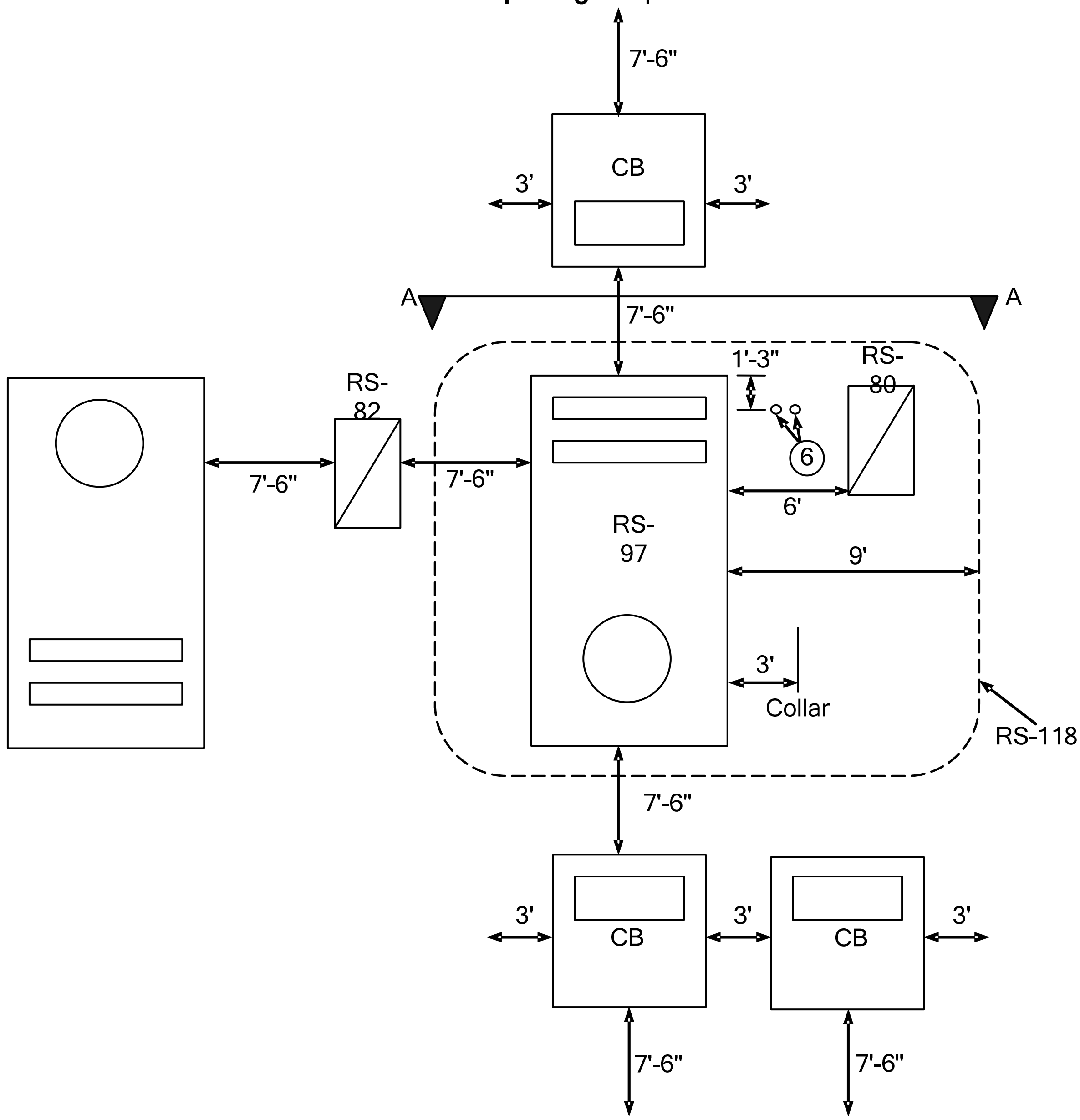


Section A-A
(From Plan View Next Page)

NOTES:

1. Consult NVE T&D Standards prior to designing with this type of switch.
2. Refer to standard RS-97 for manhole installation.
3. Refer to standard RS-80 for the communication box installation.
4. The RS-80 must be set adjacent to the low voltage compartment of the switch as shown, no exceptions.
5. The conduits for fiber optic cable must be installed within the boundary of the low voltage compartment of the switch as depicted above. This is required for proper fiber optic cable training and termination.
5. Refer to standard ER-1 for appropriate RS-118 compatible units.
6. Install conduits prior to collar pad installation.
7. Partially embed PVC/Rigid adapter in concrete collar pad.

Minimum Spacing Requirements



Plan View

NOTES:

1. All below dimensions are absolute minimums to maintain safe working clearances and equipment clearances.

DESIGN REQUIREMENTS

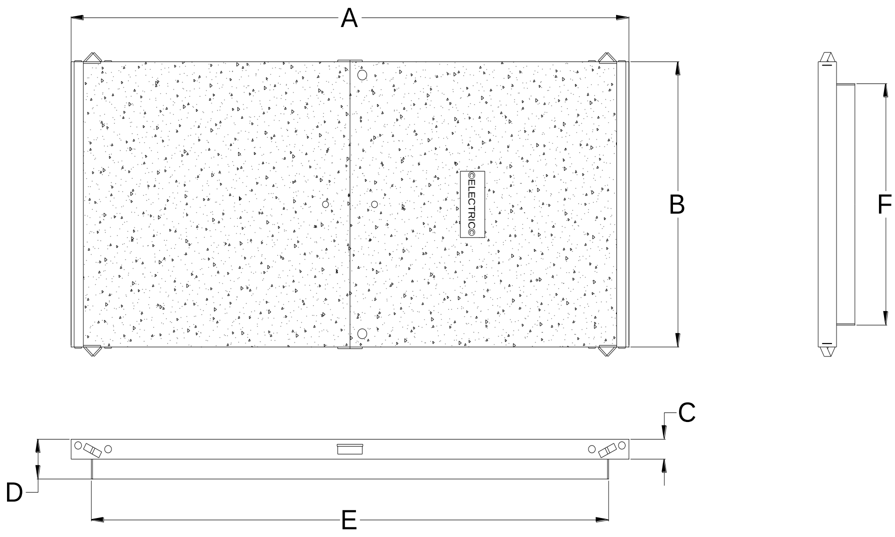


Figure 1: TORSION ASSISTED LIDS

HATCH	Adjustable Limit	DIMENSIONS (inch)					
		A	B	C	D	E	F
RS-80 H	3”	54	36	3	6	47 - 3/8	29 - 3/8
RS-82A H	3”	91	43	3	6	84 - 3/8	36 - 3/8
RS-81A H	3”	78	42	3	6	71 - 3/8	35 - 3/8
RS-81B H	5”	77	41	4.73	7.54	71 - 3/8	35 - 3/8

1. TORSION-ASSISTED LIDS

1. “ELE” in 1” letters, centered, bead welded or impressed into the top of one lid section. NOTE: “NVE COMM” shall be used instead of “ELE” on all NVE communications lids.
2. Two 5/8” slotted holes with two captive ½” – 13 UNC 304 stainless steel penta-head bolts attached to a latching mechanism and two angle brackets (see Figure 3), which shall be welded continuously to the side of the frame under the slotted holes. Bolts shall be furnished with castle nuts and cotter pins.
3. Both lid sections level to the top of the frame.
4. A 1” diameter hole (for a typical lifting hook), in covering lid section, with a permanent internal safety cover.
5. Two stainless steel (filled with grease) or brass bearing hinges for each lid section.
6. A stainless steel safety pin and chain lanyard shall be installed with each hinge, and provision shall be made to secure each pin when not in use (see Figures 4 and 5 below). McMaster – Carr Cat. No. 92730A120 and Cat. No. 98416A011, or equivalent shall be supplied.

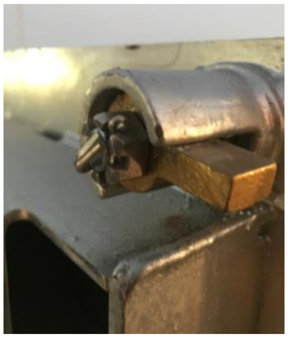


Figure 3

Figure 4

Figure 5

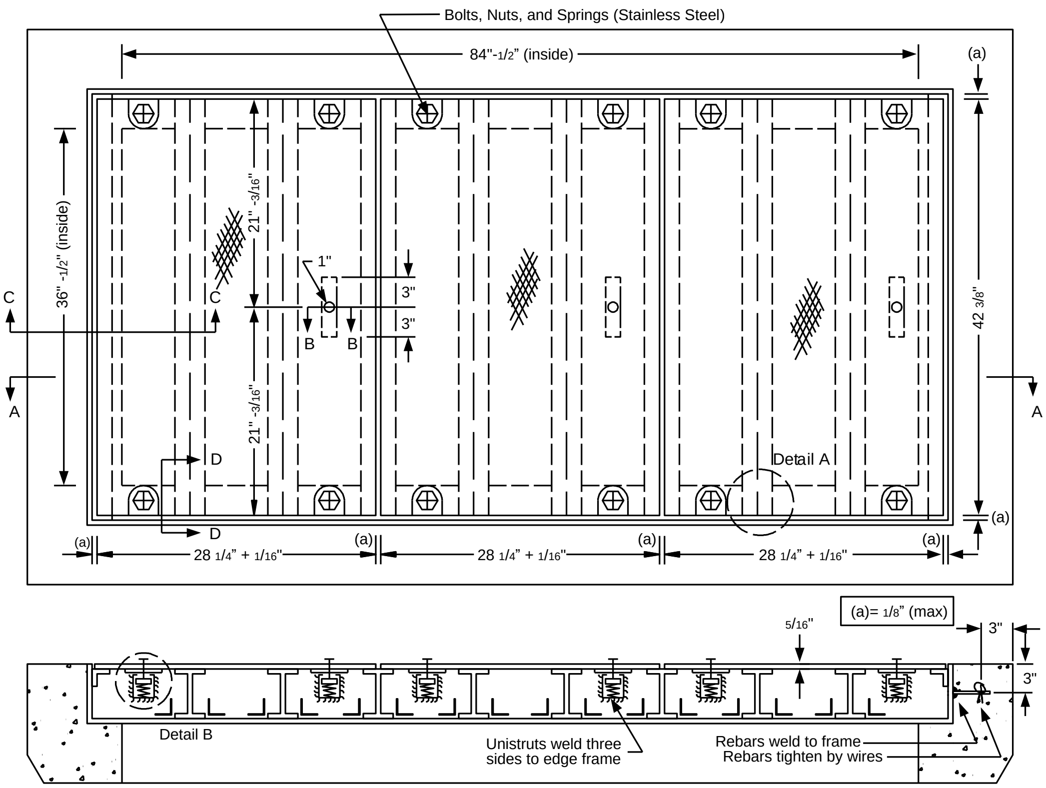
7. Manufacturer shall provide provision(s) to lock each lid in the 90 degree open position.
8. Manufacturer shall provide a maximum 1/8" horizontal and vertical gap around lid with a debris shield welded on the back side of the lid (see Figure 6).
9. Manufacturer shall provide anchoring provision(s) at both ends of the frame.
10. Two (2) ½" hexagon torsion bars are to be used for each lid. The material shall be 4140 Annealed or 5160 ASQ. Bars to be heat treated to R/C 42-44 and straightened and then cold galvanized or electroplated to prevent corrosion. Design is to allow for easy replacement of torsion bars. Material and heat treating certifications shall be provided on request.
11. Maximum 35 lb. pulling force required to open each lid section.
12. The open angle (by torsion bars) not to exceed 15 degrees between the lid and the frame.
13. An identification tag with the cover manufacturer name, model number and year of manufacture shall be installed on the inside frame.
14. Every twentieth top section assembled shall be tested by opening and closing the lid 25 times.
15. Four (4) captive ½'' bolts shall be attached to the frame one in each corner of lid not to interfere with safety latch, for adjusting the cover to grade variations. Bolt length shall be sized to limit adjustment to that listed in the table above.
16. Manufacturer shall provide a place to attach bonding wire at each end of lid frame and install a 3'- #4 copper (stranded) covered bonding wire, shall be green in color using listed connectors.(see Figure 8).
17. Covers shall be steel diamond plate (or approved alternate) with high-function coating, reinforcement as required to meet at least 250-psf live loads for loading requirements. The steel plate shall be hot-dip galvanized per ASTM 123, a minimum of ¼" thickness, a raised and high function surface water for slip resistance, and shall conform to ASTM A786. The coefficient of friction shall be greater than or equal to 0.85 verified with an ASTM-F2508 certified tribometer. Covers shall be supplied with sufficient lifting points to safely install or remove them. The approved manufacturer is SlipNOT or an approved equivalent.

Figure 6

Figure 7

Figure 8

DESIGN REQUIREMENTS – RS-82B H



SECTION A-A

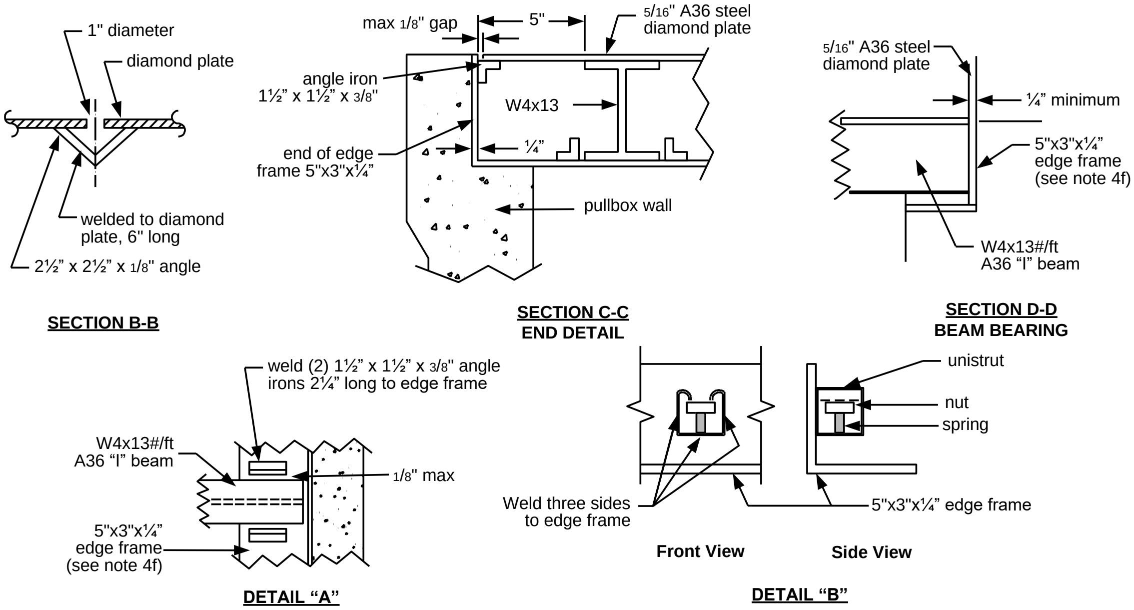


Figure 2: Three Piece Lid

2. THREE PIECE LID

1. The lid shall have:
   A. "ELE" in 1'' letters, centered, bead welded or impressed into the top of one lid section.
   B. Three pieces of 5/16'' steel diamond plate.
   C. A 1'' diameter hole (for typical lifting hook) in each plate with a permanent internal safety cover.
   D. Lid sections level to the top of the frame.
   E. A maximum 1/8'' horizontal and vertical gap around lids.
   F. Intentionally Omitted.
2. The top section shall have:
   A. Eight I –beams (type W4x13#/ft.)
   B. Four ½"-13 UNC stainless steel penta head hold down bolts per plate.
   C. The I beams held in place by ¼" x 2" x 2"-1/4" long angle irons.
   D. A 5"x3"x1/4" edge frame connected to rebar's.
   E. The unistrut nut brackets welded on three sides to the vertical side of the frame below top level of I beams.
   F. A 1-1/2" x 1-1/2" x 3/8" angle iron welded into the top edge frame along the entire length of each 36" wall.
   G. Anchoring provision(s) at both ends of the frame.
   H. The frame bolted to the precast extension and the gap sealed with mastic or similar material approved by NVE.
3. All parts must meet dimensional tolerance requirements in Figure 9. NOTE: The three piece lid is permitted for applications with High Voltage Metering Enclosure (RPM-407) or with the approval of supervisor, T&D Standards.

4. Manufacturer shall provide a place to attach bonding wire at each end of lid frame and install a 3'- #4 copper (stranded) covered bonding wire, shall be green in color using listed connectors.(see Figure 8).

TABLE OF CONTENTS

THIS PAGE INTENTIONALLY LEFT BLANK

Table of Contents

1. Metering Installation Requirements, General

These guidelines are based on NV Energy (NVE) practices that are deemed necessary in order to supply uniform satisfactory and safety service. Interpretations or clarifications of intent of these requirements are subject to NVE approval. Installations shall also conform to the provisions of applicable codes and ordinances of local inspection authorities and all other NVE standards.

If any questions arise that are not answered in this section, contact NVE Meter Services at (702) 402-6110 or (702) 402-6163 for clarification.

2. Type of Service

The type of service and metering equipment required to safely and accurately measure the energy delivered to a customer varies with the voltage and current of the service. Because of this, it is important that the customer consult the appropriate District Project Coordinator for information before proceeding with the purchase of equipment or installation of wiring. Refer to Section RPM of this manual for manufacturer requirements for utility metering and service equipment.

NVE Meter Services	(702) 402-6110
Las Vegas District Office	(702) 402-4700 or (702) 402-4800
Laughlin District Office	(702) 402-5936

3. Definitions

EUSERC – Electric Utility Service Equipment Requirements Committee. An association composed of electric utilities whose purpose is to promote uniform electric service requirements among its members.

New Sequence – This metering arrangement provides for the line current to enter first the meter and then the disconnecting means and overload protective devices (meter-switch-fuse sequence).

Old Sequence – This metering arrangement provides for the line current to enter first the disconnecting means and overload protective devices and then the meter (switch-fuse-meter sequence).

Readily Accessible (Meter) – Capable of being reached quickly for operation, renewal, or inspection without requiring those to whom ready access is a requisite to climb over or remove obstacles or to resort to portable ladders, chairs, etc.

Self-Contained Metering – A self contained meter is designed to carry rated current and be energized at line potential. It does not require auxiliary instrument transformers to step down line current or voltage.

Transformer/Instrument Rated Metering – When the electrical supply needs of the customer exceed the rating of a self-contained meter, instrument transformers are used. A current transformer (CT) provides a current on its secondary terminal that is in proportion to the customer's current. A potential transformer (PT) provides a voltage on its secondary terminal that is in proportion to the voltage supplied to the customer. An instrument rated meter is designed to properly meter at these smaller currents and voltages.

Meter Disconnect – A circuit breaker, fused switch, or other approved disconnecting means with over-current protection installed on the load side of the meter, to control all of and only the energy registered by the meter. Refer to Section RPM of this manual for specifications.

4. Who Provides Metering Equipment?

1. NVE will provide, own, and maintain the; 1) Meters, 2) Instrument Transformers, 3) Test Switches. In some instances, NVE will furnish instrument transformers for installation by the customer.
2. The Customer will provide, install, own, and maintain the; 1) Test Blocks, 2) Meter Sockets, 3) Meter Socket Enclosures, 4) Instrument Transformer Compartments, 5) Service Sections, 6) Any required conduits or raceways, and 7) Meter Disconnects.

5. Establishment of Service

Service will be connected by NVE after all service equipment has been provided and properly installed and a request for service has been made at the NVE office or by calling 367-5555. Meters will be set after an inspection clearance has been given by the proper inspection agency.

6. Meter Access

Electric meter installations shall be accessible to authorized representative of NVE for reading, testing, and inspection at all times. Consult the NVE District Project Coordinator for specific questions regarding meter locations. Refer to page 1 or RPI-G for telephone number.

1. Customer locking means for meter enclosures shall provide for independent access by NVE.
2. Working Space in front of meter: This area is to be located entirely on the Customer's property with the following conditions (for single-family residential installation, refer to RPI-2; all others refer to RPI-15)
   A. The working space shall extend a minimum of 3'-0" from the front of the meter panel or instrument transformer compartment.
   B. The customer must provide a safe walkway directly to the metering installation, and in no case should be less than a width of 3'-0", and no less than a height of 6'6".
   C. The height clearance for the working space should be no less than 6'-6".
3. Permanent barricades may be required to provide the clearances where the working space is exposed to vehicles or hazardous conditions.

7. Meter Locations – Refer to RPI-2 & RPI-15

1. Outdoor meter locations are preferred. When adequate exterior wall space is not available, the architect or builder may provide a meter room accessible from outside the building, in which the required number of meter sockets may be properly installed. Consult the NVE District Project Coordinator for specific questions regarding meter locations. Refer to page 1 of RPI-G for the telephone number.

<u>Single – Family Residence</u>

The meter shall be placed in accordance with the RPI-2 standard. . Future building or other structural changes shall not render the meters inaccessible. The metering equipment must be placed outdoors or in a meter room. Consult Meter Services for meter room requirements. Metering locations are not permitted in garages, carports, or breezeways.

<u>Multiple – Family Residence</u>

Meters and metering equipment shall be installed on the customer's premises in a location furnished by the customer and approved by NVE. The metering equipment must be placed outdoors or in a meter room. CONSULT METER SERVICES FOR METER ROOM REQUIREMENTS.

<u>Single-Story Building Other Than Dwellings or Apartments</u>

Meter socket may be installed on exterior walls in a location furnished by the customer and approved by NVE, or installed inside the building provided they are located in a public area or meter room. Consult NVE Meter Services for meter room requirements. Refer to page 1 of RPI-G for the telephone number.

<u>Multi – Story Buildings</u>

1. In large, multiple – occupancy buildings, extensive shopping centers or buildings that exceed two floors, NVE may, at its option, establish more than one meter location for groups of individual meter facilities. Consult the appropriate District Project Coordinator for written approval of the service plans in these cases. Refer to page 1 of RPI-G for the telephone number.
2. When the plan of a meter socket location has been established for a building any additional meter sockets shall conform to that plan.
3. For reasons of public safety, NVE safety, maintenance of service, and reliability of metering, it is not permissible to install meters and metering equipment as follows:
   A. In any location that is not readily accessible.
   B. In any location which is hazardous to personnel.
   C. In garages, carports or breezeways.
   D. In trash, refuse or garbage enclosures.

E. In areas containing animal waste.

F. On any surface subject to excessive vibration.

G. In any elevated or depressed area that does not have access provided by means of a ramp or clear stairway of normal tread and use which conforms to building code requirements.

H. In any substation area or transformer vault.

I. On any NVE pole. It is not permissible to attach panels, switches, junction boxes, or any other customer service equipment.

J. Within a 4' radius of NVE poles (see RS-4). Meters, metering equipment and associated service equipment may be installed on customer – owned poles, pedestal, structures, etc. provided such equipment is at least 4' from NVE poles.

8. Meter Heights

The meter height shall be measured from a level standing surface to the center of the meter. Meters shall be located not more than 75" and not less than 48" above the ground or standing surface when installed outdoors. When the meter is enclosed in a cabinet or indoors in a meter room, the minimum height may be reduced to 36". When a multiple metering panel is enclosed or properly barricaded, the minimum height may be reduced to 24".

9. Meter Room Detail

1. If the customer is installing metering equipment within a meter room, NVE must be provided with constant access through an external door directly into the meter room. The minimum width of the door shall be 36" or comply with local building codes.
2. The customer will provide a key to the meter room. NVE will provide the lockbox to house the key. The Lockbox needs to be located externally on either side of the door or to the side of it, with a minimum height of 48" to a maximum height of 72".
3. 36" minimum working clearance is required in front of the metering equipment. 10" minimum clearance is required on the sides of each meter. 7" minimum clearance is required between the meter and any obstruction above it. See RPI-2 for surrounding clearances. The meter room is not to be used as a storage closet.
4. If the customer installs an internal access door within the meter room, it must be locked and accessible only by authorized personnel.
5. If the meter is to be removed from the instrument transformer enclosure, the remote conduit length, diameter, and run must adhere to the requirements of RPI-G.
6. Meter rooms must meet all requirements of the NEC Code concerning exits.

10. Identification

1. Each installation shall be clearly identified with its permanent address (house number). The street name shall be clearly posted.
2. Multiple Meter Identification: Each meter position and each service switch or breaker shall be clearly and permanently identified by the customer to indicate the particular location supplied by it. The relation of the socket, breaker, and dwelling served must be easily discernable. Meter will not be installed until marking is complete. Examples of permanent markings are:
   A. An identification plate attached by screws, rivets or a secure adhesive
   B. Non-removable, by usual solvents, paint applied with stencil or careful lettering
   C. Commercially available decals designed for this purpose

Clear identification means a legible street address, and apartment or store number. Store name may be included, but it does not constitute a location designation in itself.

11. Sealing

All meters and enclosures for meters, metering equipment, and service entrance equipment on the line side of the meter, will be sealed by NVE. NO PERSON is permitted to tamper, or in any way interfere, with a meter or it's connections as placed by NVE.

12. Grounding

Lugs for terminating the customer's ground wire (or other grounding conductors)shall be located outside of the sealable section and shall be designed to readily permit the customer's neutral system to be isolated, when necessary, from NVE facilities.

13. Metering Service Switch and Rating

1. For each meter, the Customer or Contractor shall furnish and install a switch or other approved disconnecting means, installed on the load side of the meter, to control all of the energy registered by the meter. The disconnect means, where permitted by the governing code or ordinances, may consist of a group of switches or breakers.
2. When a single meter switch is used, the rating of the fuse or circuit breaker shall be the rating of the meter switch.
3. When a group of switches or breakers is used in lieu of a single meter switch, the ampere rating of the conductor or bus connecting to the meter socket will be considered the rating of the meter switch,
4. Every meter switch installed on a service of less than 600 volts, shall be on the load side of the meter or metering equipment. This is called "New Sequence" – see definitions on page 1 of RPI-G.
5. The meter switch may be located at a point other than adjacent to the meter and may be located inside the building served, while the meter is located outside remotely from the instrument transformer compartment. See "Instrument Transformer Enclosure with Safety Socket Box" for further requirements (Page 6).
6. In multi – meter installations, electric codes require the installation of a main service switch or breaker on the supply side of any group of 7 or more meters. In these instances, contact NVE Meter Services for approval before the equipment is installed. Refer to page 1 of RPI-G for the telephone number.

14. **Drawing Submittals**

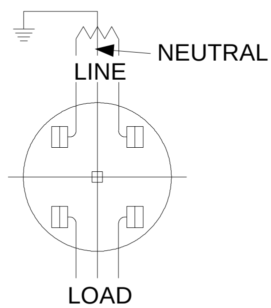
1. Drawing submittals will be required for all Customer-Owned Metering Equipment on Instrument-Rated services. Drawing submittals are not required for Self-Contained services less than 600 volts. Two (2) copies of the manufacturer's prints shall be sent to NVE at the following address for approval prior to the construction of the equipment.

NV Energy
Meter Services, MS B97MS
7155 Lindell Rd.
Las Vegas, Nevada 89118

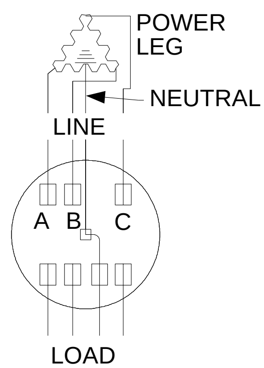
2. Drawing submittals are required for Customer-Owned Primary Switchgear for services greater than 600 Volts. Send two (2) copies of the manufacturer's prints to the above address for approval.

15. **Self-Contained Meter Sockets**

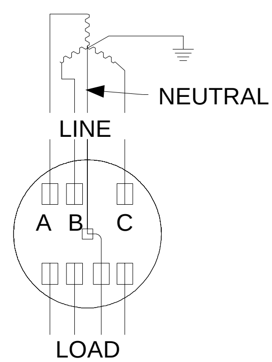
1. Sockets for use with self-contained meters are available in approved ratings. When connected to properly sized service entrance conductors, the sockets that are Underwriter Laboratory approved for up to 225 amps are permissible. Service entrance wire terminals shall accommodate conductor sizes per Standard RPI-8. Actual conductor size required must be per NVE construction drawings.
2. All self-contained meter sockets designed for underground service that have been approved for aluminum conductor by Underwriter Laboratories may be installed in the NVE service area.
3. For single-phase 120/240 Volt services, 320 amp or 400 amp self-contained meters can be supplied when the properly designed service equipment is installed by the Customer. Refer to RPM-2 and RPM-3.
4. Self –contained meters are available for 480 Volt services and are rated up to 200 amps. Consult NVE Meter Services for approval of metering equipment. Refer to page 1 for the telephone number.



120/240V: 1-Phase, 3-Wire
FIGURE 1



120/240V: 3-Phase, 4-Wire, Delta
240/480V: 3-Phase, 4-Wire, Delta
FIGURE 2



120/208V: 3-Phase, 4-Wire, Wye
277/480V: 3-Phase, 4-Wire, Wye
FIGURE 3

Self-Contained Meter Sockets
NOTE: NVE does NOT allow 3-phase, 3-wire services.

16. Sockets

For self-contained meters with customer owned wiring, the customer shall terminate their wiring. The socket shall be equipped with terminals of sufficient size to install the conductors without removing any strands of wire.

17. Instrument Transformer Enclosure-General

1. For instrument transformer-rated meters, NVE will furnish and install the normal secondary wiring from the metering transformers to the meter socket.
2. No connections shall be made in the instrument transformer enclosure to supply any other meter, or more than one load circuit.
3. When the neutral conductor is a part of the service, it shall pass through the instrument transformer box, be continuous, and be capable of being bonded to the box.
4. Line supply conductors can enter the instrument transformer compartment from either the top or the bottom of the compartment. Load wire must exit through the opposite end of the compartment from which the line supply conductors entered.
5. The instrument transformer box may be used as a combination service termination and current transformer mounting box for residential underground services when the service conductors supply only the one customer. The underground service conduit shall enter the center of the lower end of the instrument transformer box.

18. Switchboards - General

1. NVE shall be consulted prior to manufacture of switchgear, to determine the type of metering, size of current and/or voltage transformers, and any special arrangement necessary for mounting instrument transformers.
2. The customer shall bring their meter socket panel to NVE Meter Shop for wiring. At that time, the customer will be provided with current transformers (CT's) for installation in their equipment.

   Information required on the back of the meter socket panel: Job name; Job address; Main size (amps) Voltage; Top side; Hinge side; NVE work order number. If the meter is remoted, the true tape-measured length of remote conduit and the number of quarter (90°) bends in the conduit must be noted at the time the CT's are provided.

   The NVE Meter Shop is located at:

   7155 Lindell Road
   Las Vegas, Nevada 89118
3. The rating of the current transformers will not necessarily be the same as the service switch.
4. All compartments containing unmetered conductors shall be sealable. When a raceway or conduit for metering secondary wiring is necessary, such raceway or conduit shall be sealable (see "Sealing," page 3).
5. The instrument transformers supplied by NVE for metering shall not be utilized for any other purpose.

19. Instrument Transformer Enclosure with Safety Socket Box

Instrument transformer enclosure with a hinged cover and a separate meter socket enclosure are acceptable. A minimum 10" space is required between the edges of the two enclosures. The maximum separation between the edges of the enclosure is 10'. Each enclosure shall be visible from the other enclosure. There shall be no fence barrier between the two enclosures. The conduit run between the instrument transformer enclosure and the socket enclosure shall be either 1-1/2" or 2" trade size Rigid Metal Conduit or Intermediate Metal Conduit and shall contain no more than 270° of bend. Condulets(LB, LR, LL and T fittings), enclosures and junction boxes are prohibited in the conduit between the instrument transformer enclosure and the meter socket enclosure. The CT enclosure shall be located in the immediate area of the main and meter disconnecting means.

20. Switchboard Service Section

1. In cases where more than one meter is to be installed, there will ordinarily be a separate service for each meter installation and its associated service switch.
2. For services with self-contained meters (not using current transformers) it may be practicable to put two or more meters and switches in the service section.
3. When two or more switchboard service sections are supplied from one set of service conductors, the supply conductors serving these switchboards shall be terminated ahead of and outside of the metering transformer compartments in a separate sealable enclosure. The supply conductors are to be arranged so they are readily accessible without disturbing the metering transformers and associated secondary wiring.
4. Additional service connections may be made in the main service termination and pull section where more than one metering installation is necessary, or where more than one rate schedule is desired. Additional service connections shall not be made.

21. Specially Engineered Service Section

Switchboard design which does not conform to the standard switchboard is considered specially engineered, and includes the following installations:

1. Installations rated over 3000 amperes or 600 volts.
2. Where the service breaker ampacity rating exceeds that of the standard service section.
3. When multiple metering sections are used.
4. When recessed meter panels are used.

   NOTE: All specially engineered service sections shall be approved before manufacture and installation. Copies of Manufacturer drawings shall be sent to NVE Meter Services for approval.

22. Service Termination, Instrument Rated and Switchboard Services

1. Overhead Service Terminations:

   For overhead services, the customer shall furnish lugs and connect the cable to line and load sides of the bus stubs in the current transformer compartment.
2. Underground Service Terminations:
   - A. NVE will terminate its service conductors on lug landings in the termination section, as shown in Figure 1 on sheet RPM-45.
   - B. The customer shall install conductors from the service termination lug landings to the line side of current transformer compartment.

NOTE: The load wires from the distribution section (branch circuits) shall not pass through any sealable section.

3. For both standard and specially engineered switchboard service sections, all services or supply conductors shall enter the service section through one end and leave through the opposite end of the instrument transformer compartment. This stipulation applies to either overhead or underground service or if two or more service sections are connected together. The direction of feed shall be vertical through the instrument transformer compartment (see RPM-45).
4. In cases where more than one switchboard is to be installed, a separate service section will be installed which is completely barriered from other service sections, pull sections, termination sections, or service switches and disconnects.
5. When two or more switchboard service sections are supplied from one set of service conductors, the supply conductors are to be arranged so they are readily accessible without disturbing the instrument transformers and associated secondary wiring.
6. Additional service connections may be made in the main service termination section where more than one metering installation is necessary. Additional service connections shall not be made in the instrument transformer compartment. Consult NVE for approval.
7. Meter installations of six meters or less, shall be connected "New Sequence".

23. Pull Section Lug Landings and Bussing Requirements

1. Bus bars, and other hardware, attached to the outer walls of the enclosure shall be secured with devices that may not be loosened from the outside. Screws or bolts requiring special tools for installation or removal are not acceptable.

   Single Meter Switchboard Installation Rated through 800 amps

   Bus bars (or cable) shall extend from the landing lugs in the termination section to the CT bus stubs.

   Single Meter Switchboard Installation Rated above 800 amps

   Bus bars shall extend from the service-terminating stubs in the termination section to the CT bus stub.

24. Unmetered Conductors

1. Customer unmetered service wires & metered load wires are not to be run in the same conduit, raceway or wiring gutter. Unmetered conductors from the consumer's distribution section shall not pass through the utility's sealable sections.
2. Service junctions are not allowed and conduit shall be a continuous run.

25. NVE Requirements for Customer Owned Service Cables

Only authorized employees of NVE will be permitted to connect or disconnect a customer's underground service to or from any NVE facility

The customer shall furnish and NVE will install compression terminal connectors on the transformer secondary bushings. Contact the appropriate NVE New Business District for wire size information (phone #, page 1). All customer supplied connectors shall be compression type and approved by NVE. Compression lugs should be purchased according to NVE Material Standard MC-7, or may be purchased directly from NVE.

The following table lists the maximum number of conductors per service voltage for each service panel per a given service voltage. Required cable lengths above the pad are also given.

Service Panel Ratings			Maximum Conductors per Terminal	Maximum Conductor Size	Minimum Cable Length Above Pad
Volts	Amps	Phase			
120/208 or 277/480	400-1000	3	4	750 MCM AL	6 feet
	1200-2000		8		
	2500-3000		10		
	4000-6000		16		
120/240	400-600	1	2	500 MCM AL	6 feet
	400-600	3	2		12 feet
	800		3		
	1000		4		

* Maximum 15 minute peak demand on 4000-6000 Amp panels shall be limited to 3000 Amps.

NOTES:

1. The wild leg of a customer owned service panel shall be clearly marked at the pull section of the service panel with orange electrical tape. Use the C-phase as the wild leg on any instrument rated meter (>200 amps, 4 wire, delta) or any self contained meter.
2. When the customer requests 3-phase, 480 Volt 4 wire delta service from a padmount transformer, the neutral size must be large enough to carry the return fault current. The wire size provided shall be per the National Electric Code.

NOTE: NVE does **NOT** allow 3-phase, 3 wire services.

26. Multiple meter installation design

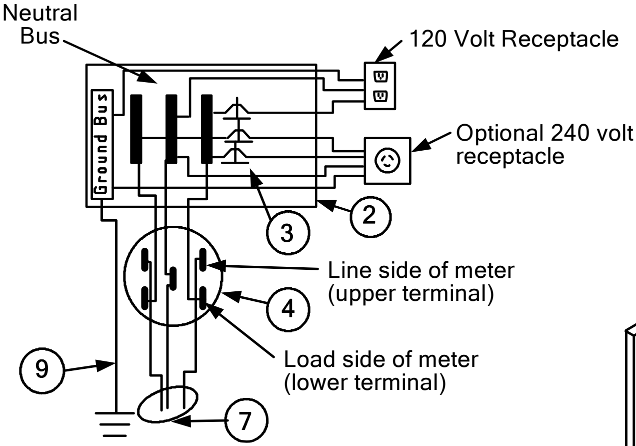
Service equipment to serve multiple tenants shall be designed so that all energy to one tenant space shall be measured by one meter. All energy for non-tenant specific (house) consumption shall be measured by one meter. Installations where the tenant is served under multiple rates such as general service interruptible water will have multiple meters. Consult NVE Meter Operations with questions.

27. Fire pump service

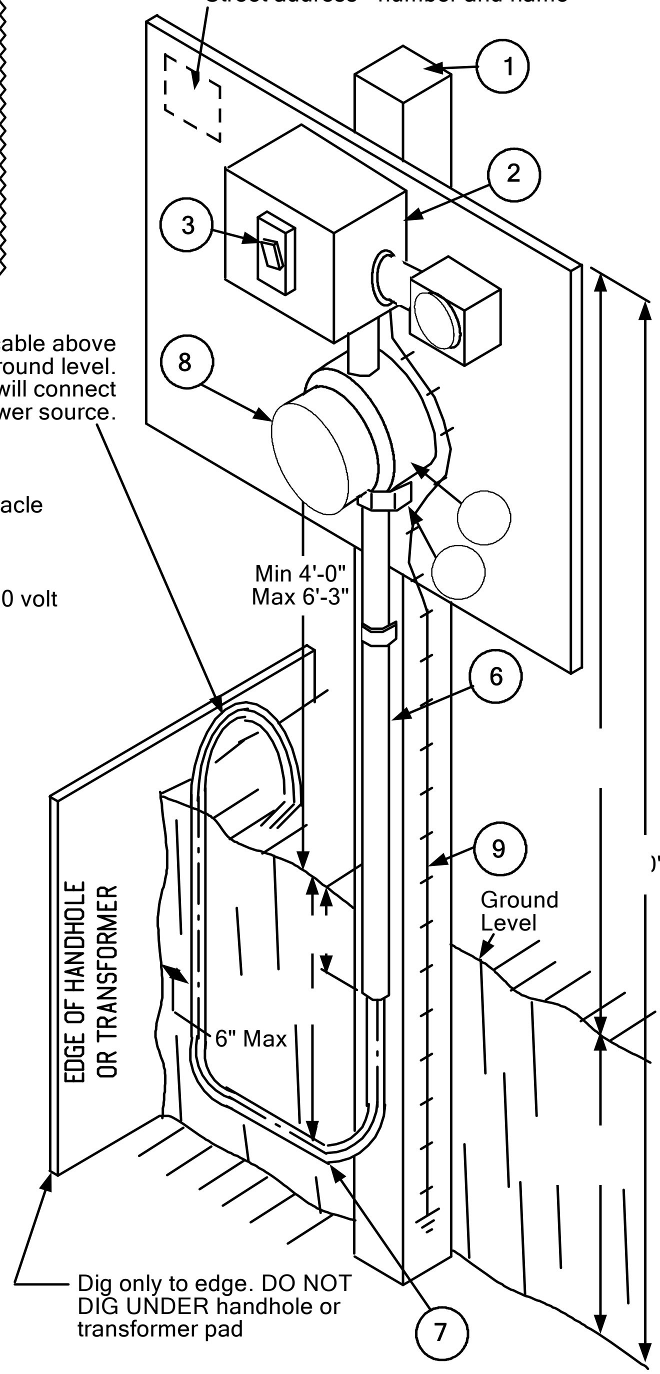
Fire pumps shall be connected so that energy for the fire pump will be measured by the non-tenant specific (house) meter. When the fire pump controller is used as the main disconnecting means, the room where the fire pump controller is located shall meet all requirements for access and work space. An easement shall be required for access to the controller.

When a separate disconnecting means is installed as supervised installation in accordance with NEC Article 695.4(B), the disconnecting means shall be installed near the service equipment or at a location approved by NVE Meter Operations. Consult NVE Meter Operation with questions.

**CAUTION
CALL BEFORE
YOU DIG
811**



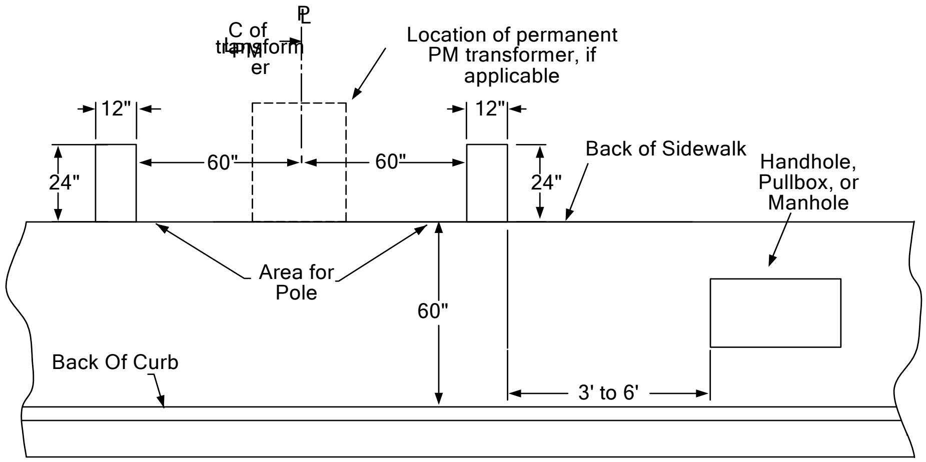
ELECTRICAL DIAGRAM



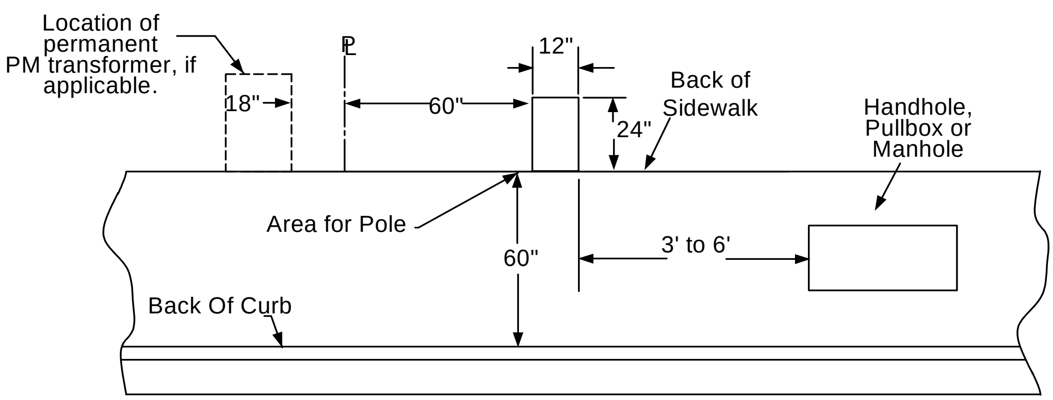
The customer is responsible for and must schedule a "Hot Stand-By" when digging under the handhole or transformer pad as necessary to complete the temporary service connection.

MATERIAL LIST

1. Post, 4" x 4" or 4" diameter
2. Raintight load center
3. GFCI breaker per NEC or GFCI receptacle 14, EUSERC approved
4. Raintight meter socket, 4 terminal
5. Threadless Union
6. Rigid conduit
7. Service wire, triples (insulated UG conductors only)
8. Meter by NVE
9. Groundings per NEC and/or local ordinances



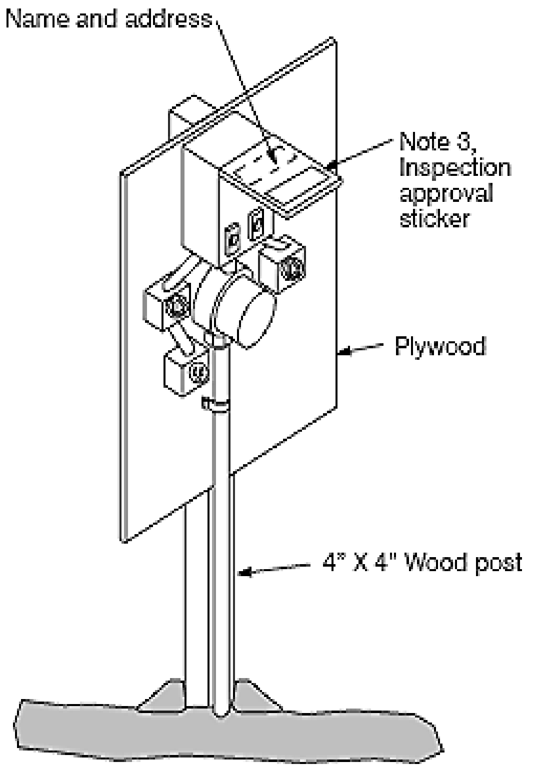
LOCATION FOR TEMPORARY POLE
(TRANSFORMER ON PROPERTY LINE OR NO TRANSFORMER).



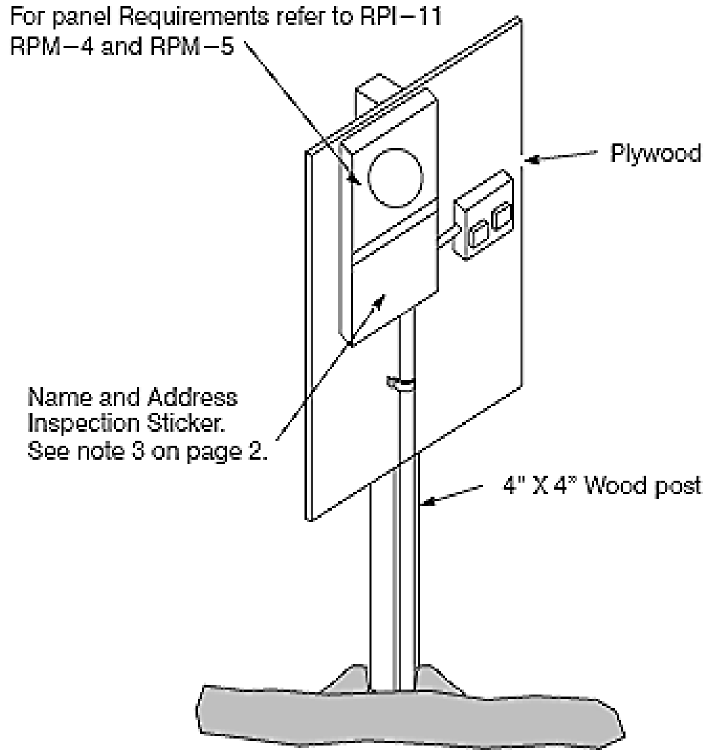
LOCATION FOR TEMPORARY POLE
(TRANSFORMER IS 18" FROM PROPERTY LINE).

NOTES:

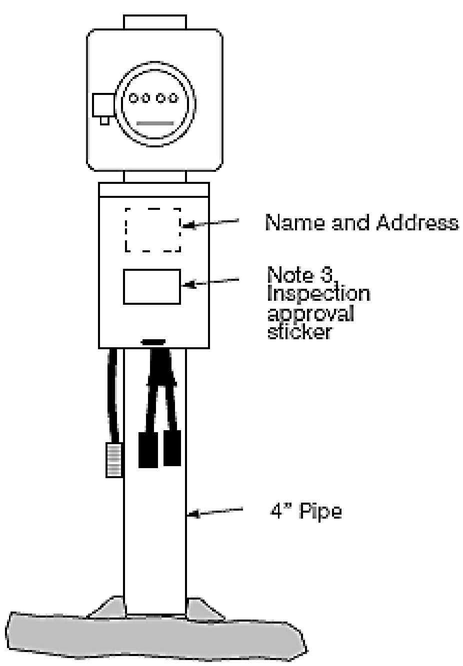
1. All temporary service installations shall meet National Electric Code (Article 305) and other City, County or State building Codes.
2. The customer or contractor shall furnish, install and maintain at no cost to NVE, all temporary service equipment, wire, trench, backfill, permits and all clean-up.
3. Customer or contractor will call NVE for connections to the transformer or handhole after the City or County has inspected and approved the service.
4. NVE will install and remove the meter, energize and de-energize the service wire at the nearest junction point.
5. All customer owned circuits shall have “Ground Fault Circuit Interrupters”.
6. Direct buried meter pedestals are acceptable.
7. If location sketches above are not applicable, the temporary pole(s) must be a 3’ min. to 6’ max. from any PM transformer, handhole, trench or NVE power pole.



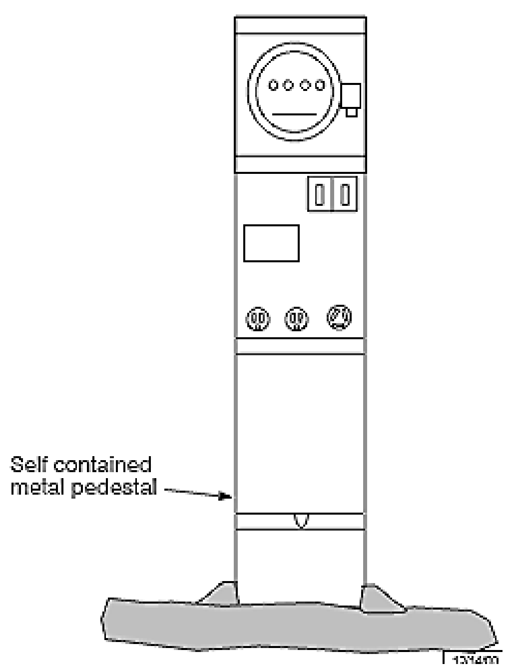
Name and address
Note 3, Inspection approval sticker
Plywood
4" X 4" Wood post



For panel Requirements refer to RPI−11 RPM−4 and RPM−5
Plywood
Name and Address Inspection Sticker. See note 3 on page 2.
4" X 4" Wood post



Name and Address
Note 3, Inspection approval sticker
4" Pipe



Self contained metal pedestal

THIS PAGE INTENTIONALLY LEFT BLANK

Table of Contents

1. Purpose

1.1 This standard specifies the requirements for the location of NV Energy (NVE) residential meters and service equipment. Requirements in this standard facilitate access to service equipment by NVE personnel for performing operations and maintenance functions as well as for fire and police agencies in emergency situations.

1.2 This standard is effective **September 14, 2009.** Customer design submittals showing meter location(s) must be project specific; design approvals will not be granted on a generic basis for possible, ongoing use.

1.3 Meter and service entrance installations must conform to the latest revisions of RPI-G and RPI-2, specifically, the “Meter Access” and “Meter Locations” section of RPI-G.

1.4 This standard must be read in its entirety to avoid additional costs or delays due to nonconformance.

2. Definitions

2.1 *Residential House*: A continuous structure under one roof containing living space and non-living space such as a storage, garage, deck, etc.

2.2 *Service Point*: The point of connection between the facilities of NVE and the premise’s electrical wiring system. The residential meter is normally installed near the service point.

2.3 *Standard Service Point*: The preferred location for installation of the residential electric meter. This service point shall be located along the front portion of the residential house that is facing the street with the legal address of the lot.

2.4 *Alternate Service Point*: An alternate location for installation of the residential electric meter. This service point shall be located along the portion of the residential house that is facing the public alley or side street where existing NVE facilities can provide a service run to the residential house. NVE will ensure that this location meets NVE rules for safe and readily accessible ingress/egress.

2.5 *Service Entrance Structure (SES)*: Service equipment that is not attached to the building, such as a meter pedestal, separate switchboard, or wall-mounted service, (see 4.4). This equipment should be approved by NVE and specified in Section RPM of the Electric Service Requirements. See NVE Standard RPM-A for 400 Amp and 600 Amp single phase pedestals.

2.6 *Acceptable SES Area*: An area where a SES must be placed if the electric meter is not located on the wall of the residential house. See area indicated in Figures 1 - 4.

2.7 *Back-of-Curb*: Location directly behind and along the existing curb. If a curb does not exist, it is defined as the edge of easement.

2.8 *In-Sight-From*: (as applied to safe work space) to be visible from public easement and not more than 100' measured from back of curb or public easement to the edge of the service equipment.

2.9 *Readily Accessible*: To be capable of being reached quickly for operation, renewal or inspection without the need to climb over, remove obstacles, or resort to portable ladders, chairs, etc., per NEC 2005 Article 100. Must be readily accessible 24/7.

3. Design Considerations

3.1 The location of the residential meter directly impacts NVE's goal to provide its customers with the safest, most cost effective and reliable electric service possible. Therefore, customers and their representatives (licensed Architects, Engineers, or owner builder) should select a meter location as close to NVE facilities as practical.

3.2 For operational and maintenance purposes, the residential meter requires direct accessibility 24-hours a day, 7 days a week. If the customer has specific problems regarding property access, landscaping, or the meter location on the house, a meter pedestal (SES) located close to the sidewalk offers the viable solution. NVE will work with the customer and their design representative to meet NVE standard requirements.

3.3 Proposed residential meter locations that will not be readily accessible over the life of the project will not be approved. All meter locations are subject to approval by NVE Meter Operations and T&D Standards.

4. Location of Service Points

4.1 The **Standard Service Point** must be located either along the wall of the residential house that is facing the street of the legal address, or along the side wall. The distance from the back of curb to the edge of the meter will not be greater than 100'. The entire safe work space must be *in-sight-from* the street or public alley. The Standard Service Point must be determined using Section 7, Method for Locating the Standard Service Point.

4.2 The **Alternate Service Point** must be located either along the wall of the residential house that is facing the public alley or side street, or along the side wall per Section 7. The distance from the back of curb to the edge of the meter will not be greater than 100'. The entire safe work space must be *in-sight-from* the street or public alley. This method can be used only where NVE existing facilities provide a service run to the residential house either from a side street or public alley. The Alternate Service Point must be determined using Section 8, Method for Locating an Alternate Service Point.

4.3 If the Standard Service Point and Alternative Service Point are not used for the meter location, an SES must be placed in the **Acceptable SES Area**. The default location for an SES must be 5' behind curb, 5' from existing driveway, and 5' from lot lines. See Figure 1.

4.4 Meters shall only be mounted on walls solely owned and controlled by the homeowner. Walls located on property lines are not approved.

5. Access to Service Equipment

5.1 Electric meter installations must be readily accessible to authorized representatives of NVE for reading, testing, and inspection at all times. Customer contact will not be required for meter reading.

5.2 **Fences, gates, walls, or other obstructions are not allowed** in front of the service equipment and are prohibited by the easement. The service equipment must be accessible without requiring passage through restricted areas or requiring customer contact.

5.3 Power-operated gates do not meet the requirements for a readily accessible service installation.

5.4 There must be a path to the service equipment that is free of landscaping.

5.5 The service lateral and access pathway, excluding paved driveways, will generally not have a running slope (maximum average slope) that exceeds ±5% except for short distances outlined in items 1-3 below for specific distances. Frequent grade changes will not be allowed. Where conformance is not possible, an SES must be installed at an Acceptable SES Area.

±5% maximum average slope AND

(1) ± 12% grade - maximum of 10’ distance

(2) ± 10% grade - maximum of 30’ distance

(3) ± 8% grade - maximum of 100’ distance

Example: A residential meter is located 100’ back of curb. The grade (slope) from back of curb to 50’ (Point A) is 8%; Point A to the meter location the grade is 2%. The maximum average slope = total rise/total run = (4’ + 1’)/100’ = 5%, with a maximum grade of 8%. This is an acceptable design.

6. Visibility of the Safe Work Space

6.1 In all cases, the entire safe work space must be *in-sight-from* the street or public alley where the residential house is served.

6.2 A 3’ x 3’ area directly in front of the meter must be provided as the minimum amount of work space necessary for safe operation and maintenance of the meter and service equipment. See Figure 5, Safe Work Space and Clearances Around the Meter.

6.3 The standing surface of the work space must not contain rocks larger than 3/8” and will be level within ¼ inch per foot in all directions.

6.4 The safe work space must not be part of a driveway or subject to vehicular traffic, including parking.

7. Method for Locating the Standard Service Point

7.1 Draw Line 1 100’ parallel to the back of curb and through the inside of the house. If the back of curb does not run along the entire face of the house, for instance with a cul-de-sac or flag lot (See Fig. 4), Line 1 must be drawn using the method outlined in Section 9.6 of Additional Conditions. The Standard Service Point must be located on the outside wall of the house at a maximum distance of 100’ from back of curb.

If the service point is greater than 100’ from back of curb: A SES must be installed within the Acceptable SES Area.

7.2 The entire safe work space must be in-sight-from the street or public alley. See Figure 5 and 6 for proper clearance around the meter.

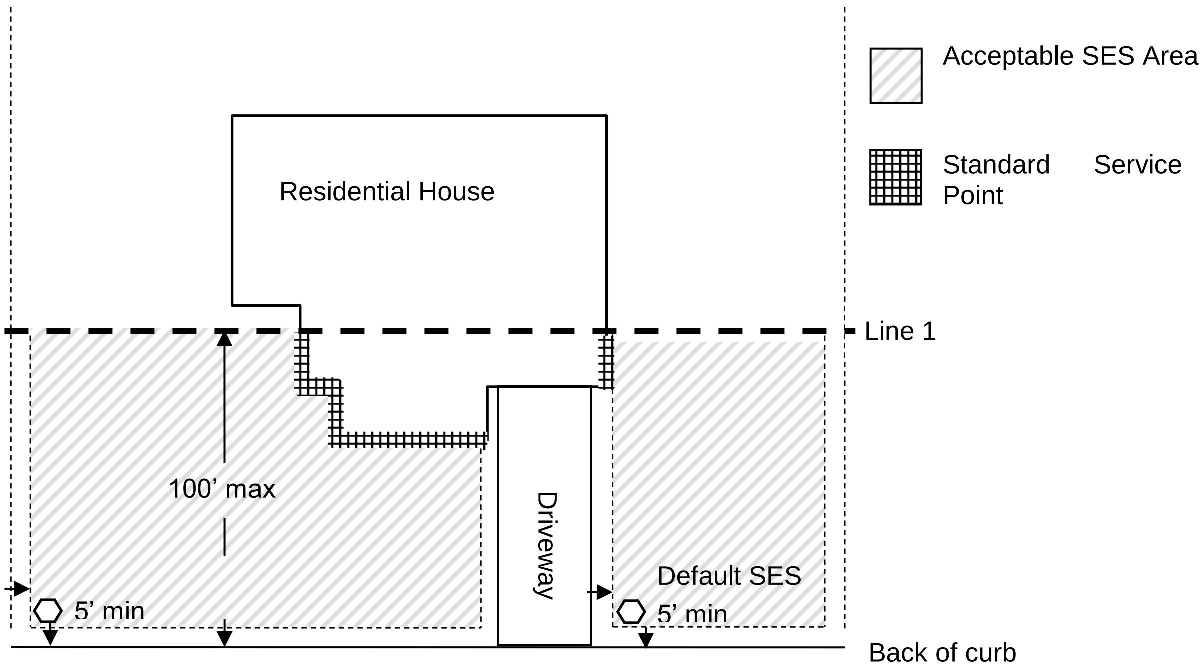


Figure 1. Locating the Standard Service Point

8. Method for Locating an Alternate Service Point

8.1 Draw Line 1 25’ parallel to the back of curb and through the inside of the house. If the back of curb does not run along the entire length of the house, for instance with a cul-de-sac or flag lot (See Fig. 4), Line 1 shall be drawn using the method outlined in Section 9.6 in Additional Conditions. The Alternate Service Point shall be located on the outside wall of the house at a maximum distance of 25’from back of curb.

If the service point is greater than 25’ from back of curb: A SES must be installed within the Acceptable SES Area.

8.2 The entire safe work space must be in-sight-from the street or public alley. See Figure 5 and 6 for proper clearance around the meter.

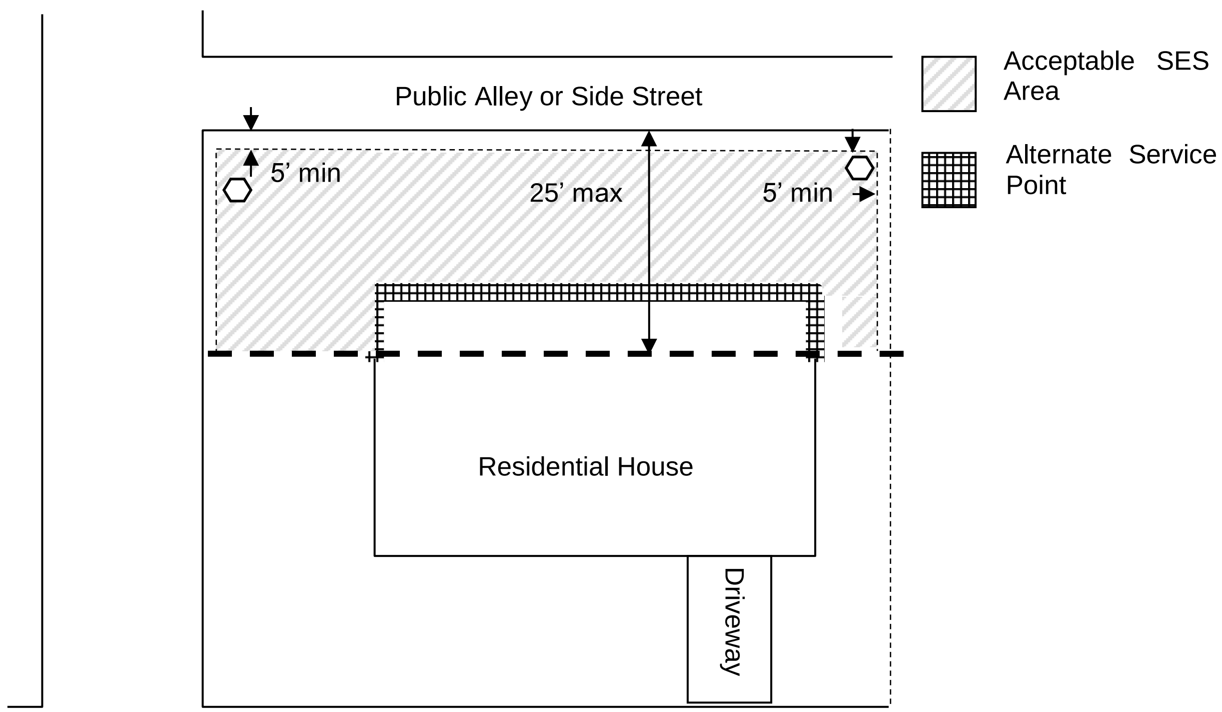


Figure 2. Locating an Alternate Service Point

9. Additional Conditions

9.1 For projects involving modification of existing service, a SES may be used to bring non-conforming installations into compliance.

9.2 Radio-read remote meters will be installed at customer's expense when the service equipment is over 50 feet from back of curb. There will be a one time charge for initial service (meter) installation.

9.3 Shunt trips with remote sockets are no longer acceptable due to changes in county ordinances.

9.4 For zero lot line developments that do not have a suitable space for service entrance equipment or Service Entrance Structures, the developer shall submit a gang meter structure design. NVE Electric Meter Operations and T & D Standards must approve the gang meter structure and the service point(s) location.

9.5 For lots where the back of curb is not parallel to the front of the house, see Figure 3 to draw **Line 1** (for method outlined in Sections 7 or 8).

9.6 For flag lots in cul-de-sacs or where the back of the curb does not run along the entire length of the house, see Figure 4 to draw **Line 1**. Line 1 for flag lots should be parallel to tangent line at the end of the back of curb as shown in Figure 4. The entire safe work space must be in-sight-from the street or public alley.

9.7 The meter(s) for an outbuilding, such as a garage, shop, or casita, must be located at the main meter location of the house.

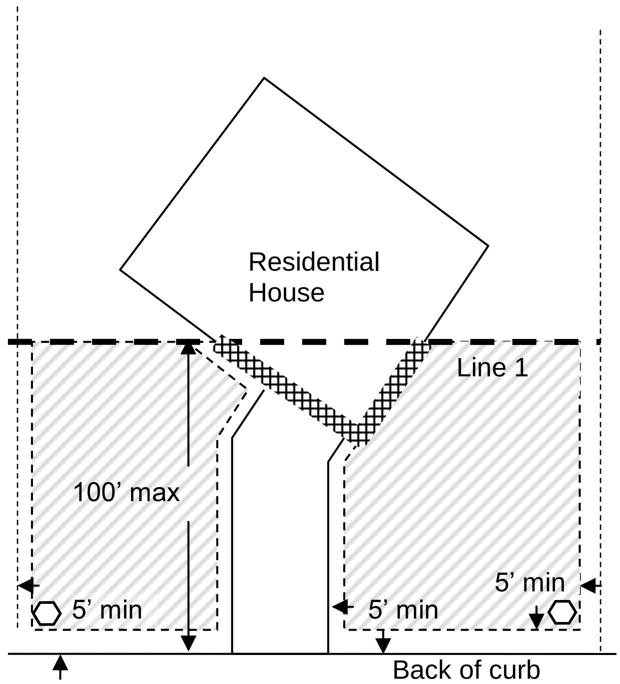


Figure 3. Front of House that is Not Parallel to the Back of Curb

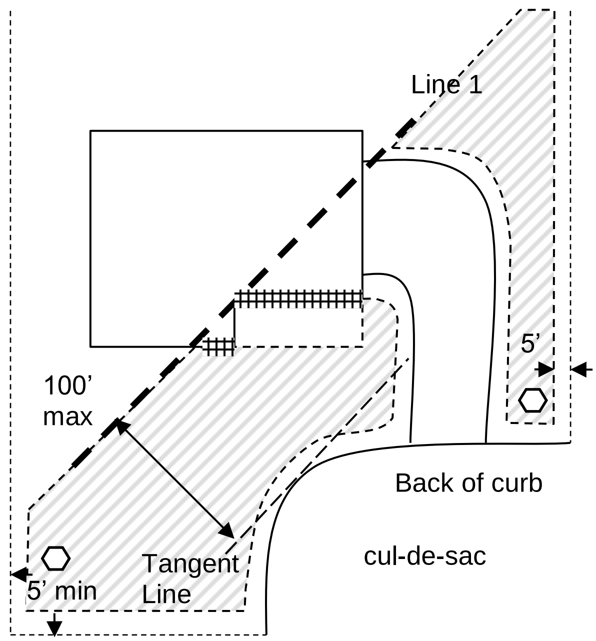
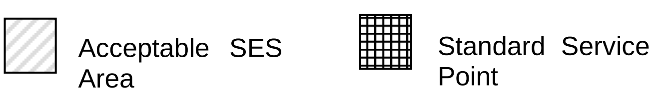


Figure 4. Flag Lot in a Cul-de-Sac



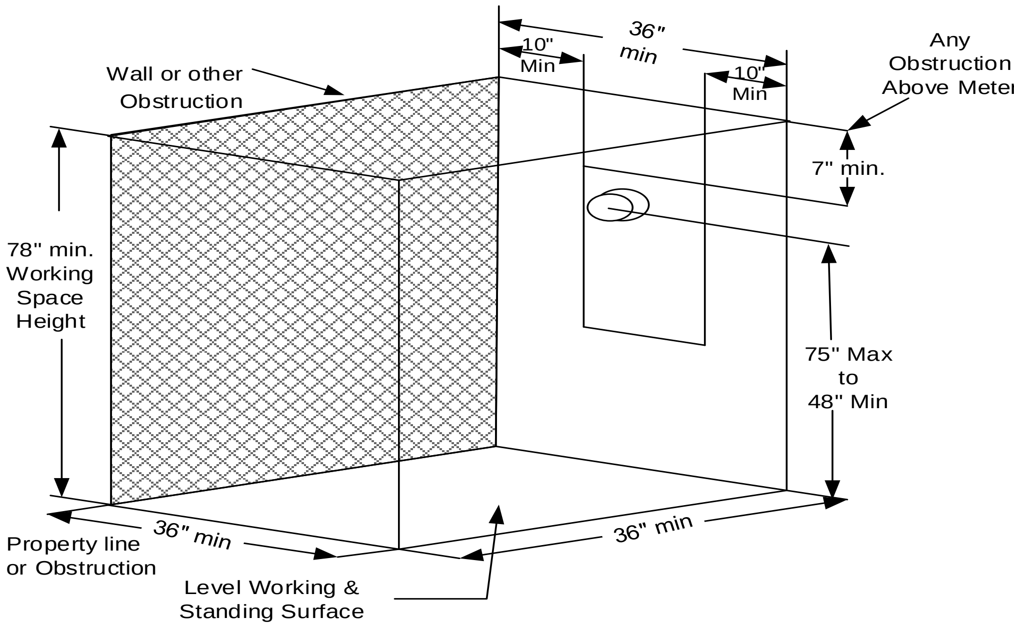


Figure 5. Safe Work Space and Clearances Around the Meter

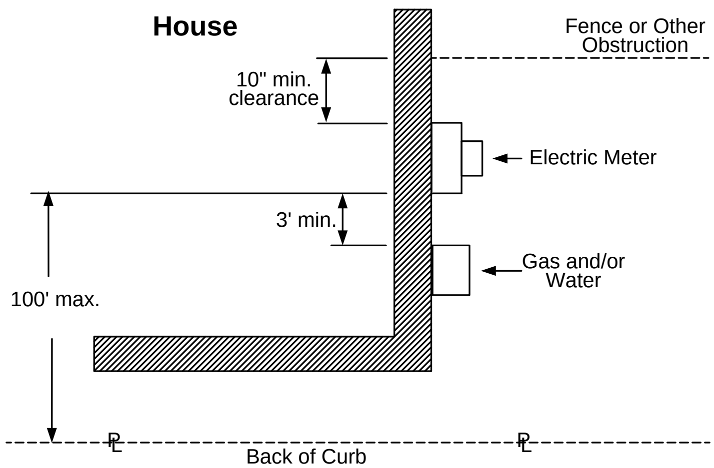


Figure 6. Clearances Around the Meter

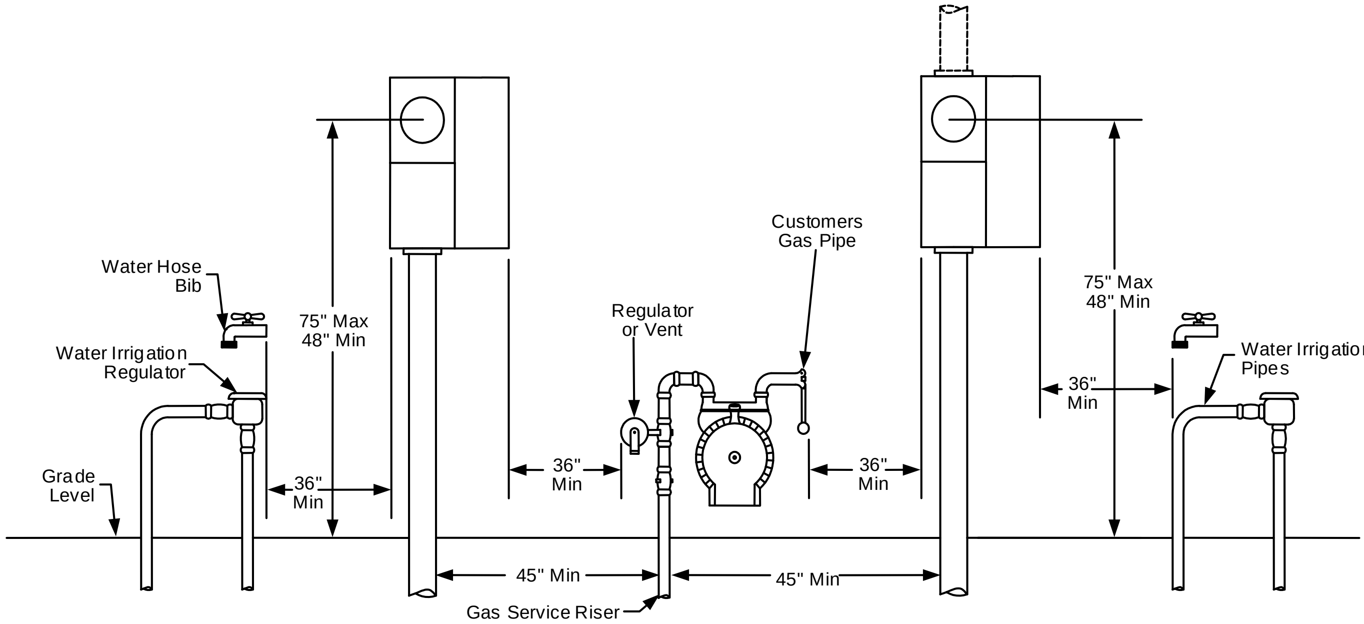


Figure 7. Electric, Gas and Water Separation

9.8 LP storage tanks- 15’ minimum distance from NV Energy meter equipment and/or piping.

9.9 Gas regulator and/or vent need to maintain 3’ separation from edge of service panel and/or electric riser pipe.

10. Residential Meter Closet

10.1 An Access to Equipment Agreement is required for an installation of a residential meter closet.

10.2 Main disconnect signage is required and must be approved by an NVE inspector

10.3 The door(s) to the meter closet must have a minimum 50% open space on the top half of the door(s).

10.4 Meter closet must not be locked.

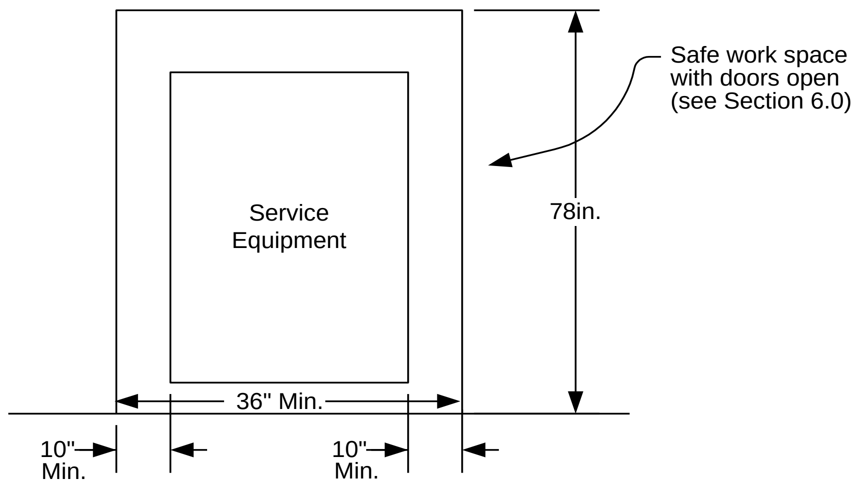


Figure 7a. Meter Closet Elevation

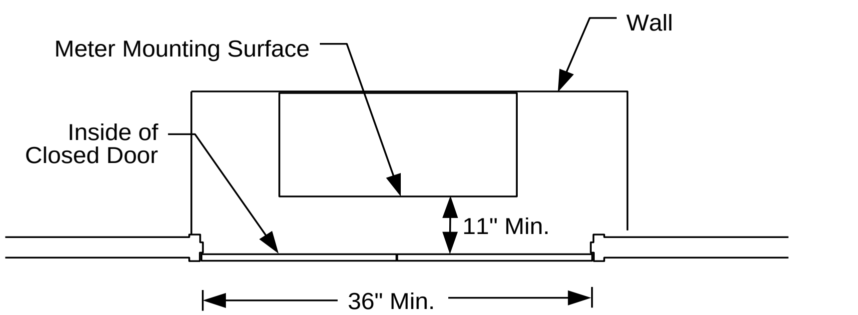


Figure 7b. Meter Closet with the Door Closed

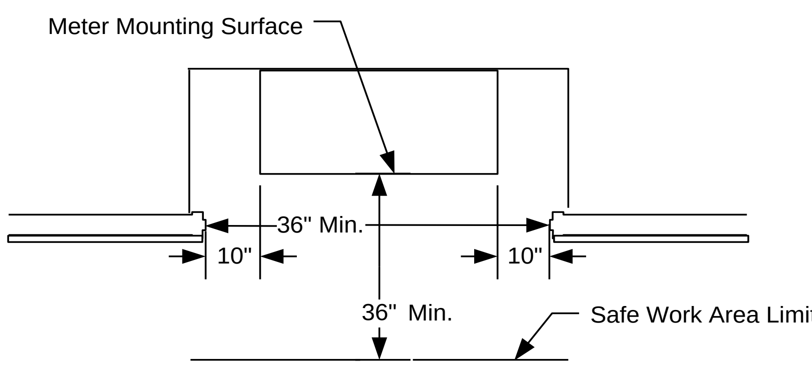
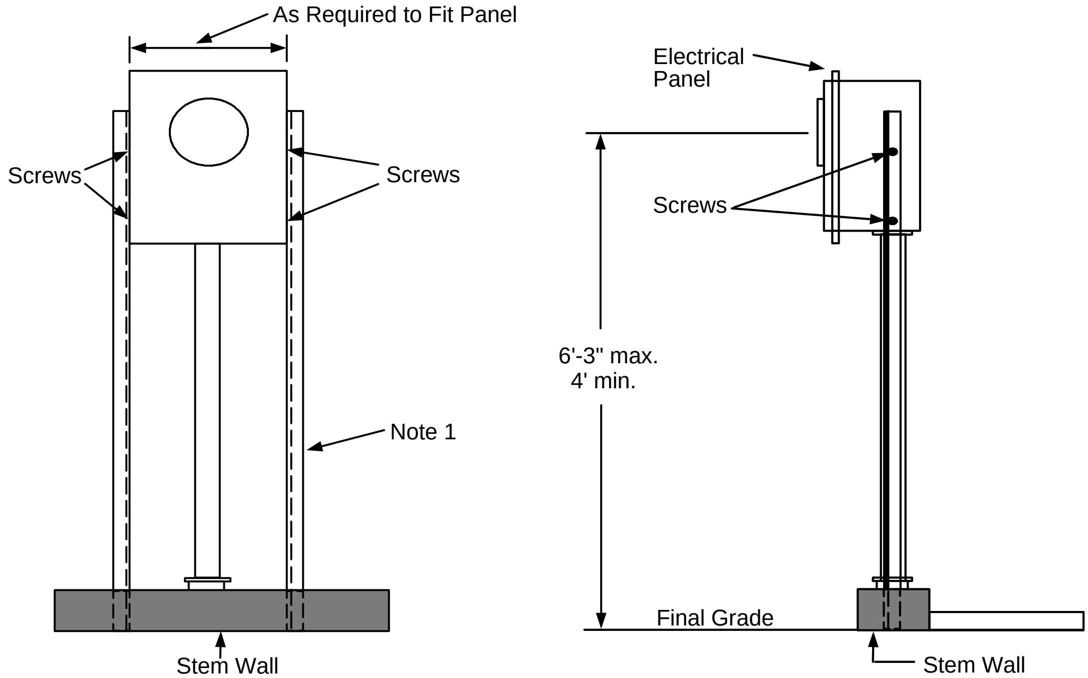


Figure 7c. Meter Closet with the Door Open

THIS PAGE INTENTIONALLY LEFT BLANK



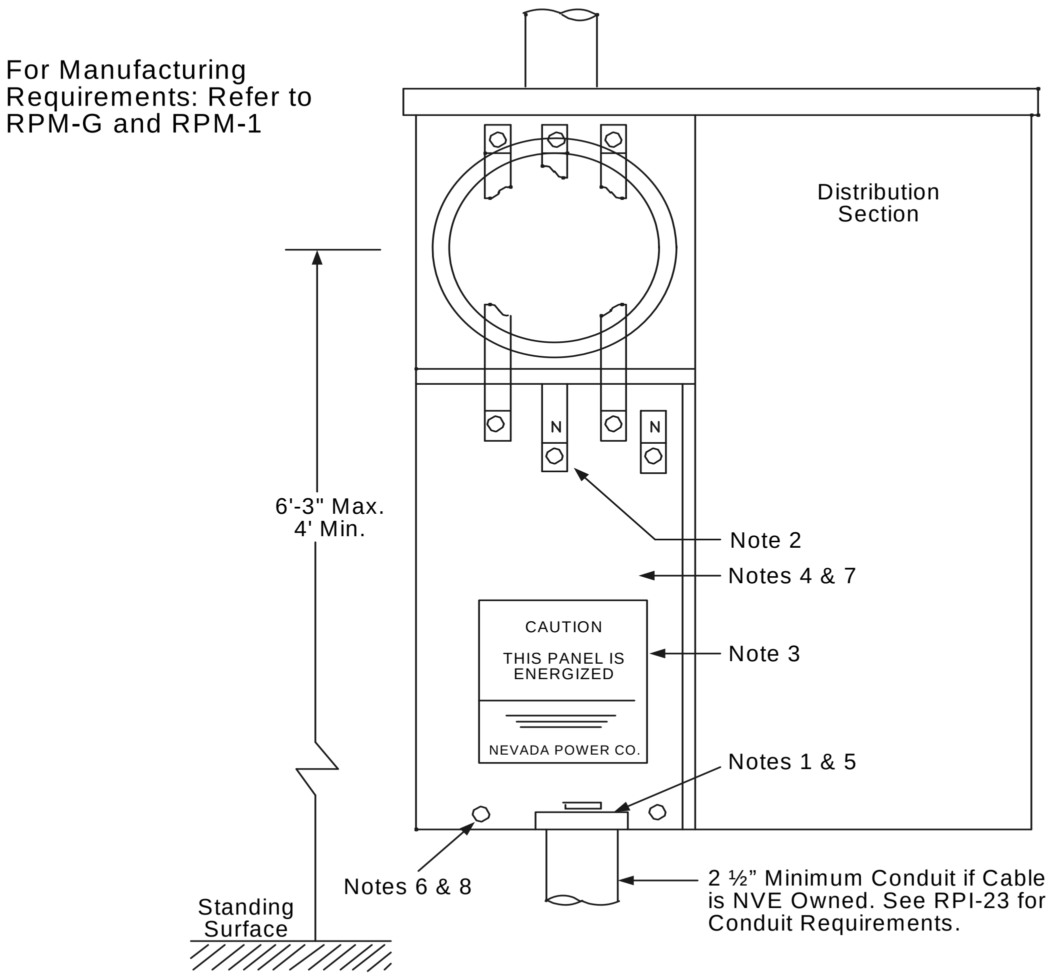
NOTES:

1. Framing shall be made of two 3-5/8" x 8' 18 GA. XC steel studs and secured to the panel by four ¾" (max.) screws.

GENERAL NOTES:

1. Panels shall be installed according to section RPM of the ESR.
2. NVE inspector shall reserve the right to reject any installation.
3. NVE will not pull wire unless the framing for the wall containing the meter panel is erected or one of the other methods shown is properly installed, plumb and square.
4. The termination section cover shall be hinged, non-removable and sealable and have provisions for the installation of a securing screw on the front panel.

THIS PAGE INTENTIONALLY LEFT BLANK



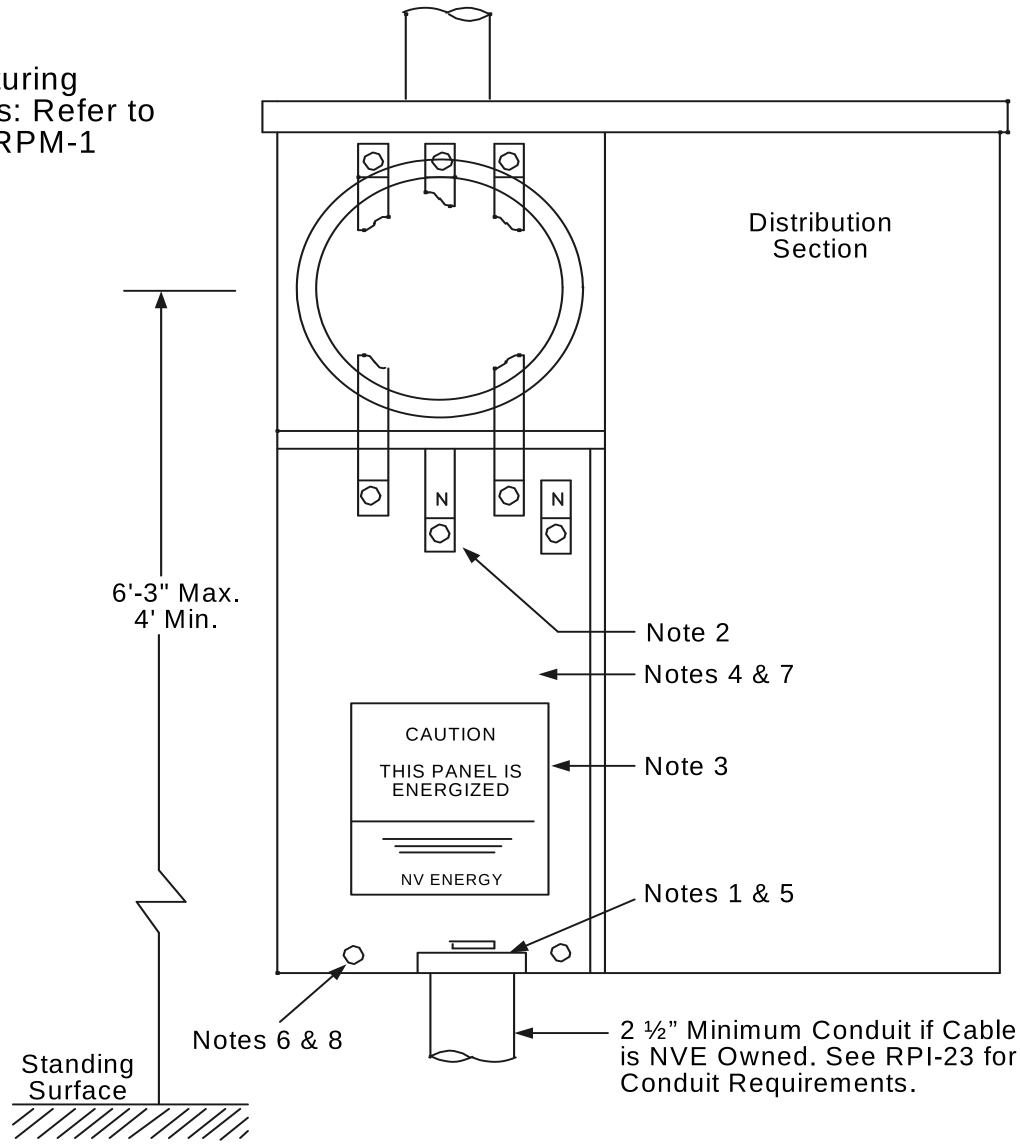
y

Maximum Ampacity	Lugs to Accept AL Conductor Size	Required Set Screws	Torque (ft-lb)
125	#4 – 2/0 AWG	Allen Screw	6 ± 10%
225	#4 – 2/0 AWG	Allen Screw	20 ± 10%

NOTES:

1. For RGS or IMC riser conduit, a hub or metal bushing with a grounding lug is required for proper grounding of the conduit. A hub is the preferred method.
2. When applying torque to Allen screws, the lugs should be supported.
3, Caution Decal to be installed by NVE on all termination sections.
4. No bends shall be allowed in service entrance conductors between the bottom of termination section and the landing lugs.
5. The termination section cover shall be hinged, non-removable and sealable and have provisions for the installation of a securing screw on the front of the panel.
6. The termination section shall be free of all earth and water pipe ground leads or connections (excludes ground lug for conduit).
7. NVE termination crew – secure the termination section with a Mighty Lock security device or approved locking / sealing device.
8. Customer-owned wiring extending from the distribution section (branch circuits) shall not pass through any section sealed by NVE (this includes system grounds).

For applications with a maximum of 320 continuous amps as calculated in accordance with the NEC. For higher continuous amps rating, use instrument rating metering system.

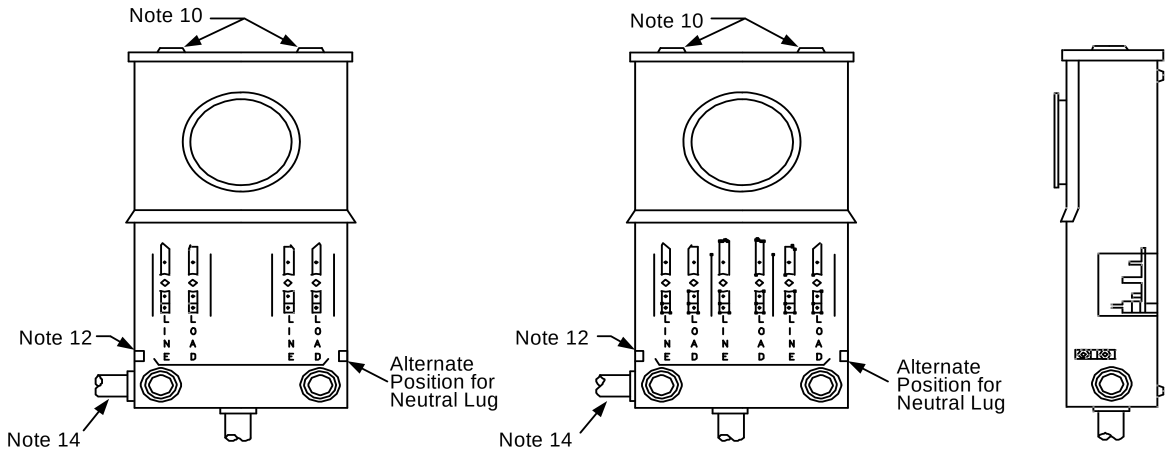


Maximum Ampacity	Lugs to Accept AL Conductor Size	Required Set Screws	Torque (ft-lb)
125	#4 – 2/0 AWG	Allen Screw	6 ± 10%
225	#4 – 2/0 AWG	Allen Screw	20 ± 10%

NOTES:

1. For RGS or IMC riser conduit, a hub or metal bushing with a grounding lug is required for proper grounding of the conduit. A hub is the preferred method.
2. When applying torque to Allen screws, the lugs should be supported.
3, Caution Decal to be installed by NVE on all termination sections.
4. No bends shall be allowed in service entrance conductors between the bottom of termination section and the landing lugs.
5. The termination section cover shall be hinged, non-removable and sealable and have provisions for the installation of a securing screw on the front of the panel.
6. The termination section shall be free of all earth and water pipe ground leads or connections (excludes ground lug for conduit).
7. NVE termination crew – secure the termination section with a Mighty Lock security device or approved locking / sealing device.
8. Customer-owned wiring extending from the distribution section (branch circuits) shall not pass through any section sealed by NVE (this includes system grounds).

FOR MANUFACTURING REQUIREMENTS: REFER TO RPM-G, RPM-4, RPM-5 AND RPM-6



1-PHASE 3-PHASE

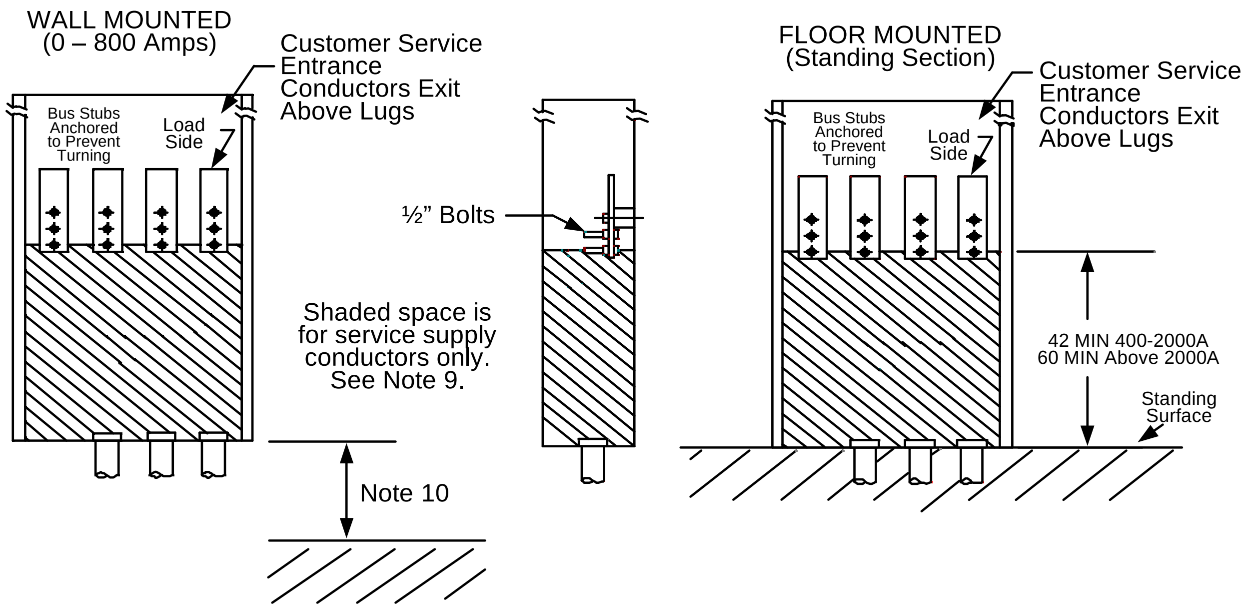
NOTES:

1. For RGS or IMC riser conduit, a hub or metal bushing with a grounding lug is required for proper grounding of the conduit. A hub is the preferred method.
2. When applying torque to slotted or Allen screws, the lugs should be supported.
3. Caution Decal - to be installed by NVE on all pull sections.
4. The termination section cover shall be removable, sealable, and have provisions for the installation of two captive securing screws on opposite sides of the panel.
5. The termination section shall be free of all earth and water pipe ground leads or connections (excludes ground lug for conduit).
6. For incoming conduit requirements, see RPI-23 and RPI-24.
7. Customer–owned wiring extending from the distribution section (branch circuits) shall not pass through any section sealed by NVE (this includes system grounds).
8. Manual circuit-closing links will be provided by NVE to maintain service continuity to the customer while the meter is removed for test or inspection.
9. Hubs shall be capped off.
10. Commercial meter services must be identified and permanently marked by contractor before meters are installed.
11. Insulated bondable vertical lay-in, double neutral lug with No. 1/0 wire capacity, mounted on either sidewall.
12. For 3 phase, 4 wire delta, identify right hand test-by pass block (2 poles) as power leg. Identification to be orange in color.
13. Alternate location for overhead installation. Service entrance cables shall not enter from the top of the panel when fed from overhead service.
14. The shorting nuts on the test-bypass facilities shall be tightened to the correct torque by the customer or electrical contractor.

THIS PAGE INTENTIONALLY LEFT BLANK

FOR MANUFACTURING REQUIREMENTS: REFER TO RPM-G, RPM-43, RPM-45, AND RPM-47

ALL DIMENSIONS SHOWN ARE IN INCHES
* Wall mounted termination applies to 0-800 Amps
* Floor mounted termination applies to all amperage ratings



NOTES:

1. The termination section cover shall be independent of any part of the service panel other than the termination section.
2. The termination section shall be free of all earth and water pipe ground leads or connections (excluding grounding lug for conduit).
3. Load conductors shall leave box in area above the lugs.
4. For RGS or IMC riser conduit, a hub or bonding jumper is required for proper grounding of the conduit. A hub is the preferred method.
5. NVE termination crew-secure the termination section with a Mitey Lock security device.
6. All terminating sections shall have full front access. Cover panels shall be removable, sealable, provided with two lifting handles, and limited to a maximum size of 9 square feet in area.
7. The wall mounted panel shall be installed per RPI-24.
8. The multi-meter section shall be installed per RPI-28 (underground).
9. Customer-owned wiring shall not pass through any section sealed by NVE (this includes system grounds).
10. For 0-800 Amp service panels, a minimum 6" clearance between the standing surface and the service panel is required.
11. All cables to be sized in accordance with NEC and local building ordinances.
12. Consult with manufacturer for number of landing positions required. Typical design criteria is a maximum of 400 Amps per conductor for service with 0-1200 Amp rating.

THIS PAGE INTENTIONALLY LEFT BLANK

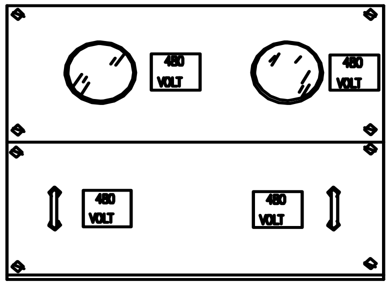


FIGURE 1
PANEL COVERS

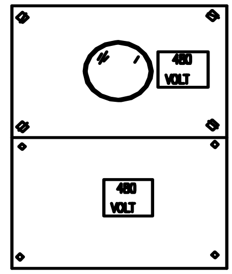


FIGURE 2
PANEL COVERS

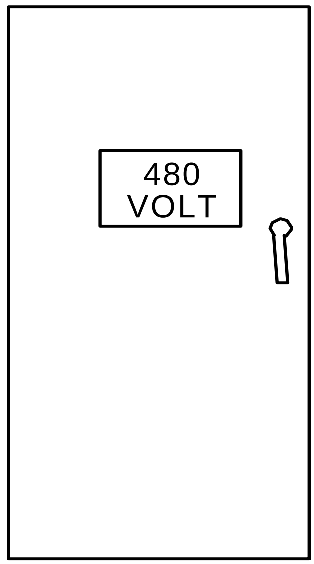


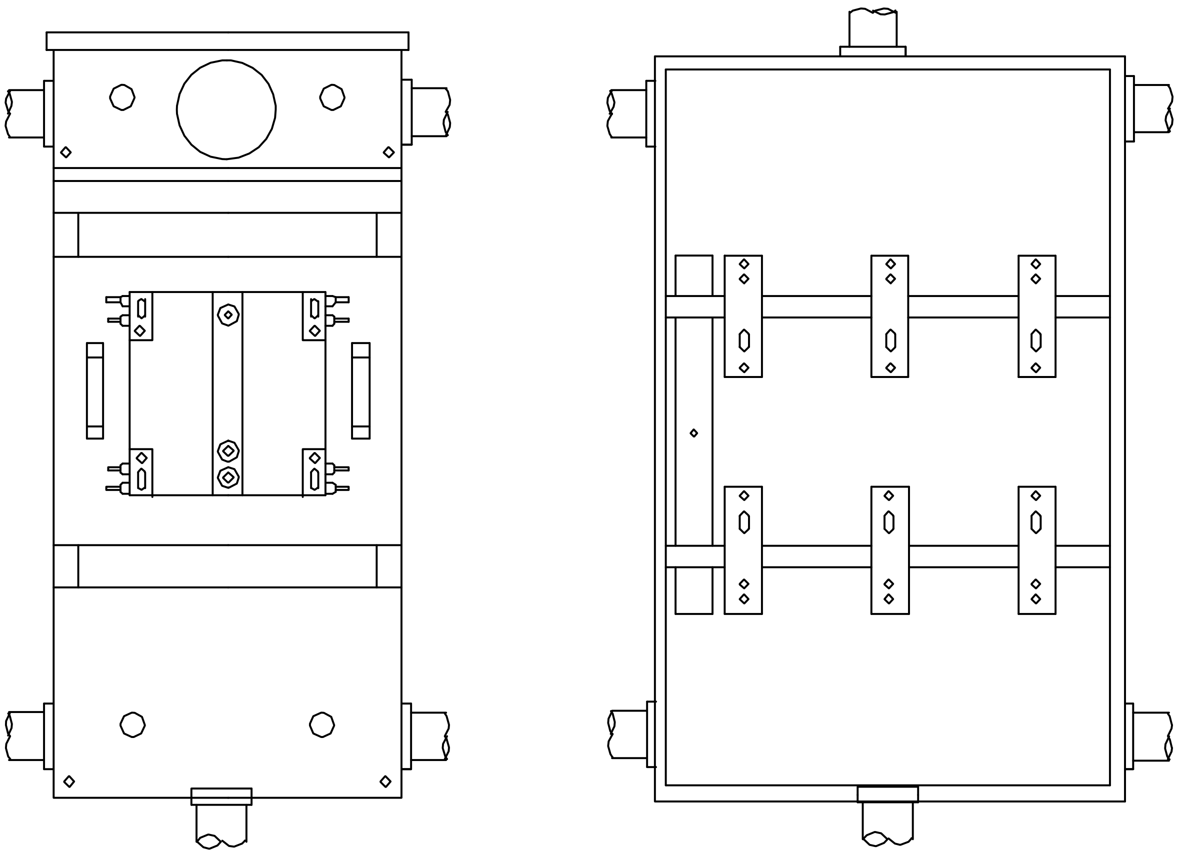
FIGURE 3
CABINET DOOR

NOTES:

1. Each meter panel shall be labeled with one permanent sign beside each meter socket. This sign shall be approximately 2" x 2", shall be red with white lettering and shall read "480 Volt". See figures 1 and 2.
2. Each test-bypass block cover panel shall be labeled with one permanent sign beside each meter socket. This sign shall be approximately 2" x 2", shall be red with white lettering, and shall read "480 Volt". See figures 1 and 2.
3. If the equipment is enclosed within a cabinet, the outside of the cabinet door must be labeled with at least one permanent sign, approximately 4" x 6". This sign shall be red with white lettering, and shall read "480 Volt". See figure 3.

THIS PAGE INTENTIONALLY LEFT BLANK

FOR MANUFACTURING REQUIREMENTS, REFER TO RPM-G, RPM-13, RPM-14, RPM-16, RPM-17, AND RPM-18



NOTES:

1. For RGS or IMC riser conduit, a hub or metal bushing with a ground lug is required for proper grounding of the conduit. A hub is the preferred method.
2. The termination section shall be free of all earth and water pipe ground leads or connections (excludes grounding for conduit).
3. Hubs shall be capped off.
4. Commercial meter services must be identified and permanently marked by contractor before meters are installed.
5. Line supply conductors can enter the instrument transformer compartment from either the top or bottom of the compartment. Load wires must exit through the opposite end of the compartment from which the line supply conductors entered.

THIS PAGE INTENTIONALLY LEFT BLANK

Table of Contents

1. Purpose

1.1 This standard specifies the requirements for the location of all NV Energy (NVE) meters and service equipment with the exception of single-family residential meters (see RPI-2 for residential meters).

1.2 Requirements in this standard facilitate access to service equipment by NVE personnel for performing operations and maintenance functions as well as for fire and police agencies in emergency situations.

1.3 Customer design submittals showing meter and service equipment location(s) must be project specific; design approvals will not be granted on a generic basis for possible, ongoing use.

1.4 Meter and service entrance installations must conform to the latest revisions of RPI-G and, specifically, the “Meter Access” and “Meter Locations” sections of RPI-G.

1.5 This standard must be read in its entirety to avoid additional costs or delays due to nonconformance.

2. Definitions

2.1 *Service Point*: The point of connection between the facilities of NVE and the premise’s electrical wiring system. The meter and service equipment shall be installed near the service point.

2.2 *Standard Service Point*: The preferred location for installation of the meter and electric service equipment.

2.3 *Alternate Service Point*: An alternate location for installation of the meter and electric service equipment. NVE will ensure that this location meets NVE rules for safe and readily accessible ingress/egress.

2.4 *Service Entrance Structure (SES)*: Service equipment that is not attached to the building, such as a meter pedestal, separate switchboard, or wall-mounted service. This equipment should be approved by NVE and specified in Section RPM of the Electric Service Requirements. See NVE Standard RPM-A for 400 Amp and 600 Amp single phase pedestals.

2.5 *Acceptable SES Area*: An area where a SES must be placed if the electric meter is not located in the preferred location.

2.6 *Readily Accessible*: To be capable of being reached quickly for operation, renewal or inspection without the need to climb over, remove obstacles, or resort to portable ladders, chairs, etc., per NEC 2005 Article 100. The installation must be readily accessible 24 hours per day, 7 days per week.

3. References

3.1 National Electrical Safety Code (NESC) Part I. 110 or latest edition/revision.

3.2 National Electrical Safety Code (NESC) Part I. 125 or latest edition/revision.

3.3 National Electric Code (NEC) Article 100

3.4 National Electric Code (NEC) Article 110

3.5 National Electric Code (NEC) Article 230

3.6 Occupational Safety and Health Administration (OSHA) 29 CFR 1910

3.7 NV Energy Electric Service Requirements (ESR) RPI-G

3.8 NV Energy Electric Service Requirements (ESR) RS-5

3.9 NV Energy Electric Service Requirements (ESR) RPM-A

4. Design Considerations

4.1 The location of the meter and service equipment directly impacts NVE's goal to provide its customers with the safest, most cost effective and reliable electric service possible. Therefore, customers and their representatives (licensed Architects or Engineers) should select a location as close to NVE facilities as practical.

4.2 For operational and maintenance purposes, the meter and service equipment require direct accessibility 24-hours a day, 7 days a week. If the customer has specific problems regarding property access, landscaping, or the meter/service equipment location, a Service Entrance Structure (SES) located close to the sidewalk offers the viable solution. NVE will work with the customer and their design representative to meet NVE standard requirements.

4.3 Proposed meter and service equipment locations that will not be readily accessible over the life of the project will not be approved. All meter locations are subject to approval by NVE Meter Operations and T&D Standards.

5. Location of Service Points

5.1 The standard service point will be located at the corner of the building nearest the NV Energy supply.

5.2 Alternate service points may, at the discretion of NV Energy, be allowed provided that they meet all requirements of Section 6 "Access to Service Equipment".

5.3 Meter rooms, although not preferred, may, at the discretion of NV Energy, be allowed provided that they meet the requirements of Section 6 "Access to Service Equipment" and Section 8 "Meter Rooms".

5.4 If the Standard Service Point and Alternative Service Point are not used for the meter location, an SES must be placed in the **Acceptable SES Area**. The default location for an SES must be 5' behind curb, 5' from existing driveway, and 5' from lot lines.

5.5 Meters shall only be mounted on walls solely owned and controlled by the property owner. Walls located on property lines are not approved.

6. Access to Service Equipment

6.1 Electric meter and service equipment installations must be readily accessible to authorized representatives of NVE for reading, testing, and inspection at all times. Customer contact will not be required for meter reading.

6.2 Permanent vehicle access to the service equipment is required for the installation and maintenance of service cables and metering equipment. The service equipment must be accessible without requiring passage through restricted areas or requiring customer contact.

A. For services 600v and less, the vehicle access will be a minimum 12’ wide, 20’ high direct path to the metering equipment.

B. For services greater than 600v (primary service) or where the services include the installation of three-phase transformers, switch or fuse cabinets, capacitor banks, or other large equipment, the vehicle access will be a minimum 23’ wide, with no overhead obstruction.

C. Where applicable, vehicle access will require roll curbs (RTC drawings 217.S1 or 217.S2) or driveways (RTC 224).

D. Where applicable, all services and related equipment must maintain clearances per NV Energy Electric Service Requirements standard RS-5.

E. For drives without a vehicular outlet, the maximum distance to the alternate meter room entrance shall be 50 feet.

6.3 Power-operated gates do not meet the requirements for a readily accessible service installation.

6.4 The permanent vehicle access area and path to the service equipment shall be free of vegetation and rocks larger than 3/8”.

6.5 The service lateral and access pathway, unless paved, will not have a maximum average slope that exceeds ±5% except for short distances. In no instance will the slope exceed 10% grade. Frequent grade changes will not be allowed.

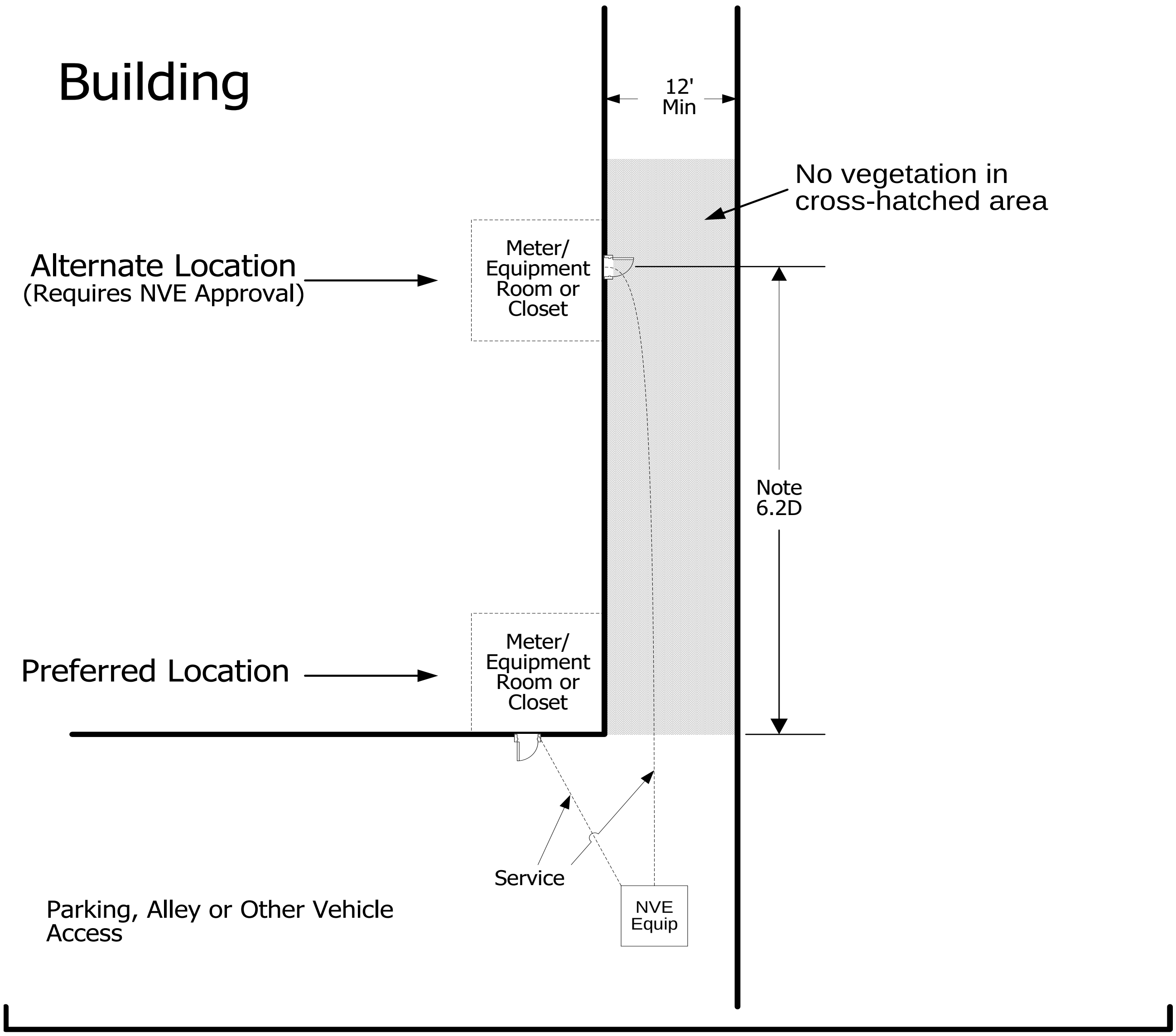


Figure 5a. Service Equipment Locations – 600v or Less – Typical (see Section 6.2.a)

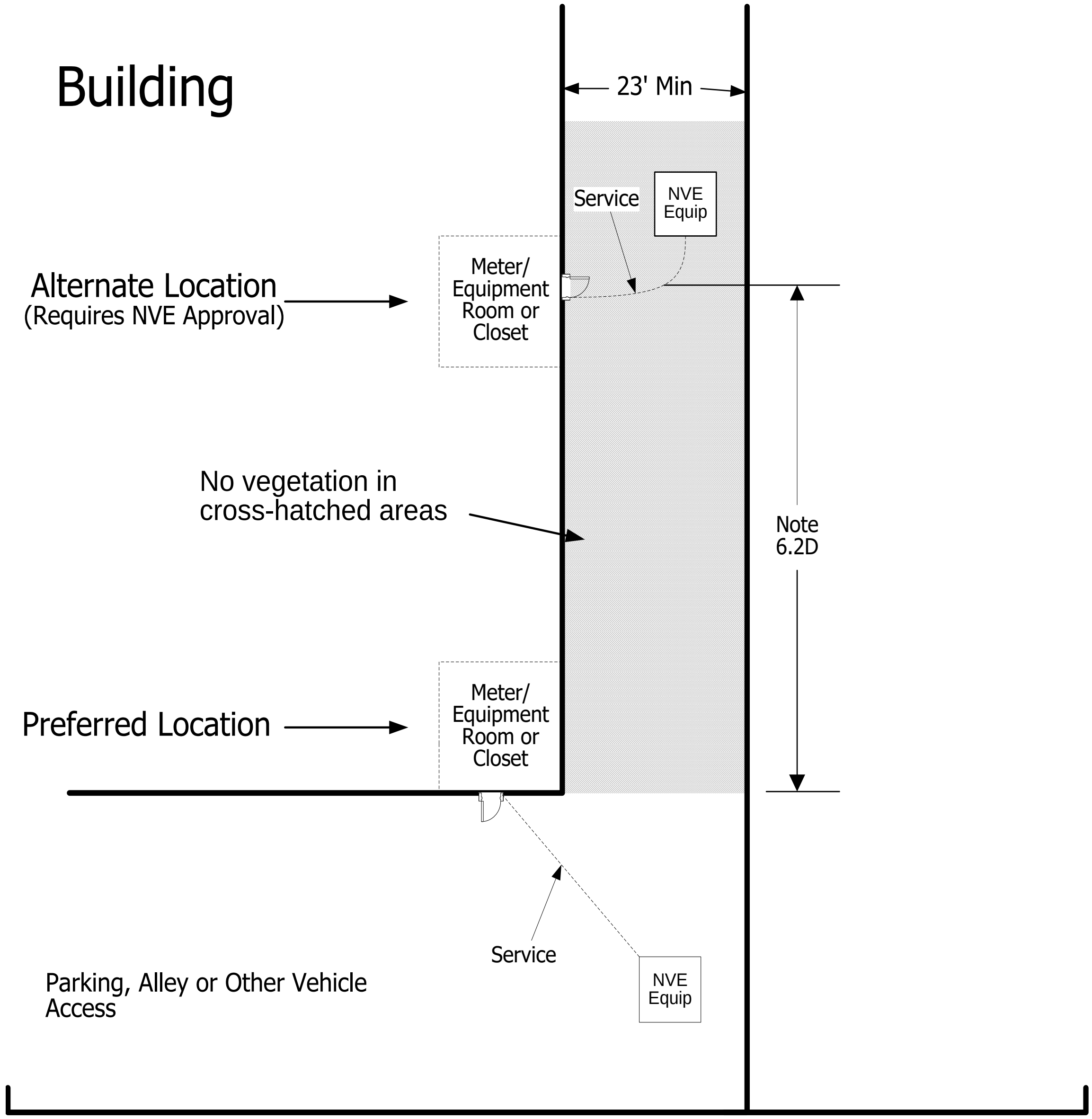


Figure 5b. Service Equipment Locations – Over 600v or with NVE Equipment – Typical (see Section 6.2.b)

7. Safe Work Space

7.1 In addition to the requirements of NEC Article 110.26, a 3' x 3' area directly in front of each meter must be provided as the minimum amount of work space necessary for safe operation and maintenance of the meter and service equipment. See Figure 5, Safe Work Space and Clearances around the Meter.

7.2 The standing surface of the work space must not contain rocks larger than 3/8" and will be level within ¼ inch per foot in all directions.

7.3 The safe work space must not be part of a driveway or subject to vehicular traffic, including parking.

7.4 Bollards or other barricades may be required to maintain the 3' clearance if the meter/service equipment is adjacent to vehicle access or parking.

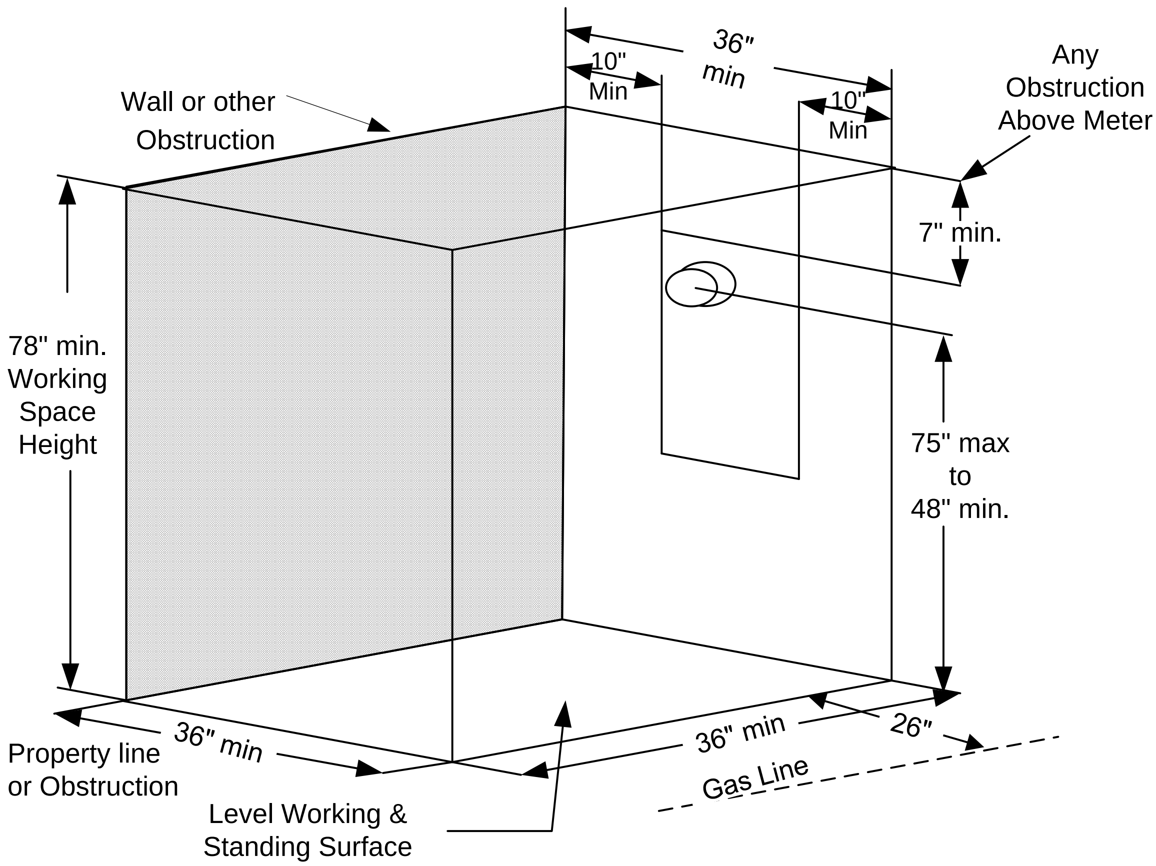


Figure 7. Safe Work Space and Clearances around the Meter

8. Meter/Equipment Rooms (refer to RPI-G, Section 9)

8.1 An Access to Equipment Agreement is required for meter room installations.

8.2 A meter room is a dedicated room on the ground floor directly accessible from the outside. Securing means will be by NV Energy lock or a customer lock with a key housed in a lock box accessible to NV Energy representatives.

8.3 Meter rooms shall be provided and maintained by the customer and are to be used for the customer's electric service equipment.

8.4 Meter rooms may contain Communications and/or CATV.

8.5 Meter rooms may not contain water or gas services or equipment.

8.6 Meter rooms will not be used for storage.

8.7 The meter room will be illuminated and ventilated directly to the outside.

8.8 To facilitate installation and replacement of service equipment and conductors, each service entrance pull section will open directly towards the exterior meter room entrance to provide equipment access for cable installation equipment.

8.9 Personnel doors will open outward and be equipped with panic bars, pressure plates or similar devices that operate under simple pressure.

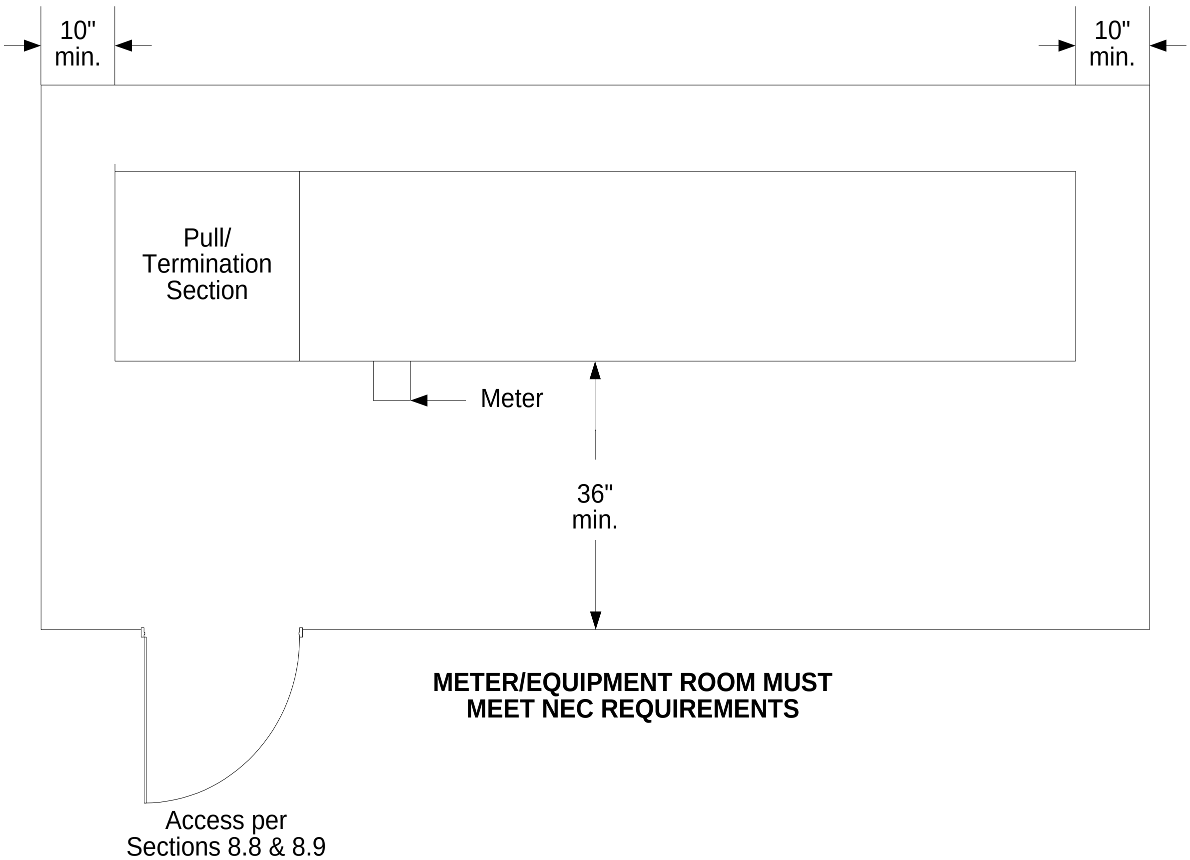


Figure 8. Meter/Equipment Room Detail - Typical

9. Additional Conditions

9.1 For projects involving modification of existing service, a SES may be used to bring non-conforming installations into compliance.

9.2 Shunt trips with remote sockets are no longer acceptable due to changes in county ordinances.

9.3 For reasons of public safety, NVE employee safety, maintenance of service, and reliability of metering, it is not permissible to install meters and metering equipment as follows:

- A. In any location that is not readily accessible.
- B. In any location which is hazardous to personnel.
- C. In garages, carports or breezeways.
- D. In trash, refuse or garbage enclosures.
- E. In areas that contain animal waste.
- F. On any surface subject to excessive vibration.
- G. In any elevated or depressed area that does not have access provided by means of a ramp or clear stairway of normal tread and use which conforms to building code requirements.
- H. In any substation area or transformer vault.
- I. On any NVE pole. It is not permissible to attach panels, switches, junction boxes, or any other customer service equipment.
- J. Within a 4’ radius of NVE poles (see RS-4). Meters, metering equipment and associated service equipment may be installed on customer – owned poles, pedestal, structures, etc. provided such equipment is at least 4’ from NVE poles.

10. Meter Closet

10.1 An Access to Equipment Agreement is required for an installation of a meter closet.

10.2 Main disconnect signage is required and must be approved by an NVE inspector.

10.3 10” minimum clearance must be maintained between the sides of the gear to wall or obstructions to allow meter panels to open fully per RPM-G.

10.4 11” minimum clearance must be maintained between the meter mounting surfaces and the doors when the doors are in the closed position to prevent damage to the meter(s).

10.5 Minimum door opening to be 20” greater than the width of the equipment centered in the closet space but in no case will the width be less than 36” (standard trade size 3’ 0” door).

10.6 The door(s) to the meter closet shall be louvered or screened to allow a minimum 50% open space on the top half of the door(s) to facilitate radio communication.

10.7 If the customer desires that the meter closet be locked, securing means will be by NV Energy lock or a customer lock with a key housed in a lock box accessible to NV Energy representatives

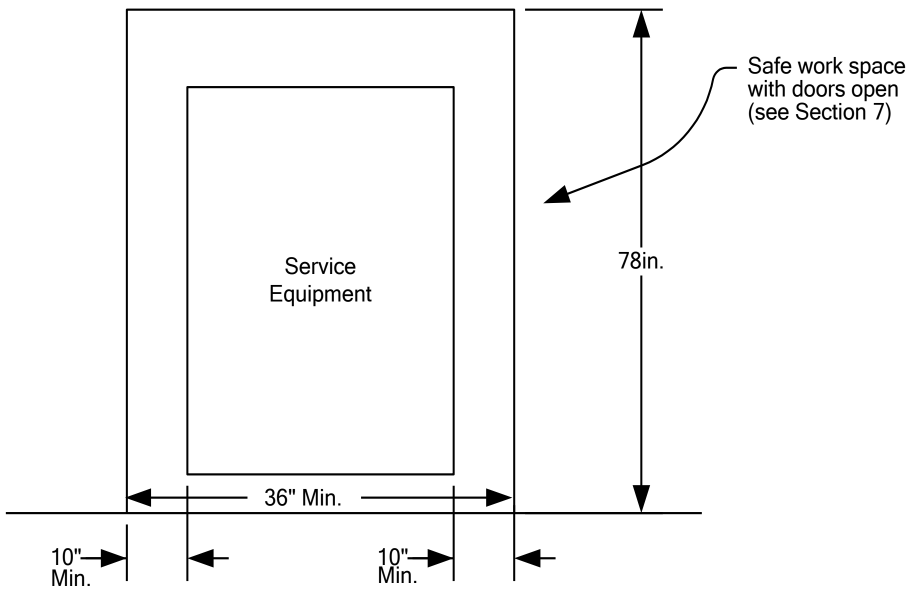


Figure 10a. Meter Closet Elevation

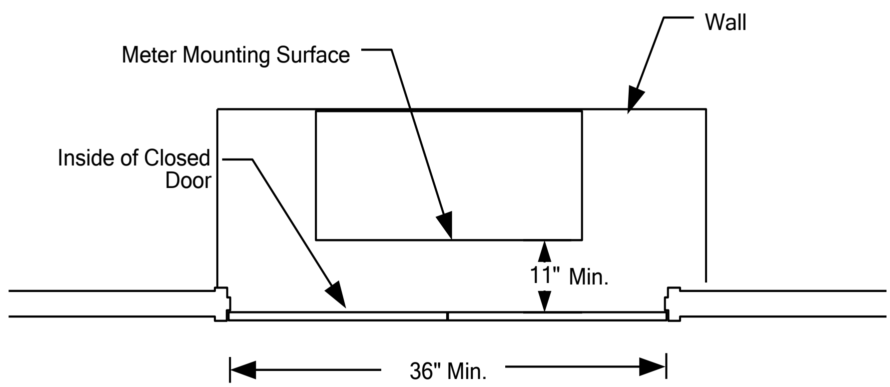


Figure 10b. Meter Closet with the Door Closed

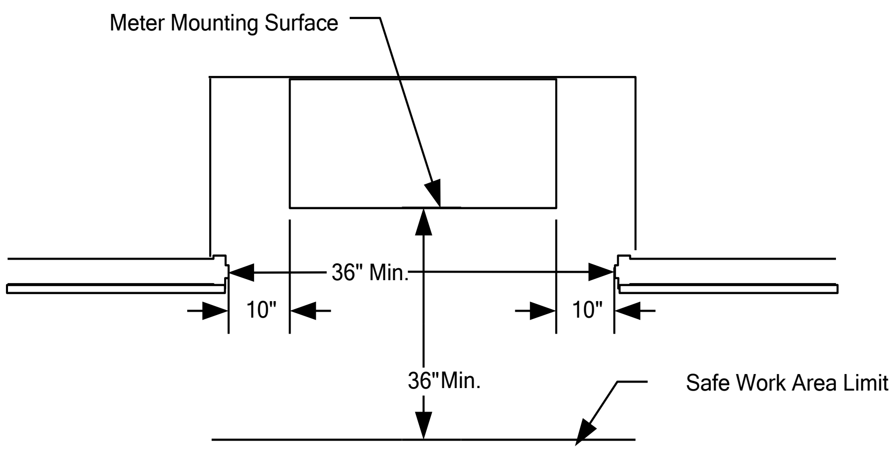
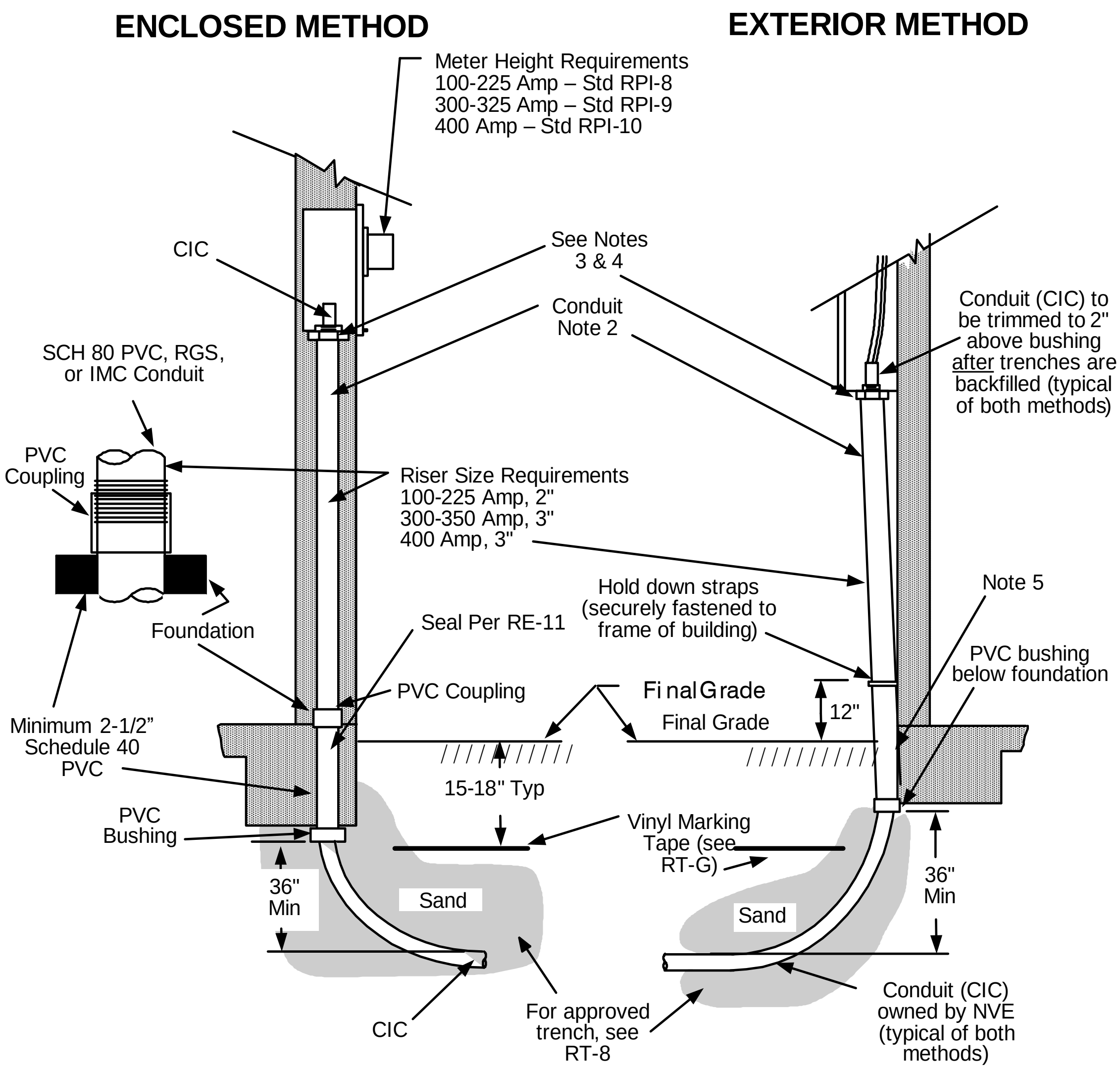


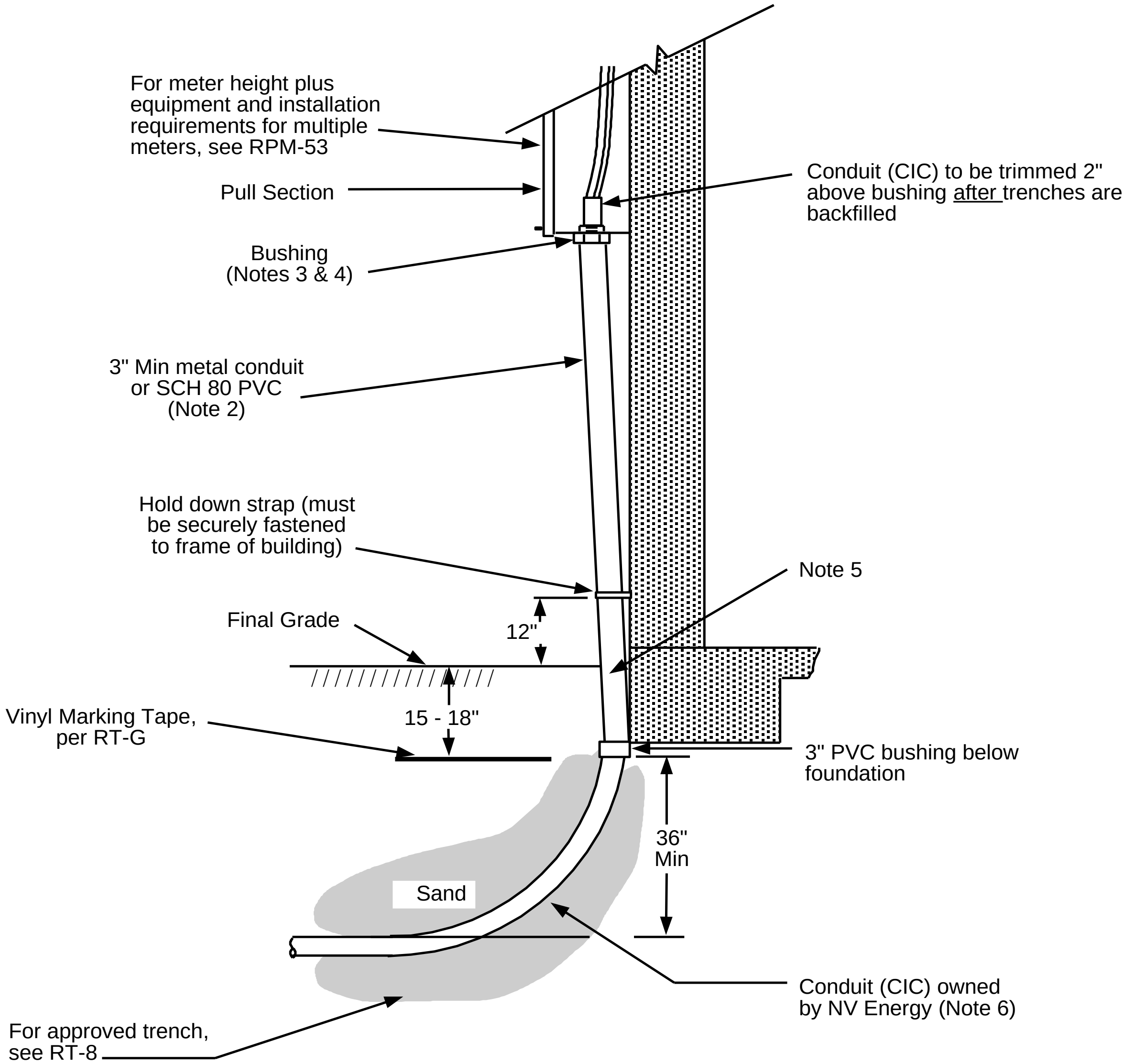
Figure 10c. Meter Closet with the Door Open



SUBDIVISIONS, CUSTOM HOMES, AND TOWN HOUSES

NOTES:

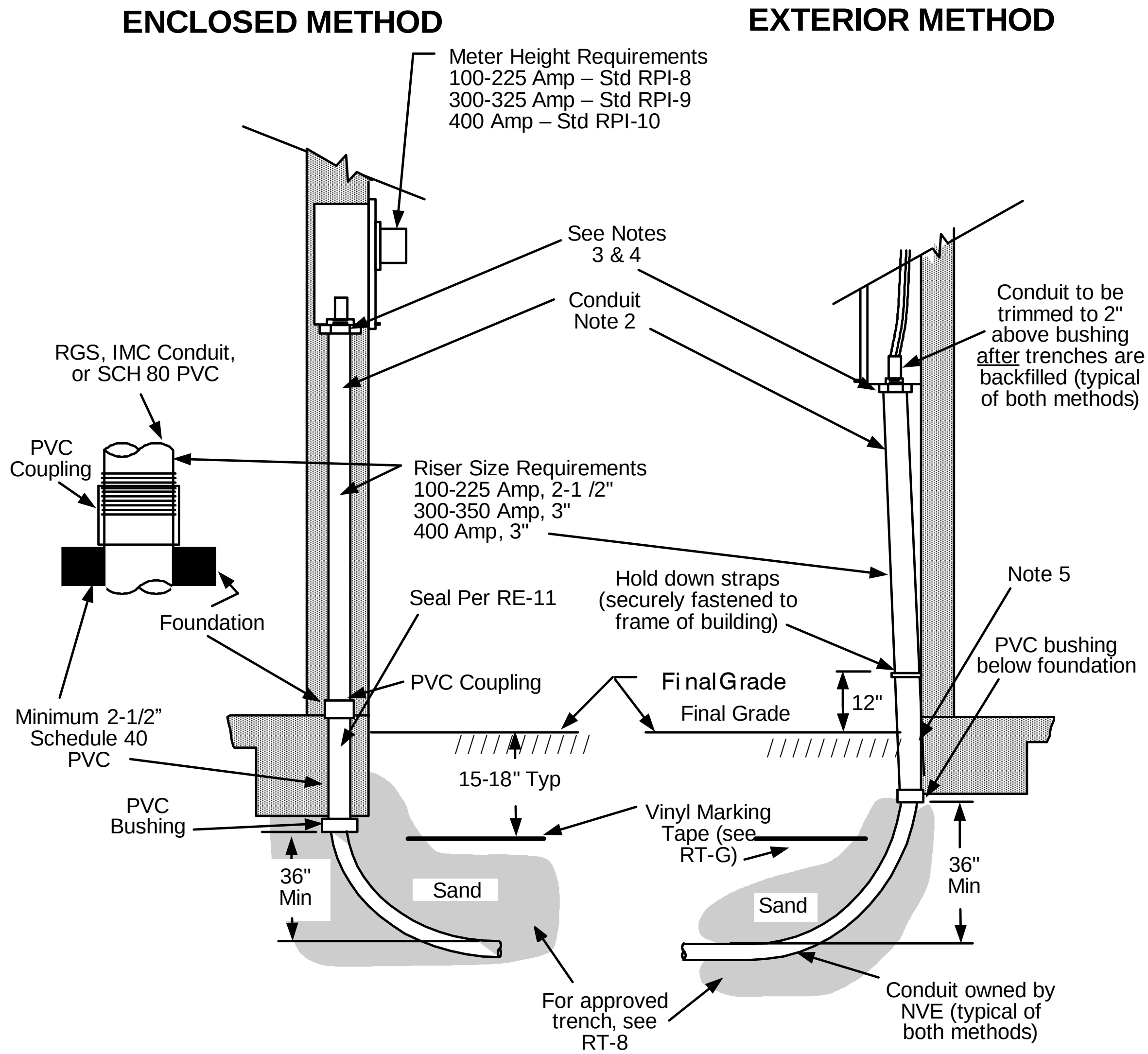
1. All installations shall meet the City, County, or State building codes.
2. Incoming conduit can be of rigid galvanized steel (RGS), intermediate metal conduit (IMC), or SCH 80 PVC. If SCH 80 PVC is used contractor must make sure trade size is clearly labeled and visible, showing SCH 80. If this cannot be done it will be **rejected.**
3. A plastic bushing is required on the panel end of the incoming conduit.
4. For the RGS or IMC conduit, a hub or bonding jumper is required for proper grounding of the conduit. A hub is the preferred method. (Per local building code)
5. All metal conduit exposed to the earth must be covered with 10 mil pipe protection tape, ½ lapped or PVC coating.
6. Kicks or Offsets shall not be permitted in service risers.
7. If contractor elects to hard stick service then they shall follow all applicable NEC codes and County codes in effect. This is above and beyond NVE standard installation.



APARTMENTS AND CONDOMINIUMS

NOTES:

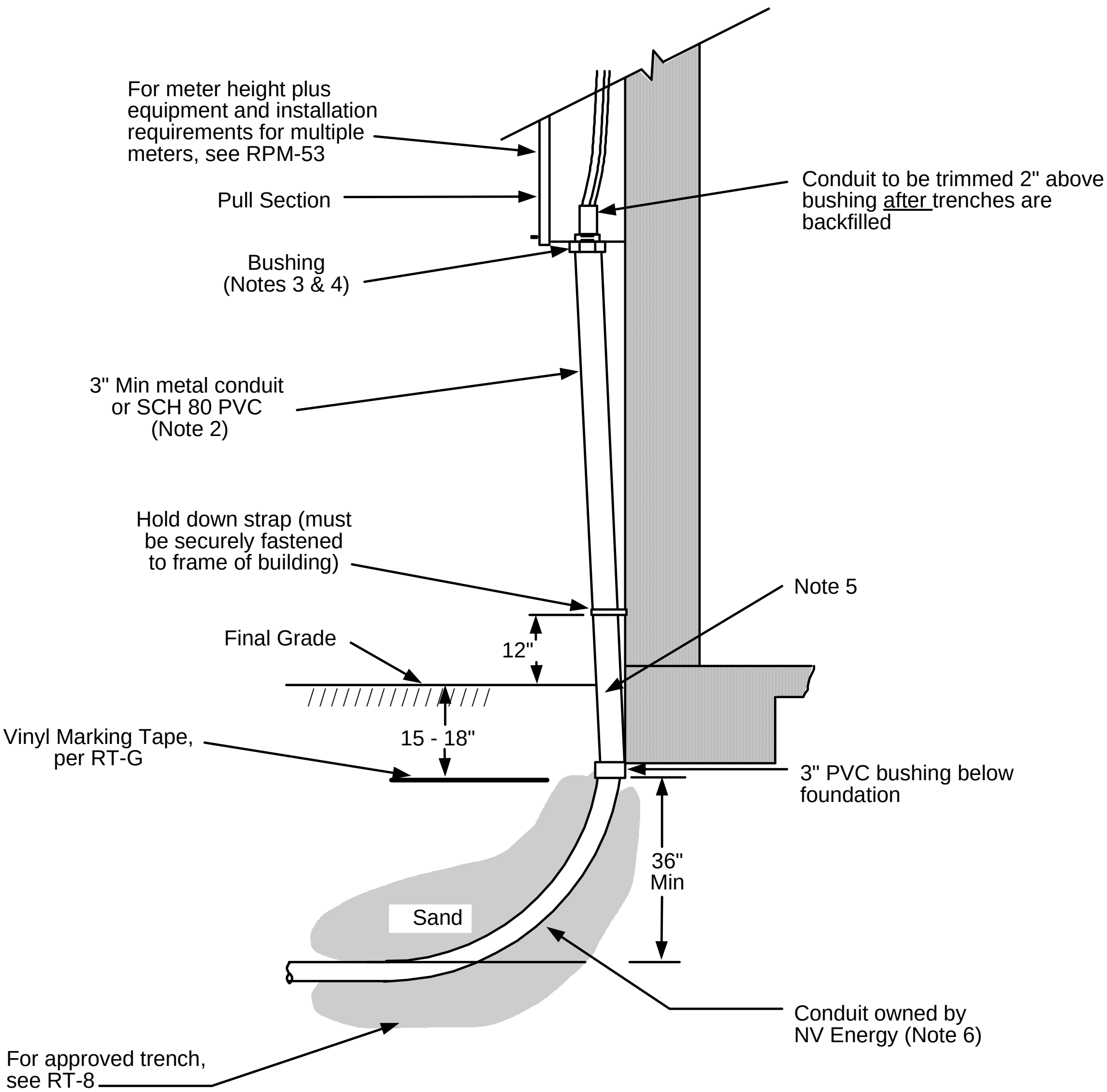
1. All installations shall meet the City, County, or State building codes.
2. The incoming conduit can be a rigid galvanized steel (RGS), intermediate metal conduit, or SCH 80 PVC. If SCH 80 PVC is used contractor must make sure trade size is clearly labeled and visible, showing SCH 80. If this cannot be done it will be **rejected.**
3. A plastic bushing is required on the panel end of the incoming conduit.
4. A hub or bonding jumper is required for proper grounding of the conduit. A hub is the preferred method (per local building code).
5. All metal conduit exposed to earth must be covered with 10 mil pipe protection tape, ½ lapped or PVC coating.
6. Kicks or Offsets shall not be permitted in service risers.
7. If contractor elects to hard stick service then they shall follow all applicable NEC codes and County codes in effect. This is above and beyond NVE standard installation.



SUBDIVISIONS, CUSTOME HOMES, AND TOWN HOUSES

NOTES:

1. All installations shall meet the City, County, or State building codes.
2. Incoming conduit can be of rigid galvanized steel (RGS), intermediate metal conduit (IMC), or SCH 80 PVC. If SCH 80 PVC is used contractor must make sure trade size is clearly labeled and visible, showing SCH 80. If this cannot be done it will be **rejected.**
3. A plastic bushing is required on the panel end of the incoming conduit.
4. For the RGS or IMC conduit, a hub or bonding jumper is required for proper grounding of the conduit. A hub is the preferred method (per local building code).
5. All metal conduit exposed to the earth must be covered with 10 mil pipe protection tape, ½ lapped or PVC coating.
6. Kicks or Offsets shall not be permitted in service risers.



APARTMENTS AND CONDOMINIUMS

NOTES:

1. All installations shall meet the City, County, or State building codes.
2. The incoming conduit can be a rigid galvanized steel (RGS), intermediate metal conduit, or SCH 80 PVC. If SCH 80 PVC is used contractor must make sure trade size is clearly labeled and visible, showing SCH 80. If this cannot be done it will be **rejected.**
3. A plastic bushing is required on the panel end of the incoming conduit.
4. A hub or bonding jumper is required for proper grounding of the conduit. A hub is the preferred method (per local building code).
5. All metal conduit exposed to earth must be covered with 10 mil pipe protection tape, ½ lapped or PVC coating.
6. Kicks or Offsets shall not be permitted in service risers.

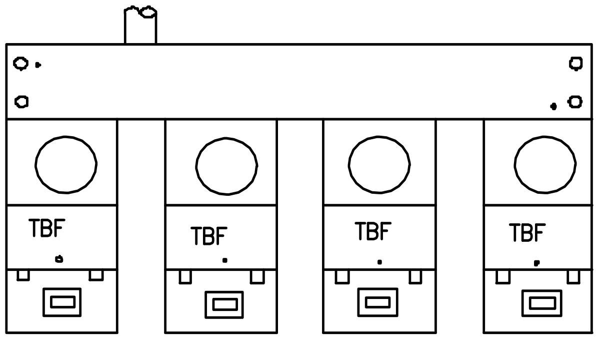


FIGURE 1
COMMERCIAL

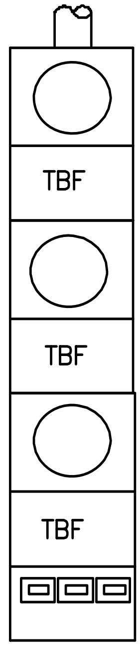


FIGURE 2
COMMERCIAL

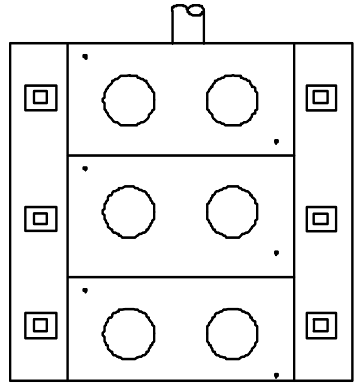


FIGURE 3
RESIDENTIAL

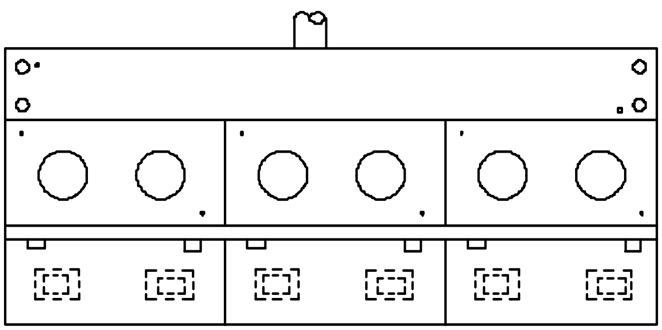


FIGURE 4
RESIDENTIAL

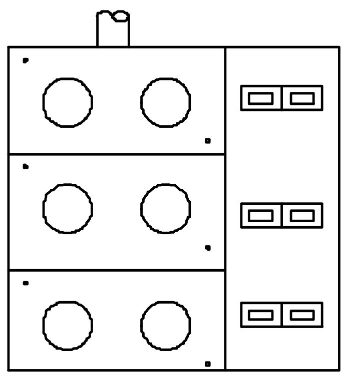


FIGURE 5
RESIDENTIAL

<u>OVERHEAD INSTALLATIONS</u>

TBF – Test Bypass Facilities

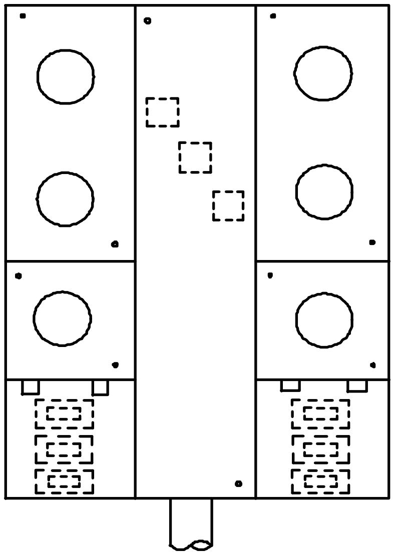


FIGURE 6
RESIDENTIAL

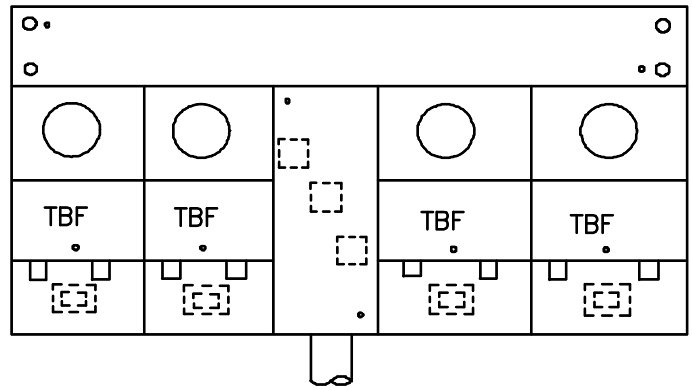


FIGURE 7
COMMERCIAL

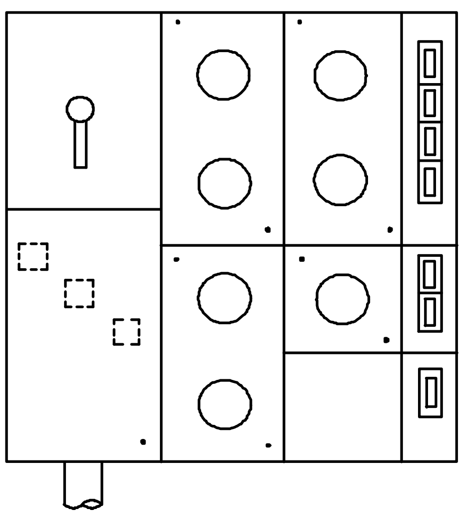


FIGURE 8
RESIDENTIAL

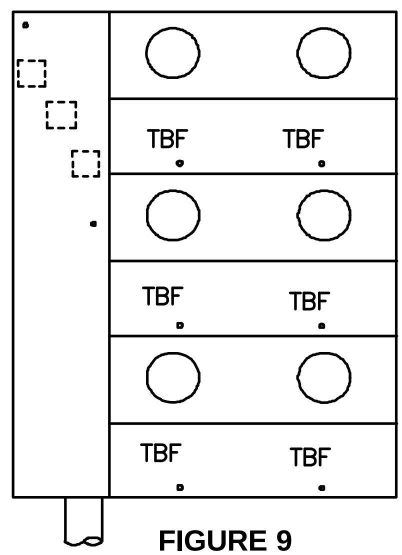


FIGURE 9
COMMERCIAL

UNDERGROUND INSTALLATIONS

TBF – Test Bypass Facilities

NOTES:

1. Refer to Standards RPI-2 and RPI-G for meter clearances and general metering requirements.
2. See local codes and ordinances for requirements of main switches.
3. NVE will secure termination section with a Mitey Lock security device or an approved locking/sealing device and an NVE seal, as appropriate.
4. Each meter socket shall be marked to identify the residential or commercial unit it serves. Refer to RPI-G for specific marking requirements.

FOR MANUFACTURING REQUIREMENTS, REFER TO RPM-G, RPM-16, RPM-17, & RPM-18

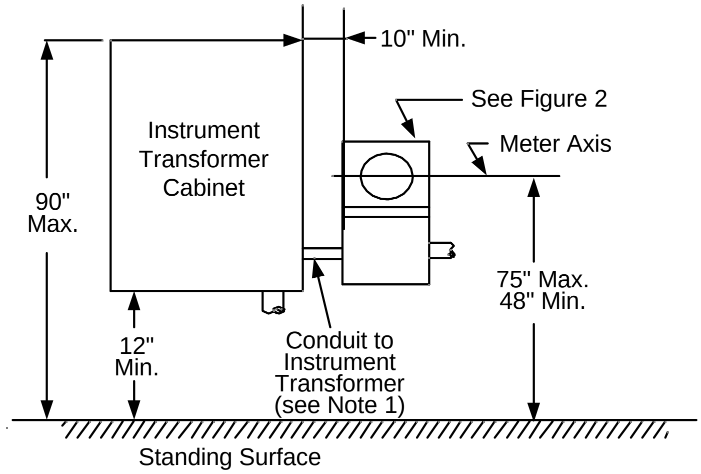


Figure 1.
GENERAL ARRANGEMENT INSTRUMENT TRANSFORMER CABINET

FOR MANUFACTURING REQUIREMENTS, REFER TO RPM-G & RPM-39

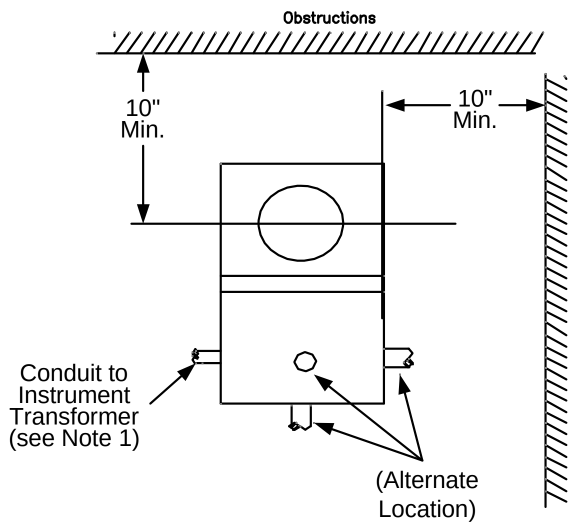


Figure 2.
ONE OR MORE INSTRUMENT RATED METER PANELS WITH TEST SWITCH PROVISIONS.

NOTES:

1. Conduit to the instrument transformer compartment shall be a minimum of 10 inches and up to 10 feet in length. Each enclosure shall be visible from the other enclosure. There shall be no fence barrier between the two enclosures. Refer to RPI-G, Section 19, Instrument Transformer Enclosure with Safety Socket Box.
2. See local codes and ordinances for requirements of main switches

THIS PAGE INTENTIONALLY LEFT BLANK

Table of Contents

Table of Contents

1. Scope

A. This section contains minimum manufacturing requirements for utility metering and service equipment rated 0-600V.

B. The following general notes, pages 1 through 14 apply to all drawings in this section where applicable; each drawing may also contain additional notes which should be considered unique to that drawing unless reference is made to another specific drawing or section.

C. Refer to Section RPI for typical application and installation requirements.

2. Metering Equipment Requirements, General

These requirements are based on practices that are necessary in order to supply uniform satisfactory and safe service. Interpretations or clarifications of intent of these requirements are subject to NVE approval. Installations shall also conform to the provisions of applicable codes and ordinances of local inspection authorities, and all other NVE standards.

A. Grounding, General

Lugs for terminating the customer's ground wire (or other grounding conductors) shall be located outside of the sealable section and shall be designed to readily permit the customer's neutral system to be isolated, when necessary, from NVE facilities.

B. Meter Sequence

The metering arrangement approved as standard and required by NVE provides for the line current to enter first the meter and then the disconnecting means and overload protective devices, (meter-switch-fuse sequence). In multi-meter installations, electric codes require the installation of a main service switch or breaker on the supply side of any group of seven or more meters. In these instances, contact NVE Meter Services for approval before the equipment is installed.

C. Meter Access

Customer locking means for meter enclosures shall provide for independent access by NVE.

D. Meter Heights

Meters shall be located not more than 75 inches and not less than 48 inches above the ground or standing surface when installed outdoors. When meters are enclosed in a cabinet or indoors in a meter room, the minimum height may be reduced to 36 inches. The meter height shall be measured from a level standing surface to the center of the meter.

E. Meter Sockets, General (<u>Provisions outlined per line 8 and 9 of this section will be **effective June 14, 2011**</u>)

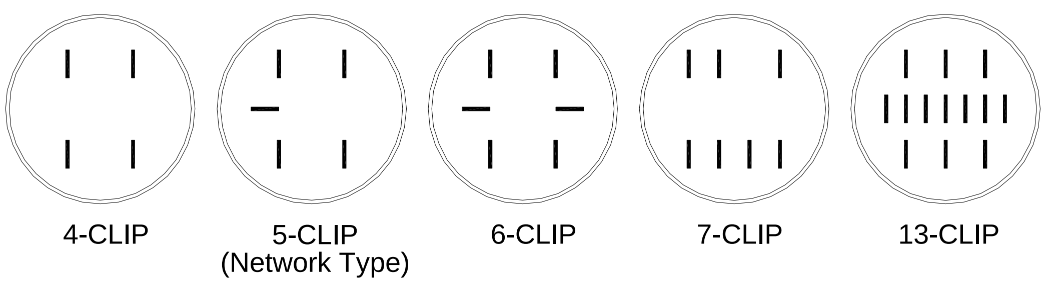
1. The socket and enclosure shall be designed in accordance with the latest revision of AEIC-EE-NEMA Standards for Watt-hour Meter Sockets, Publication ANSI C12.7, Underwriters Laboratories Standard for Meter Sockets UL414.
2. Sockets for self-contained meters shall be furnished, installed and wired by the customer. Diagrams of connections can be found in Section RPI of this manual.
3. When self-contained meter sockets are installed in switchboards, they are not to be wired by the switchboard manufacturer.
4. Sockets for instrument transformer installations shall be furnished and installed by the customer. NVE will furnish and install the normal secondary wiring from the instrument transformers to the meter socket.

5. Potential taps, including the neutral potential tap, shall be located behind a sealed panel. The customer's grounding electrode shall not be located within the meter socket or socket area of a combination CT/ meter enclosure.
6. When instrument transformer-rated sockets are installed on panels, they shall be fabricated and installed by the manufacturer for back connection. The meter socket shall be attached with machine screws so that it may be interchanged or replaced. Sheet metal self-tapping screws are not acceptable; see RPM-32 & RPM-33.
7. All self-contained meter sockets shall be rigidly attached to the back wall of the socket enclosure or to a stationary support connected to the enclosure. The meter sockets shall be installed in a manner that will assure alignment of the socket ring to the socket jaws. Sheet metal or self-tapping screws are not acceptable.
8. Tensioning spring for meter socket jaws shall be installed so that the spring cannot be dislodged if the tension is lost.
9. Meter socket jaws shall be retained in the socket base by threaded fasteners or by metal fasteners that are installed parallel to the direction of force of meter insertion or removal. Jaws held in place by tension spring or friction are not acceptable.

F. Meter Sockets, Requirements

The number of socket clips and their arrangement varies with the type of service supplied to the customer. The following table lists these requirements:

Type of Service	Number of Clips Self-Contained	Number of Clips Transformer Rated
1 Phase, 3 Wire, 120/240 Volt	4	6
3 Wire Network, Form 12S, 120/208 Volt	5	NA
3 Phase, 4 Wire, 120/208 Volt Wye	7	13
3 Phase, 4 Wire, 120/240 Volt Delta	7	13
3 Phase, 4 Wire, 277/480 Volt Wye	7	13
3 Phase, 4 Wire, 240/480 Volt Delta	7	13



G. Meter Sockets with Test-Bypass, Disconnect Facilities

Sockets equipped with test-bypass disconnect facilities are required for commercial applications. They are also required for residential applications using Class 320 socket-type meters. The bypass will be used to maintain service continuity to the customer while the meter is removed for test or inspection.

H. Meter & Cover Panels, General

1. The hinged meter panels shown on RPI-32 & RPI-33 are designed to accommodate only transformer-rated socket meters. Self-contained sockets shall not be mounted on hinged panels.
2. Non-hinged meter panels shall not be used in front of a current transformer section.
3. Not more than two meters shall be mounted on any removable meter panel.
4. Additional space may be required for recording or graphic demand meters (see RPM-33).
5. Hinged meter panels and filler panels shall be equipped with stops to prevent inward swinging beyond the front surface of the switchboards.
6. A hinged instrument transformer cabinet cover may be used provided there is proper clearance to open the cover when the cabinet is installed. A cabinet with hinged cover shall be designed so that the cover cannot be removed by tampering with the hinges when the cabinet cover is closed. Provisions shall be made for sealing the cabinet cover by use of an approved method.
7. All pull and termination section cover panels shall be removable, sealable, provided with two lifting handles and limited to a maximum size of nine square feet in area.
8. All screws used for the attachment of meter and cover panels shall be captive.

I. Lifting Handles

When lifting handles are required on panels and covers, each handle shall be sized for full hand grasping, securely attached and have strength to withstand handling stresses of a minimum of 75 pounds. Lifting handles shall be permanently attached and designed so that they cannot be removed when the cover or panel is in place.

J. Sealing

1. All removable panels and covers to compartments used for terminating or routing unmetered conductors shall be sealable.
2. Sealable latches, stud and wing-nuts, or sealing screws shall be provided as the means of sealing removable or hinged access covers.
3. Hinged cover panels shall be sealed on the side opposite the hinges.
4. Removable cover panels shall be sealed with stud and wing-nut assemblies on opposite sides of the cover. Alternate sealing methods may be used if the removable covers are self-supporting with the captive screws and sealing provisions removed.
5. Sealing and securing devices shall be provided as follows:
   a. Stud and wing-nut assemblies shall consist of a ¼” x 20 (min) stud and an associated wing-nut, each drilled 0.0635 inches (min) for sealing purposes. The stud shall be securely attached so as to not loosen or screw out when being fastened.
   b. Sealing screws shall be drilled .0635 inches (minimum) for sealing purposes.
   c. Latching devices shall be designed to permit positive locking and made of a durable corrosion resistant material.
   d. All securing screws shall be captive.
6. All removable access covers for compartments containing unmetered conductors shall be sealable. When a raceway or conduit for a meter secondary wiring is necessary, such a raceway or conduit shall be sealable. No removable panel or cover requiring sealing shall be located behind other panels, covers or doors (except rain tight enclosure doors).
7. All sealing screw shall be drilled .0635” (minimum) for sealing purposes. All cover panels (top and sides, except for removable compartment access panels) providing access to unmetered conductors shall be secured in place with devices that may not be loosened from the outside. Screws or bolts requiring special tools for installation or removal are not acceptable.

8. All service switches or breakers shall have provisions for sealing in the open position.

K. Cover Panel Labeling

Test-bypass block compartment cover panels shall have a caution sign on the front saying "Do Not Break Seal—No Fuses Inside."

L. Unmetered Conductors

Customer unmetered service wires and metered load wires are not to be run in the same conduit, raceway or wiring gutter. Metered and unmetered wires shall be separated by suitable barriers. Metered wires from the customer's distribution section (branch circuits) shall not pass through sealable sections.

M. Ventilation Openings

A ventilation opening – slot, louver, or the like in covers and doors with provisions for utility seals, shall be protected by one or more baffles, barriers, or other obstructions of such dimensions and locations that any wire, or similar material, will be deflected two times after it is inserted, at any possible angle, through the ventilation hole or mesh. One deflection shall be at least 90° from the direction of travel. In addition, if the minor dimension of a ventilation opening is larger than ¼", it shall be protected by a screen having a minor dimension no larger than ¼".

N. Bus Bar

1. Ampacity

a. The dimensions in these requirements are based on the use of a rectangular bus bar. Ampacities of bus bar conductors based on UL-891. Standard for Dead-Front Switchboard, including ampacities based on thermal limits provided for therein.

b. Ampacity of instrument transformer compartment bus shall conform to NEMA Standards Publication PB2, Part 6.04, Paragraph A, for Section Bus.

2. Plating

a. Manufacturers using aluminum bus bar construction must use a plating process approved by EUSERC. Approved bus bar plating processes are as follows:

Plating Process	Plating Process	Plating Thickness	
		Minimum (inches)	Maximum (inches)
Alstan 70	Bronze	0.00003	0.00005
Alstan 70	Tin	0.00020	0.00035
Alstan 80	Bronze	0.00003	0.00005
Alstan 80	Tin	0.00020	0.00035
Alstan 88 (*)	Tin	0.00010	0.00030
Alstan 88 (*)	Silver	0.00010	0.00030
Alumon D-79	Copper	0.00075	0.00100
Alumon D-79	Tin	0.00100	0.00125

(*) Per applicable formula

b. Aluminum bus bar shall be identified with the approved plating process designation stamped or indented where service cables are terminated and current transformers are installed.

3. Attachment to the Enclosure

Bus bars, and other hardware, attached to the outer walls of the enclosure shall be secured with devices that may not be loosened from the outside. Screws or bolts requiring special tools for installation or removal are not acceptable.

O. Service Disconnects

1. Meter Disconnects, General
   a. For each and every meter, the customer shall furnish and install a circuit breaker, fused switch, or other approved disconnecting means with over-current protection referred to in these requirements as a meter disconnect.
   b. The meter disconnect shall control all of and only, the energy registered by its related meter.
   c. The meter disconnect may consist of up to two separate devices for self-contained meters.
   d. The number of meter disconnects for instrument rated systems must not exceed the maximum outlined in NEC Article 230.71 for service disconnects.
      i. All disconnect devices must be installed in groups in accordance with NEC Article 230.72 for service disconnects. The exceptions of NEC Article 230.72 will apply except in the case of optional standby service which must be grouped.
      ii. All meter disconnects must be permanently marked to identify it as a meter disconnect and by its value relative to the total amount of service disconnects, i.e. “1 of 6”, “2 of 6”, “3 of 6”,….
      iii. A visible and permanent plaque outlining the relative location of all meter disconnects must be place at all locations in which a meter disconnect is installed.
2. Meter Disconnects, Locking Provisions
   a. Meter disconnects supplied from instrument-transformer compartments shall be capable of being locked in the open (off) position.
   b. Locking Provisions may be:
      i. A lockout device which is incorporated as an integral part of each meter disconnect, or
      ii. A lockable cover for each meter disconnect where the lock prevents the operation of the disconnect and prevents removal of the cover, or
      iii. A lockable cover fro multiple meter disconnects where the lock prevents the operation of any of the disconnects, prevents removal of the cover, and all disconnects are supplied from a single instrument transformer compartment.
      iv. Items 1, 2, and 3 shall be permitted to be accomplished by a maximum of two locking provisions per disconnect.
      v. For fused disconnects, the fuse access cover shall be lockable when the disconnect is locked in the off (open) position.
      vi. All locking provisions for disconnects rated less than 400 amps shall accept a lock shank of not less than ¼”.
      vii. All locking provisions for disconnects rated 400 amperes and above shall accept a lock shank of not less than 5/16”.
3. Main Service Disconnects
   a. A main service disconnect device is installed on the supply side of a group of meter sockets and may be a circuit breaker, fused disconnect, or other approved disconnecting means.
   b. A service disconnect shall be installed on the supply (line) side of more than seven meter sockets.

c. A service disconnect is not permitted on the supply (line) side of a single meter socket (Old Sequence).

3. Self-Contained Rated Metering Installation

Self – contained meters are designed to carry rated current and be energized at line potential. They do not require auxiliary instrument transformers to step down line current or voltage.

A. Residential, General

Three types of self-contained meters are commonly used for this application.

1. Class 100 socket-type meter
2. Class 200 socket-type meter
3. Class 320 socket-type meter
4. 5-Clip network type meters for residential structures 12 or more meters.

Note: Sockets equipped with test-bypass disconnect facilities are required only on Class 320.

Note: Only ring-type sockets are acceptable for class 100, 200, 320 socket-type meters.

Note: 5-Clip network type meter sockets in a multiple meter section may only be used for multi-family residential structures with twelve meters or more, and only when pre-approved by Meter Services and the New Business District.

B. Commercial, General

Class 100, 200, and 320 socket-type meters are commonly used and test-bypass disconnect facilities are required for this application.

Note: Only ring-type sockets are acceptable for class 100, 200, 320 socket-type meters.

C. Multiple, Switchboard

1. The socket and socket enclosure shall be designed in accordance with the latest revision of AEIC-EEI-NEMA Standards for Watt-hour Meter Sockets, Publication ANSI C12.7, and with standard for Meter Sockets UL414.
2. The bussing or cables to each individual meter socket are to be installed so they can be visibly traced.
3. Multiple meter enclosures that are not factory bussed shall have non-removable, solid metal barriers, to isolate the metered conductors from the unmetered conductors.
4. The service termination enclosure, socket enclosures, raceways and sections for test-bypass or manual circuit facilities shall have separate, removable, and sealable access panels (or plates). Meter socket enclosures shall have a separate cover containing no more than two meter positions.

Note: Only ring-type sockets are acceptable for class 100 and 200 socket-type meters.

D. Metering Spacing and Clearances

1. The rules for spacing of socket meters in multiple residential meter installations shall be as follows:

   Horizontal spacing – 7 1/2 inches minimum on centers.

   Vertical spacing – 8 1/2 inches minimum on centers.

2. See RPM-53 for Multiple Meter clearances.

4. Transformer Rated Metering Installation

A. General Requirement

1. Instrument transformer compartments are required in the following instances:
   a. Single phase services where connected load exceeds 400 amperes.
   b. Three phase services where connected load exceeds 200 amperes.
2. Meter, instrument transformers, and test switches will be furnished and installed by NVE. Any required conduits or raceways shall be furnished and installed by the switchboard manufacturer or contractor.
3. All compartments containing unmetered conductors shall be sealable. When a raceway or conduit for meter secondary wiring is necessary, such raceway or conduit shall be sealable.

B. Switchboard Service Sections, General

1. For both standard and specially engineered switchboard service or supply conductors shall enter the service section through one end and leave through the opposite end of the instrument transformer compartment. This stipulation applies to either overhead or underground service or if two or more service sections are connected together. The direction of feed shall be vertical through the instrument transformer compartment, (See RPM-45).
2. In case where more than one switchboard is to be installed, a separate service section will be installed which is completely barriered from other service sections, termination sections or service switches and disconnects.
3. Except where otherwise specified in theses requirements, barriers used in switchboard installations to separate customer sections from utility sections (i.e., pull sections and metering sections) and sections containing unmetered conductors or bus shall be constructed from 16 gauge (minimum) steel and shall be secured with devices that are not removable from either the customer sections or the exterior of the switchboard.
4. When two or more switchboard service sections are supplied from one set of service conductors, the supply conductors are to be arranged so they are readily accessible without disturbing the instrument transformers and associated secondary wiring.
5. Additional service connections may be made in the main service termination and pull section where more than one metering installation is necessary. Additional service connections shall not be made in the instrument transformer compartment. Consult NVE Meter Services for approval.
6. Meter installations of six meters or less, shall be connected “new sequence”.

C. Standard Switchboard Service Section

1. The general arrangement of a standard switchboard section is shown on RPM-25 and 26.
2. A standard switchboard service section has a hinged meter panel located in front of the instrument transformer compartment. RPM-33 shows spacing for various combinations of multiple meters.
3. Hinged meter panels must have handles and open a minimum of 90° with meters and test switches mounted to permit safe and ready access to the instrument transformers. When hinged panels are recessed, the section shall have additional width to meet this requirement. A recessed panel requires NVE Meter Services approval as a specially engineered section, see RPM-54.
4. Hinged meter panels must be sealable, and easily removable with the hinges readily interchangeable from the right or the left side on the job site.
   a. The hinged meter panels on RPM-32 and RPM-33 are designed for transformer-rated, socket-type meters.
   b. Meter panels and filler panels shall be equipped with stops to prevent inward swinging beyond the front surface of the switchboard.

c. Not more than two meters shall be mounted on any removable meter panel.

5. For hinged socket meter panels, see RPM-32 and RPM-33.

6. For underground service application of Standard Switchboard Service Sections, see RPM-45.

D. Specially Engineered Service Sections

1. Switchboards which do not conform to standard design criteria are considered specially engineered and include installations:

   a. Rated over 3000 amperes or 600 volts.

   b. Where service breaker ampacity rating exceeds that of the standard service section.

   c. Where multiple metering sections are used.

   d. Where recessed meter panels are used.

2. When a specifically engineered service section is necessary, drawings in triplicate of the proposed section shall be submitted to NVE Meter Operations Department for approval prior to manufacture and bidding. Such drawings shall indicate the contractor's and the customer's name and address and job location.

3. The general arrangement of Specially Engineered Switchboard Service Sections should follow, as nearly as practicable, that of the Standard Service Sections, and the following general requirements shall be observed:

   a. Instrument transformer-rated socket meters, used with current transformers, shall be mounted on hinged panels.

   b. If a hinged meter panel is located behind a door, a clear space of at least 11 inches between the meter panel and the door is required, and designed to open 90° with meters and test switches in place. If needed, additional section width shall be provided to meet this requirement.

   c. A clear space in back of a meter panel shall be provided for the secondary wiring. For minimum dimensions between the hinged meter panel and the nearest bus, see RPM-19 through RPM-24.

   d. For minimum clearance between meters, see RPM-6, RPM-33 and RPM-53.

   e. Not more than two meters shall be mounted on any removable meter panel.

   f. Busses shall be adequately supported in the metering transformer compartment to withstand the mechanical stresses of short circuit. The bus supports shall not interfere with installation or removal of current transformers. Current transformers shall not be used to support the busses. The busses shall be entirely self-supporting.

   g. The busses and current transformer mountings shall be designed so that each of the current transformers may be withdrawn from its mounting position directly through the access panel without disturbing any other current transformer. When multi-leaf busses are used, the busses shall be oriented so that they appear "edgewise" when viewed from the access panel.

E. Instrument-Transformer Compartment

1. For details of instrument transformer compartments, see RPM-19 through RPM-22.

2. Covers for instrument transformer compartment shall be made of cold gauge metal: if non-hinged panels are used as covers, they shall be provided with lifting handles and be attached with sealable studs and wing-nuts or by other approved means.

3. Copper or aluminum bus bar shall be used on both the line and load sides of all current transformers. When aluminum bus is used the bus bars shall be plated, see Bus Bar Plating.

4. Instrument transformers supplied by NVE for metering shall not be used for any other purpose

5. The ends of the current transformer bus stubs shall be located so the current transformers can be installed without removing adjacent panels.
6. The current transformer bus stub supports in the instrument transformer compartment shall be sufficiently rigid to maintain alignment of the bus when the conductors are installed. The current transformers or bus links shall not provide bus support or alignment.

5. Service Termination Equipment, General

A. Switchboards Excluded

This paragraph of the Requirements applies to all meter and service equipment when not installed on switchboards.

1. General
   - a. Service termination facilities shall be specifically designed to receive the NVE underground service lateral conductors as a single cable entry. Enclosures designed for either overhead or underground cable are acceptable provided they meet requirements for both types of cable entry.
   - b. Service cable termination lugs or connectors shall be suitable for use with both aluminum and copper conductors.
   - c. Socket enclosures designed for single sockets rated up to, and including 200 amperes, shall have service terminating lugs independently mounted from the socket jaw support.
   - d. Test for meter sockets shall be in accordance with the current Standard for Meter Sockets UL414.
   - e. Service terminating space in enclosures rated greater than 200 amperes with multiple meter sockets shall accommodate compression-type. All bussing or cable conductors beyond the terminating lugs shall be provided by the manufacturer or the customer's contractor. Bus stubs or bussing in the service terminating space used for terminating the utility service lateral shall have mounting bolts spaced in accordance with NEMA Standards. For termination bus details, see RPM-43.
   - f. The service cable termination compression lugs shall be compatible with the size and type of service being installed (i.e., aluminum-bodied AL-CU with aluminum cables, etc.). The termination lug landings for the neutral and each phase conductor shall be rigidly and permanently affixed in the service termination space and all grouped at one location.
   - g. Wireways in the service termination space designed for terminating the utility service lateral shall be clearly identified for such use. Service termination shall be made in the service termination enclosure or in specially designated space of a meter panel which has a separate removable and sealable access plate.
   - h. The layout design of the service termination enclosure which requires bending the utility service conductors, should provide space to permit a minimum cable bending radius equal to four times the overall diameter of the cable measured from the inner surface of the cable (from Minimum Bending Radius for Thermo-Plastic Insulated Cables, IPCEA S-61-402 and NEMA WC-5 Standards).

     Note: The overall termination enclosure size is not predicated solely on the cable bending radius. Adequate working space and electrical clearances are also considered in establishing enclosures dimensions in these requirements.
   - i. The service termination enclosure, socket enclosure, and test-bypass disconnect block section shall be sealable and isolated or barriered from other integral enclosure sections which are accessible to the customer.

j. The manufacturer's rating label, or other markings used in lieu of a label, shall show among other things:
   i. Whether the socket or socket enclosure is designed for overhead service entry or underground service entry, or both
   ii. That the termination lugs are designed for both aluminum and copper conductors.
   iii. The wire size range of the termination lugs.

2 Single Self-Contained Meter Termination, Underground Service
   a. The socket and enclosure shall be specifically designed to receive service cables from an underground supply system. Separate service terminating lugs supported independent of the socket and connected to it by bus bars are required for single family residential meter socket enclosures, see RPM-1.
   b. Wiring space for service lateral conductors shall be clearly identified as intended for such use, shall be clear of all projections, and shall be used exclusively for such purposes.
   c. A separate removable cover, independent of the meter panel, is required in front of the termination section, see RPM-1.
   d. Knockouts in cable wireways shall be positioned to minimize service lateral cable bending.
   e. The service cable entry section and the meter socket section shall be sealable and isolated or barriered from other integral enclosure sections which are accessible to the customer.
   f. The load wires from the distribution section (branch circuits) shall not pass through any sealable section.

3. Multiple Self-Contained Meter Termination, Underground Service
   a. When self-contained meters are installed on switchboards, the service termination requirements for switchboards shall be followed (see Switchboards).
   b. hen self-contained meters are installed in multiple arrangements, in separate meter enclosures, the GENERAL service equipment requirements shall be followed. (See RPM-43 for termination enclosure requirements, and installation guides section for typical arrangements).

6. Metering and Service Equipment (601-27,000V)

A. High Voltage Metering and Service Equipment (0-27,000V)

This Section applies only to revenue metering compartments of in door and outdoor metal-clad switchgear in 601 through 27,000 volt installations and will address two general designs:

1. Enclosures without Voltage Transformer Disconnect 4160 Volts (See Drawings RPM-403 and RPM-404)
2. Enclosures with Voltage Transformer Disconnect 2400 Volts to 27,000 Volts (See Drawing No. RPM-401 and RPM-G page 14)

7. Switchgear, With Fused or Unfused Voltage Transformers

A. General

1. Drawing Approval

   The manufacturer shall contact NVE Meter Service for specific requirements and final approval of high voltage metering equipment for 601-27,000 Volt Services, generally 0-200 Amps. Feeder sizing and coordination limitations may impact maximum ampacity of the equipment (see paragraph 11 of this section). Copies of drawings must be provided to NVE Meter Services and NVE System Protection prior to fabrication of the equipment. Such drawings will contain the following information:

   a. Customer Name
   b. Job Name and Address
   c. Contact Address
   d. Telephone number of manufacture's representative
   e. NVE Work Request Number

2. Utility Compartment Labeling

   Compartments of the metering enclosure shall be permanently labeled with machine engraved laminated phenolic (or equal) tags. Quarter-inch white letters and numbers on red colored material which is readily visible and mechanically attached to the face of the following designated compartment.

   a. Utility voltage transformer compartment.
   b. Utility voltage transformer fuse compartment.
   c. Utility current transformer compartment.
   d. Utility service termination compartment.
   e. Utility metering panel.

3. Safety Grounding Provisions

   Bare bus 4 inches above and below the current transformers shall be provided to permit application of serving agency safety grounds. As an alternate, a grounding knob may be provided on the line and load side of the bus at each current transformer location.

4. Meter Panel

   Meter panel and hinges are to be designed to adequately support a 25 pound load applied at the unsupported end with 1/8" maximum sag when open. A #4 AWG flexible braided bond wire shall be installed across the hinges. See drawing RPM-409 and RPM-410 for meter panel Layout.

5. Lifting Handles

   When lifting handles are required on panels and covers, each handle shall be sized for full hand grasping, securely attached, and have strength to withstand handling stress of a minimum of 75 pounds.

   Note: Chest type handles with a folding bale grasp are not acceptable.

6. B.I.L. Rating

   B.I.L. (Basic Impulse Level) for the metering enclosure shall be not less than that for the customer's associated switchgear. Reference shall be made to ANSI Standards for the minimum acceptable B.I.L. ratings for high voltage switchboards built to the listed nominal voltages shown in the applicable tables "Voltages and Insulation Levels for AC Switch gear assemblies and as tabulated for Metal Enclosed Interrupter Switchgear. The metering cubicle shall be labeled with the B.I.L. rating.

7. Ventilation Openings

   A ventilation opening-slot, louver, or the like-shall be protected by one or more baffles, barriers, or other obstructions of such dimensions and locations that any wire, or similar material, will be deflected two times after it is inserted, at any possible angle, through the ventilation hold or mesh. One deflection shall be at least 90 degrees from the direction of travel. In addition, if the minor dimension of a ventilation opening is larger than ¼", it shall be protected by a screen having a minor dimension no larger than ¼".

8. Rear Door Access to Metering Cubicle

   Working clearances at the customer's job site may determine if the manufacturer is to furnish either a single or double full height hinged rear door access. In addition to provisions for a three point locking mechanism with hardware for attachment of the utility-furnished padlock, each door shall, when closed, be secured in place with the standard "stud and wing nut assembly" for sealing. All external doors shall, when opened, be equipped with a device to hold door at 90 degrees or more.

9. Weatherproofing and Locking

   Enclosure sketches on the following drawings show equipment with weatherproof doors. The meter panel shall be hinged on the side opposite that of the outer door on weatherproof units to permit 90 degrees opening with the meters and test facilities in place. The weatherproof doors may be omitted if the equipment is located indoors. If the outer door is omitted, the meter panel must be lockable. The front weatherproof door shall be a single

10. CT and VT Installation

   Current transformers and voltage transformers, meters, testing facilities, and all normal secondary wiring from the transformers, to the meters will be furnished and installed by the serving agency.

11. Service Fusing and Protection

   All service fusing and other protective equipment schemes such as relays, etc., must have approval from NVE System Protection prior to fabrication to ensure proper coordination with our distribution system. The S & C SM-4 or SM-5 175E fuse is the largest that will coordinate with NVE 12.5kV substation feeder breakers in non-rural areas within the Las Vegas Valley. Services in rural areas may require smaller size fuses to coordinate. The System Protection Department will provide specific requirements once the actual location is determined.

B. Bus Bar and Conductors

1. Approved Bus Material

   Only copper or EUSERC approved plated aluminum bus shall be used in the metering enclosure. Aluminum bus shall be identified with the plating process where the service cables are terminated and the current transformers are mounted. NOTE: At any time, EUSERC may require certification and supporting documentation or manufacturing process to meet electroplating thickness requirements.

2. Bus Dimensions and Spacing

   Maximum bus size shall be 3/8" x 4". Minimum bus size shall be ¼" x2" unless otherwise indicated on specific drawing. Bus size outside of these limits require special engineering and consultation with the serving agency.

3. Bus Installation, Main Switch Ahead of Metering

   When the main switch or circuit breaker enclosure is adjacent to and on the source side of the metering enclosure, connections from the load side of the main switch or circuit breaker to the line side of the current transformers shall be made using bus bars.

4. Conductors Passing Through Compartment Walls

Where cables or buses pass through compartment walls, through-the-wall bushings with full voltage rating of the switchboard must be used.

C. Termination

1. Service Cable Terminations

For service ampacities up to 800 amperes, one landing position (*) shall be provided on each phase and neutral bus for each 400 amperes, or portion thereof, of service ampacity. All bolts shall be secured in place and provided with nuts, flat washers and pressure maintaining spring washers. All parts must be plated to prevent corrosion. Consult the serving agency for termination requirements when the ampacity exceeds 800 amperes.

(*) Two ½" steel bolts on 1 ¾" vertical centers, extending 2 inches minimum to 2 ½" maximum from the mounting surface.

2. Insulated Neutral Termination

An insulated neutral is required. It shall have full-voltage rated insulation from the metering cubicle.

D. Instrument Transformer Mounting Bases and Bus Links

Voltage transformer and current transformer mounting bases are to be provided by the manufacturer (See DWG. RPM-408).

1. Voltage Transformers

Locate the front or leading set of voltage transformer mounting holes 9" from the voltage transformer compartment door.

2. Current Transformers and Bus Link

Bus drilling and spacing shall accommodate 800 ampere or less current transformers of the proper voltage insulation class (See Dwg. RPM-414). Current transformer center phase position shall be bused straight through for three-phase, three-wire service voltage installations. This bus shall consist of a removable link dimensioned the same as the current transformer bars on the metered phases.

3. Phase and Neutral Taps for Fuse and VT's

Lugs for voltage transformer phase and neutral connections shall be provided in the voltage transformer compartment.

4. Fuse Specification

Voltage transformer fuses shall be furnished and installed by the serving agency. The manufacturer shall provide mounting clips for indoor current limiting fuses with mounting clip separation and fuse ferrule diameter appropriate for the voltage rating of the equipment. Fuses shall be accessible through V.T. interlocked compartment door.

8. Metering Compartment, With Disconnect for V.T.

A. Voltage Transformer Disconnect Requirements:

1. Kirk Key interlocking is required between the voltage transformer disconnect and the voltage transformer compartment door so that, for personal safety, the voltage transformer compartment cannot be entered until all of the following conditions are met:

   a. The disconnect is visibly open and visibly grounded.

   b. When the voltage transformer disconnect is fully open, the disconnect blades must ground automatically.

   c. The disconnect is locked open with a key interlock system.

2. The interlock system must prevent closing of the disconnect without first closing and locking the voltage transformer compartment
3. NVE will be provided with two keys for the interlock system.
4. Primary contacts for the voltage disconnect shall be of the blade and jaw design or equivalent to assure continued adequate contact. Wiping contact or pressure contact is not acceptable.
5. Operating handle or lever of the voltage transformer disconnect switch shall be pad lockable in the closed position.
6. The Voltage Transformer Compartment Door shall provide unobstructed access to the Voltage Transformers and Fuses.

B. Alternate Meter Panel Location
1. As an alternate, the meter panel may be mounted in front of the CT/Termination compartment, provided that when the meter panel is opened, the compartment is fully isolated by a removable or hinged barrier.
2. All external and interior doors providing access to the CT buss including the outer door and hinged barrier shall, when opened, be equipped with a device to hold them at 90° or more.

9. Instrument Transformer Mounting

See Drawing No. RPM-408

10. Fuse Specification

Voltage transformer fuses shall be furnished and installed by NVE. The manufacturer shall provide mounting clips for indoor current limiting fuses with mounting clip separation and fuse ferrule diameter dimensions as indicated under dimension H on Drawing No. RPM-401.

11. 20.8 To 27 kV Service Voltage

A. Vertical busing in the pull section and C.T. compartment shall be spaced 18 inches on centerline between phases, and the center phase shall be on the enclosure centerline.

B. Current and voltage transformers will be outdoor type. Provide transformer mounting bases and busing configuration (in the C.T. compartment) to accommodate this style transformer.

MANUFACTURING REQUIREMENTS

NV Energy (NVE) is a member of the Electric Utility Service Equipment Requirements Committee (EUSERC) and as such, will accept certain metering and service equipment that is designed and built in accordance with EUSERC's current standard practices.

The NVE approved EUSERC drawings are listed below:

NVE	EUSERC	TITLE
RPM-4	304	Safety Socket Box with Factory Installed Test-Bypass Facilities, 100A
RPM-5	305	Safety Socket Box with Factory Installed Test-Bypass Facilities, 200A
RPM-6	306	Self-Contained Meters Installed in Switchboards 0-200A
RPM-11	311	Test-Bypass/Disconnect Block for Safety Sockets, 100 and 200A
RPM-12	312	Test-Bypass/Disconnect Block for Safety Sockets, 100 and 200A (Bussed and/or Cable Term)
RPM-13	313	Combination Current Transformer Cabinet and Meter Socket Panel for Overhead Services 400A
RPM-14	314	Combination Current-Transformer Cabinet and Meter Socket Panel for Underground, 40A
RPM-15	315	Combination Disconnecting Device and Terminating Enclosure
RPM-16	316	Current Transformer Cabinet, 400A
RPM-17	317	Current Transformer Cabinet, 1-Phase, 600A
RPM-18	318	Current Transformer Cabinet, 3-Phase, 4 Wire, 800A
RPM-22	322	Instrument Transformer Compartment for Switchboards, 1001-300A, 3-Phase 4 Wire
RPM-24	324	Instrument Transformer Compartment for Switchboards, 3000A and Above, 3-Phase, 4 Wire
RPM-25	325	Standard Switchboard Service Section with Instrument Transformer Compartment
RPM-26	326	Standard Switchboard Service Section with Instrument Transformer Compartment & Filler Panel
RPM-27	327	Remote Metering Cabinet
RPM-28	328	Current Transformer Mounting Base, 1-Phase, 600a
RPM-29	329	Current Transformer Mounting Base, 3-Phase, 4 Wire, 800A
RPM-30	330	Removable Link & CT Support for Instrument Transformer Compartment with 4-inch Bus
RPM-31	331	Removable Link & CT Support for Instrument Transformer Compartment with 5-inch Bus
RPM-32	332	15-Inch Hinged Meter Panel
RPM-33	333	30-Inch Hinged Dual Socket Meter Panel
RPM-39	339	Safety Socket Box for Meter Used with Instrument Transformers
RPM-42	342	Combination Terminating Enclosure and Multi-Meter Panels for Residential Services, 6 Meter Maximum, 1-Phase, 3 Wire, 600A

NVE	EUSERC	TITLE
RPM-43	343	Enclosures for Underground Service Termination
RPM-45	345	Underground Service Termination Standard Switchboard Service Section
RPM-47	347	Underground Service Terminating Facilities in Pull Boxes /Pull Sections
RPM-53	353	Clearances for Residential Multiple Meter Installations
RPM-54	354	Outdoor Raintight Enclosures for Switchboards
RPM-401	401	High Voltage Metering Enclosure, 2400-27,000V
RPM-402	402	Mounting Pattern for Instrument Transformers, 2400-27,000 Volt Service
RPM-404	404	Hinged Meter Panel with Dual Socket for 2400-27,000 Volt Service
RPM-408	408	Indoor Current Transformer Dimensions for Metering Purposes 5-15kV
RPM-410	410	Voltage Transformer (VT) Dimensions, 5-15kV Outdoor
RPM-411	411	UG Service Terminating Pull Section, 3-Phase, 4 Wire, 2400-4800V & 7200-17000V
RPM-412	412	Busway Service Head, 3-Phase, 3 or 4 Wire, 750 to 34500V
RPM-413	413	High Voltage Metering Enclosure, 3 Phase, 4 Wire, 4160V, 0-800A
RPM-414	414	High Voltage Metering Enclosure, 3 Phase, 4 Wire, 4160V, 801-3000A

For more information about EUSERC standards, go to (www.EUSERC.com) on the internet, or contact the NV Energy Meter Services Department at: (702) 402-6110.

TABLE OF CONTENTS

1. Application

For all single phase 120/240V applications requiring 400 Amp or 600 Amp service that are not attached to a building. Application throughout the service area to all rate classes.

2. Installation requirements

1. Design professional to determine fault current requirements.
2. Pedestal shall be installed on 36” by 36” minimum concrete base. Base shall be designed by licensed or registered design professional.
3. Pedestal shall have 36” clear work space on service connection side, meter socket side, and side that has door locks. Side with hinges shall have 12” minimum clearance. Clear work space shall be level within ¼ inch per foot in all directions. See diagram below
4. Installation shall meet or exceed all local codes.
5. The top of the pedestal base shall be 6” above final grade.
6. Installation shall conform to RPI-G and RPI-2 requirements.

3. Material requirements

1. There is no directly applicable EUSERC drawing. Manufacturers are to contact NVE Meter Operations for design approval prior to construction.
2. The overall dimensions are approximately 24” wide by 24” deep by 48” tall.
3. The CT mounting and termination section requirements will conform to EUSERC Drawings 314 and 328A for instrument rated system. The CT compartment cover will hinge on the left side.
4. The meter socket panel will conform to the general layout of EUSERC 332 and will hinge on the left side. Dimensions are not applicable. The door for the circuit breaker will hinge on the right side.

4. Approved Equipment

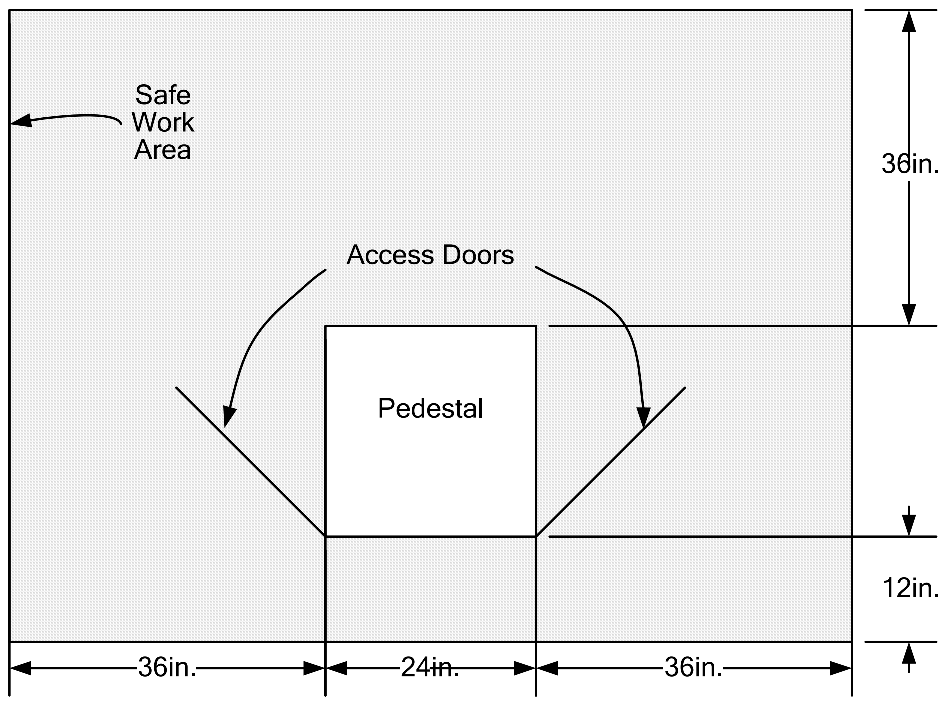
1. 400 Amp Pedestal:

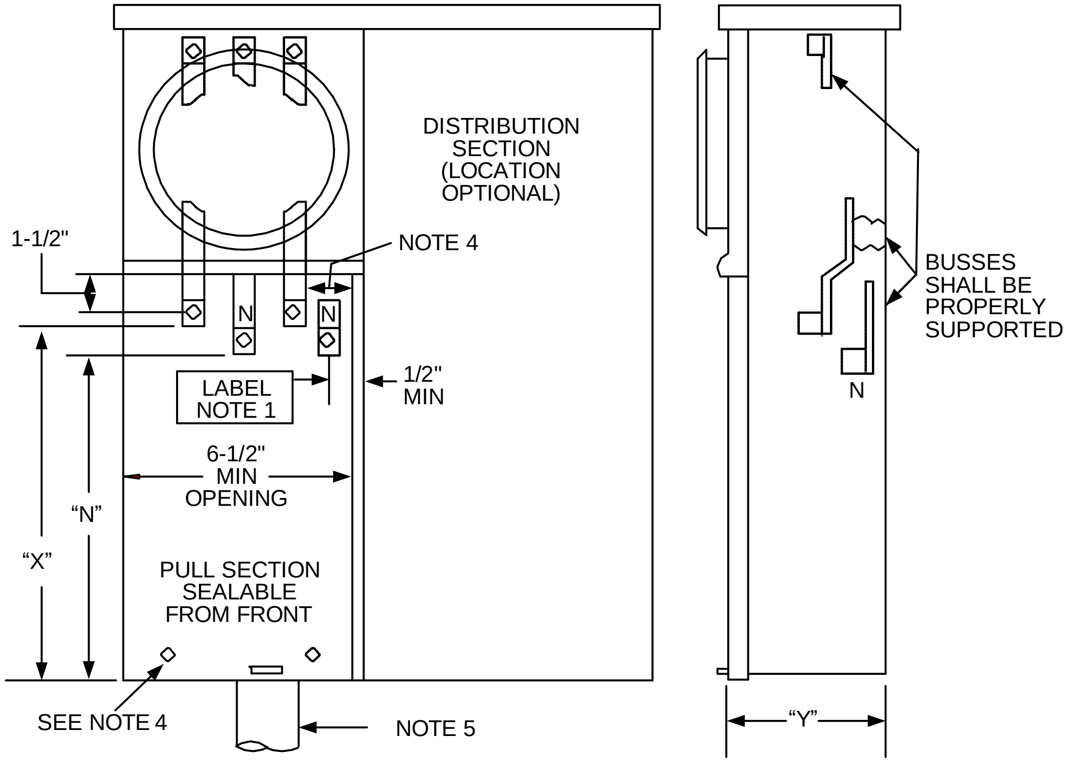
Milbank Part Number CP3B1411JB22	
Milbank Part Number CP3BB411JX50	Single 400/2p Main CB with a 50AIC rating
Milbank Part Number CP3BB411JX22	Two 200/2p Main CB’s with a 22KAIC rating
Milbank Part Number CP3BB4126X50	Two 200/2p Main CB’s with a 50 KAIC rating
Pacific Utility Products, Inc Part Number	SES-36-48-M2400-100 Single 400/2p
Tesco Part Number 28-413	

2. 600 Amp Pedestal:

Milbank Part Number CP3BB611JX50	Single 600/2P Main CB with a 50 AIC rating
Milbank Part Number CP3B6126X50	Two 300/2p Mains with 50 AIC ratings
Milbank Part Number CP3BB6126X22SP1	Three 200/2p Mains with 22AIC ratings
Milbank Part Number CP3BB6146X50SP1	Three 200/2p Mains with 50 AIC ratings
Pacific Utility Products,SES-36-48-M2600-100	Single 600/2P Main CB
Tesco Part Number 28-613	

5. Installation Plan View





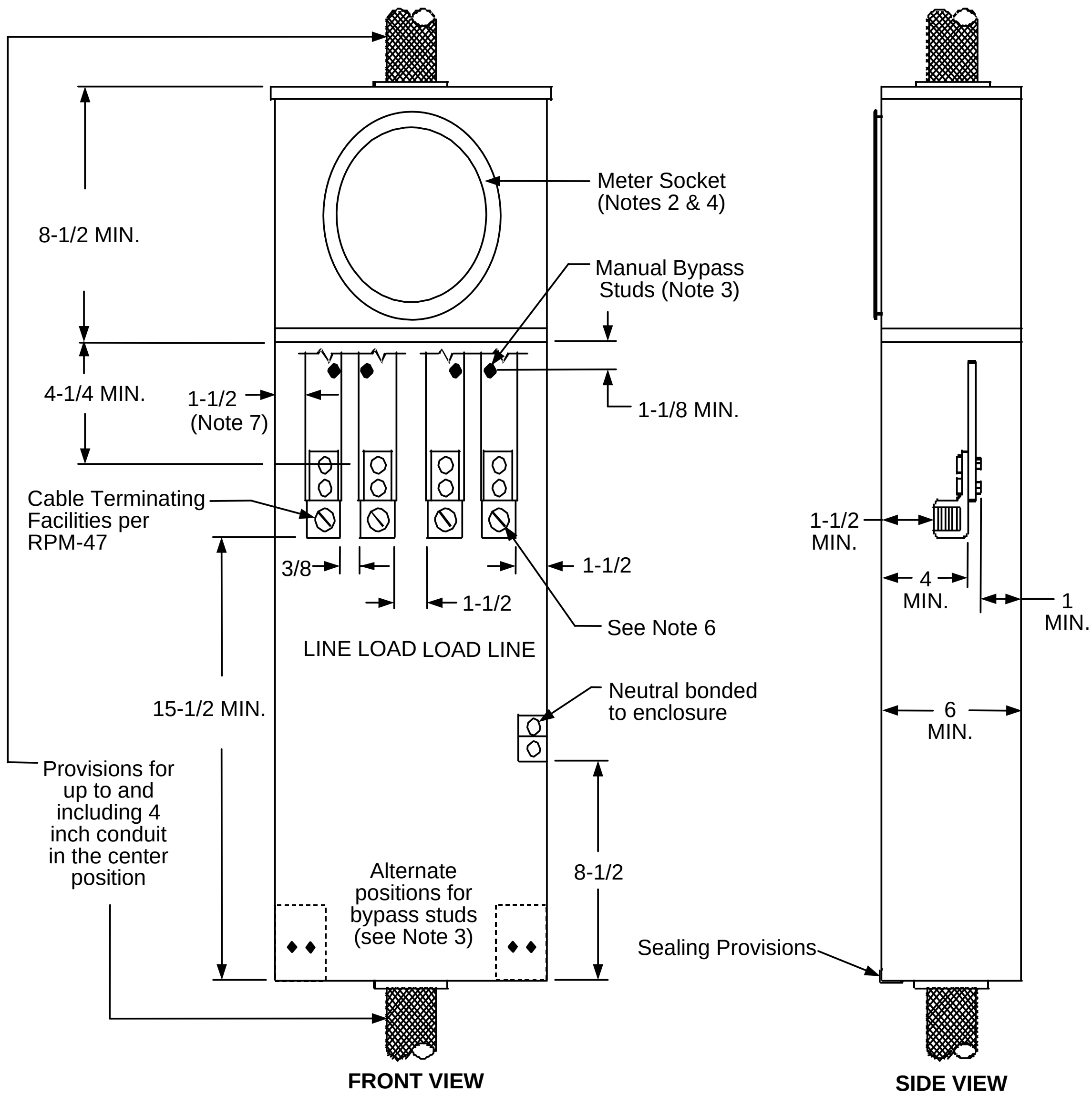
Maximum Ampacity	Lugs to Accept AL Conductor Size	Required Set Screws	"X" Min. Dim.	"N" Min. Dim.	"Y" Min. Dim.
125	#4, 2/0 AWG	Allen Screw	8"	6"	4"
225	#4, 2/0 AWG	Allen Screw	11"	8-1/2	5-1/2

All dimensions shown are in inches.

NOTES:

1. This equipment may be constructed for overhead, underground, or for combination overhead/underground service applications. When constructed as an OH/UG device, a yellow caution label (2" x 3" minimum) shall be installed below the terminations in the pull section reading CAUTION: BUS ENERGIZED AT ALL TIMES .
2. Provide a bonding screw or jumper if the neutral terminal is insulated from the enclosure
3. A minimum, radial clearance of 1-1/2 inches shall be provided between hot bus terminals and ground or neutral surfaces.
4. Termination section cover shall be removable and sealable and have provisions for the installation of securing screw on the front of the panel.
5. Conduit provisions shall be for 2" nominal conduit.

THIS PAGE INTENTIONALLY LEFT BLANK

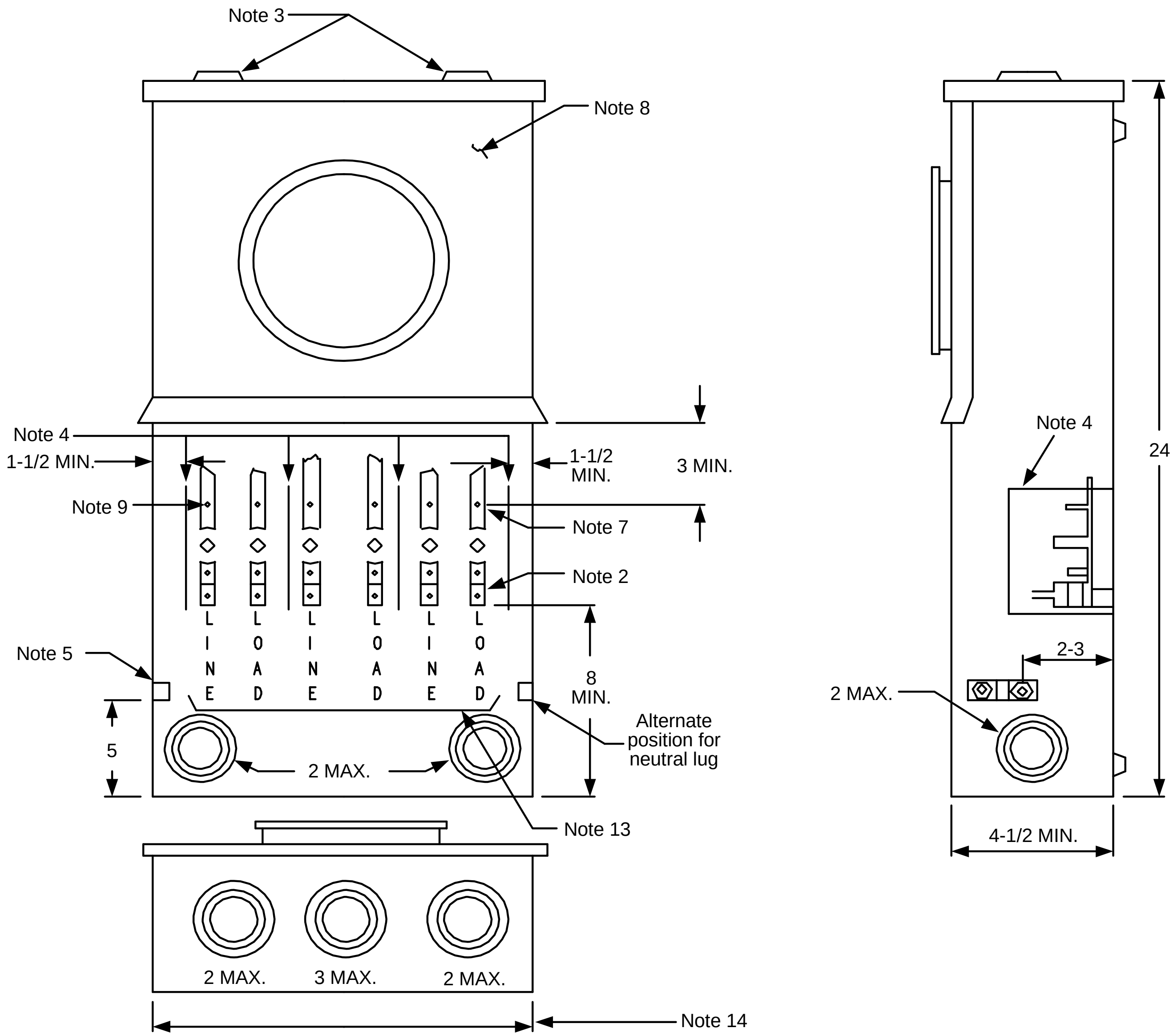


All Dimensions Shown are in Inches

NOTES:

1. This service equipment shall be marked with a continuous amperes rating of 320 amperes. Alternatively, it may be marked “400 amps (320 amperes continuous)”.
2. Only ring-type sockets are acceptable. See RPM-G. Ringless-type sockets are not acceptable.
3. Bypass studs may be 12-24 TPI minimum up to 5-16 x 24 TPI maximum, ½” in height with ½” hex-nut (measured across the flat) shall be provided on each phase bus section. The studs shall have a horizontal spacing of 1-1/2” (measured from centers) between the line and load bus sections, and shall be offset from the line side termination lugs to permit cable entry from the top without interference with the utility provided manual bypass links. 1-1/2” clearance to the side and bottom is required for the alternate bypass stud positions.

4. Sockets equipped with test-bypass facilities are required for commercial occupancies and for residential applications using Class 320 socket-type meters.
5. Meter mains similar to the Circle AW model U404 series ending in "MCC" or Meter Sockets similar to the Circle AW model 324C are acceptable.
6. Terminations for service conductors shall be aluminum-bodied mechanical lugs with a range of No. 1 AWG through 600 Kcmil. The lugs shall be secured to assure vertical alignment and line side lugs shall be offset from the face of the bus to permit cable entry from the top. The line and load positions shall be indentified in ¾" high block letters.
7. 1-1/2" dimension may be less if insulating material is provided.
8. The customer section location may be located to the left or to the right of the utility section (i.e. – meter section and pull section).
9. "Lever style bypass facilities which deenergize the meter socket are not permitted.
10. The bypass/cable termination compartment cover panel shall be independent of the meter panel, removable, lockable, and sealable. All securing screws shall be captive.

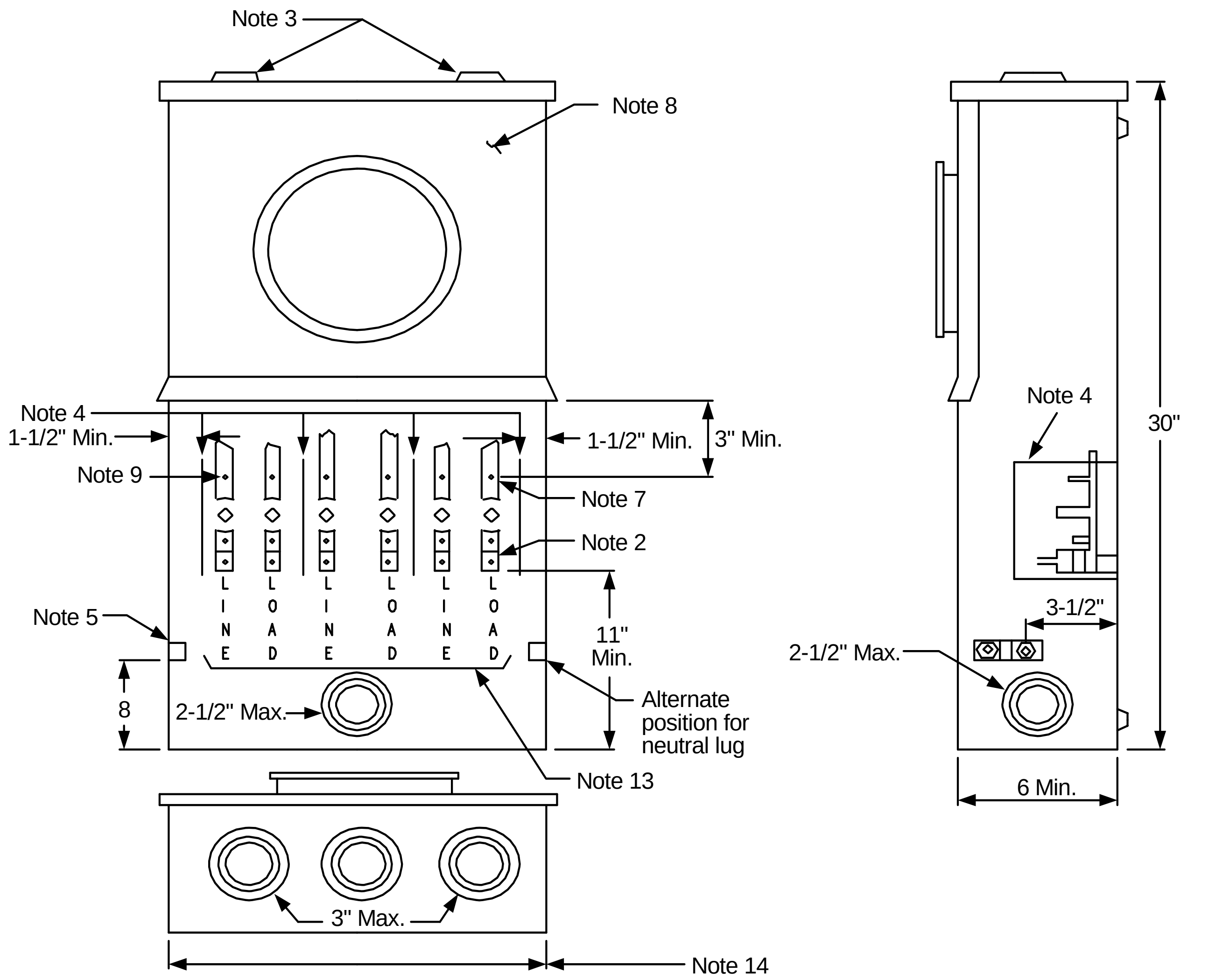


All Dimensions Shown are in Inches

NOTES:

1. This device may be used for commercial types of occupancies.
2. Aluminum bodied terminals for No. 6 through No. 1/0 wire.
3. Hubs capped off if used for underground feed.
4. Rigid insulating barriers.
5. Insulated bondable vertical lay-in, double neutral lug with 1/0 wire capacity, mounted on either sidewall.
6. Test-bypass blocks shall be bussed or wired to socket jaws or terminals.
7. Upper test connector studs.

8. All section panels shall be independently removable. Upper panel shall be non-removable when meter is in place. Meter socket shall be mounted on support and attached to upper panel. Lower panel shall be sealable and permanently labeled: “Do Not Break Seals. No Fuses Inside”.
9. Test-bypass block detail on RPM-12.
10. For 3ϕ, 4 wire, connect 7th jaw to body of neutral lug with No.12 min. copper wire, white in color.
11. For 3ϕ, 4 wire delta, identify right hand test-bypass block (2 poles) as power leg. Identification to be orange in color.
12. For 1ϕ, 3 wire, provide two test-bypass blocks mounted in the outer positions and a four jaw socket.
13. Decals on inside back of enclosure in ¾” minimum block letter labeling (see drawing).
14. Minimum width of access opening shall be 11-1/2”.

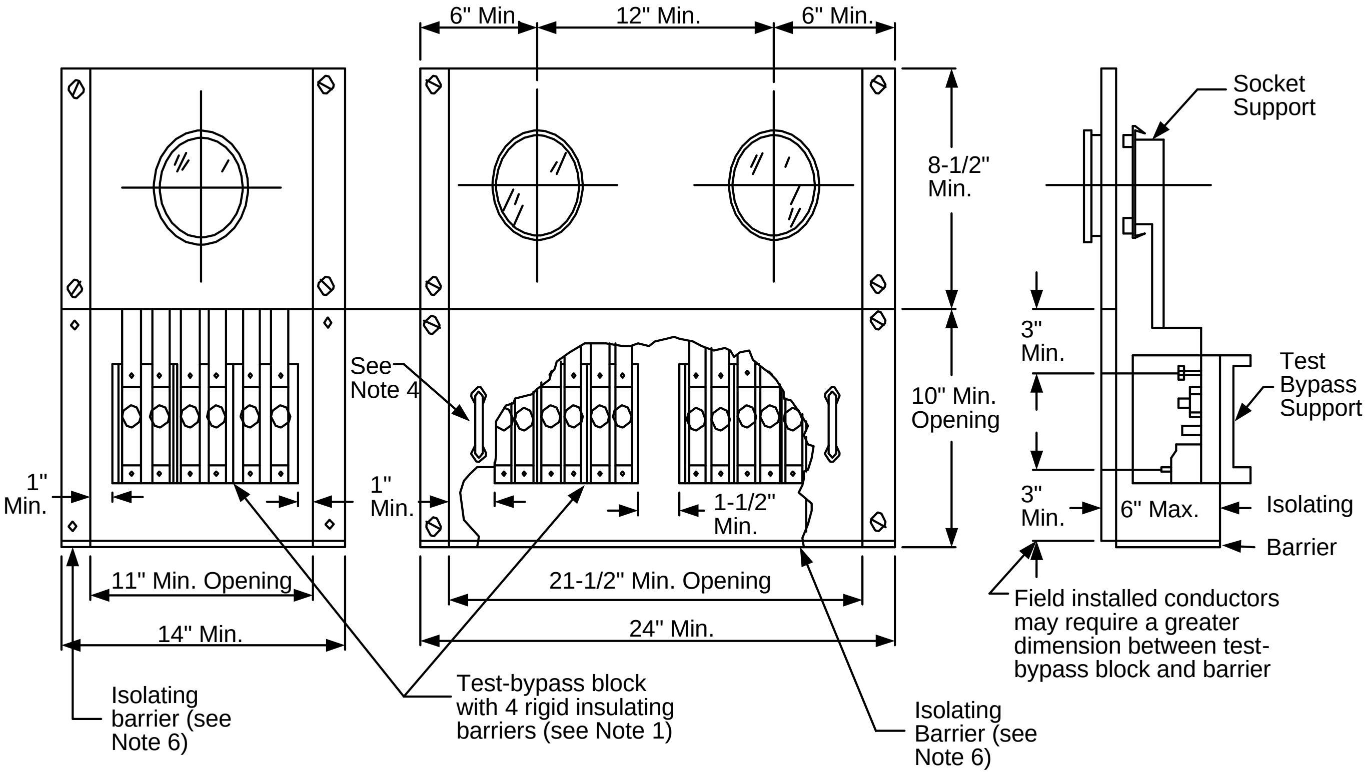


All Dimensions Shown are in Inches

NOTES:

1. This device may be used for commercial, multifamily residential (not separately metered) and other types of occupancies.
2. Aluminum bodied terminals for No. 1/0 through No. 250Kcmil wire.
3. Hubs capped off if used for underground feed.
4. Rigid insulating barriers.
5. Insulated bondable vertical lay-in, double neutral lug with No. 250 Kcmil wire capacity, mounted on either sidewall.
6. Test-bypass blocks shall be bussed or wired to socket jaws or terminals.
7. Upper test connector studs.

8. All section panels shall be independently removable. Upper panel shall not be non-removable when meter is in place. Meter socket shall be mounted on support and attached to upper panel. Lower panel shall be sealable and permanently labeled: "DO NOT BREAK SEALS. NO FUSES INSIDE."
9. Test-bypass block detail on RPM-12.
10. For 3ϕ, 4 wire, connect 7th jaw to body of neutral lug with No.12 min. copper wire, white in color.
11. For 3ϕ, 4 wire delta, identify right hand test-bypass block (2 poles) as power leg. Identification to be orange in color.
12. For 1ϕ, 3 wire, provide two test-bypass blocks mounted in the outer positions and a four jaw socket.
13. Decals on inside back of enclosure in 3/4 inch minimum block letter labeling (see drawing).
14. Minimum width of access opening shall be 13-1/2".



All Dimensions Shown are in Inches

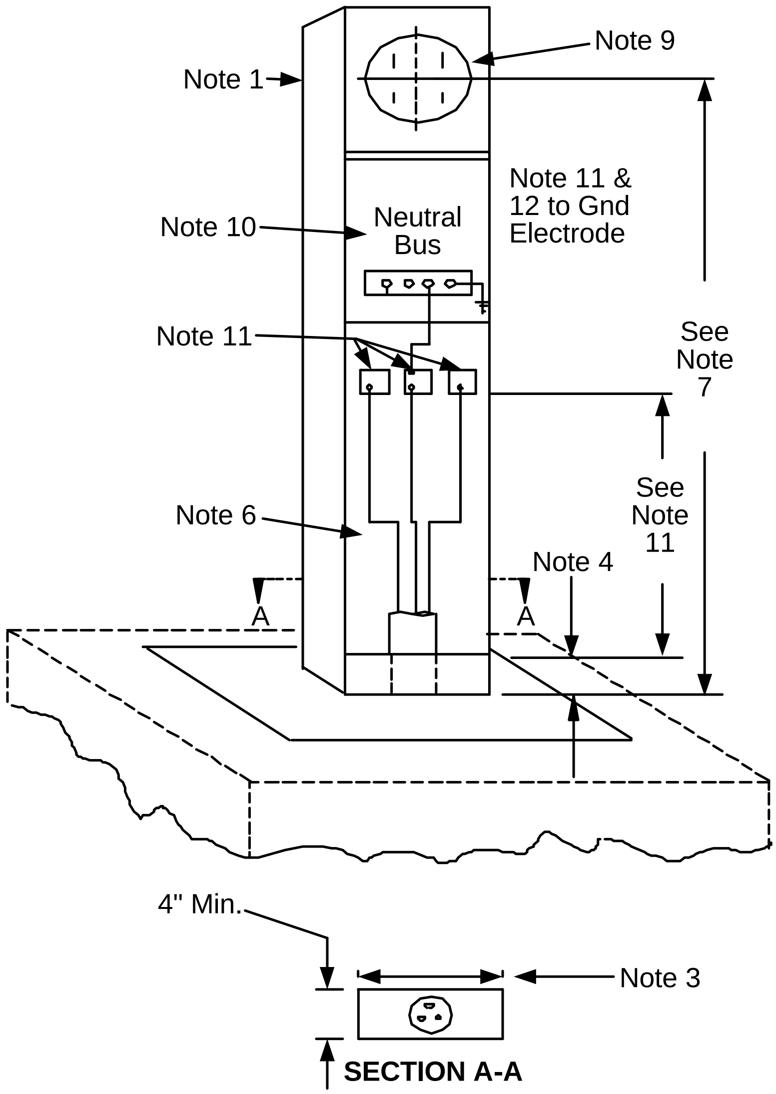
NOTES:

1. Test-bypass blocks with rigid insulating barriers shall be furnished, installed, and wired or bussed to the meter socket by the manufacturer. Connection sequence is line-load from left to right.
2. Metered conductors shall not pass through metering compartments except in enclosed wireways. To ensure proper identification of cables in factory cabled equipment, metered cables (except in the test-bypass area), shall be either physically barriered or bundled so as to separate them from unmetered cable or permanently marked and isolated from unmetered cables. Physical barriers will not be required if the unmetered conductors are bus.
3. Meter panels shall be removable with a maximum of two meters per panel. Panels shall be non-removable when the meter is in place. Meter socket is to be supported independent of and attached to the meter panel.
4. Test-bypass block cover panel shall be sealable and fitted with a lifting handle. All panels exceeding 16” in width shall require two lifting handles.
5. When a neutral is required for metering or testing, an insulated neutral terminal shall be provided behind each test-bypass cover panel. The terminal shall be readily accessible when the cover panel is removed and shall be individually connected to the neutral bus with a minimum size No. 8 AWG copper wire.
6. A factory-installed, full-width insulating barrier shall be located at the bottom of each test-bypass compartment. In addition, a full width and depth isolating barrier shall be located below the bottom test-bypass compartments and above the load terminals of the meter disconnect devices. If a factory-installed rear load wireway is provided, the isolating barrier shall extend back to that wireway. Ventilation openings, when provided, shall not exceed a maximum of 1-1/2” in depth and may extend to the width of

the meter disconnect devices. The slot may not be located in the front 6” of the test-bypass compartment insulating barrier.

7. For 3ϕ, 4 wire, connect 7th jaw of meter socket to body of neutral lug with a white No. 12 AWG copper wire.
8. For 3ϕ, 4 wire Delta, identify right hand test-bypass block (2 poles) as power leg. Identification to be orange in color.
9. For 1ϕ, 3 wire, omit center test-bypass block.
10. Separate line and load conductors shall be installed by the contractor or manufacturer for each meter socket.
11. Each line and load position shall be clearly identified by ¾” minimum block letter labeling (see drawing).
12. All securing screws shall be captive. All panels shall be sealable.

200 Amps, 240 Volts Maximum, Single or Double Meter Post



All Dimensions Shown are in Inches

NOTES:

General Construction:

1. The meter socket shall be sealable and have a minimum rating of 100 amperes.
2. Construction, material, and corrosive-resistant finish shall be approved by a EUSERC recognized test laboratory.
3. Minimum width of access opening shall be 7-1/2”.
4. A fixed panel shall extend 2” minimum to 6” maximum above grade.

5. Base shall be suitable for mounting on a concrete foundation with four (4) ½” diameter bolts per sheet RS-70.
6. Adequate ventilation shall be provided to inhibit the condensation of moisture within the enclosure.
7. The minimum meter height shall be 36” above the grade line when the meter is enclosed, or 48” when exposed.
8. The service cable pull and terminating section shall be accessible from either front or rear of the post by removing an 8” minimum width sealable panel (or panels). The removable panel (or panels) shall extend from the top of the fixed panel (See Note 3) and when removed, allow full access to the terminating lugs. The service cable pull and terminating section space shall be restricted to serving agency use.
9. If the meter is enclosed, the enclosing cover shall be hinged and self-supporting, equipped with a reading window and be removable for meter testing or inspection.
10. The service main disconnect and power outlet section shall have barriers installed to prevent access to the service cable pull and termination section and to unmetered conductors which connect to the socket.

Service Terminating Facilities:

11. Service termination lugs shall be twin No. 2 to 350 MCM aluminum bodied set screw type for use with 5/16” Allen wrench. The minimum height of lug is 18” above grade line; the maximum is 36”. A minimum 12” opening shall be maintained from the termination lugs to any fixed panel below the lugs. Space between termination lugs or between phase termination lugs and sides of pedestal shall be 1-1/2”. Insulation barriers are required when this space is reduced.

Grounding Facilities:

12. An accessible equipment grounding lug shall be provided.

Metering Facilities:

13. The meter socket base shall be fabricated with components tested by a EUSER- recognized test laboratory and shall be provided with a sealing ring. The meter socket shall be mounted on support and attached to meter panel. The socket shall be factory-wired with the conductors located in a separate or barriered raceway from the service terminating lugs to the meter socket. The conductors which extend to the meter socket shall be connected at the service terminating lugs independently of the connection for the service lateral conductors.

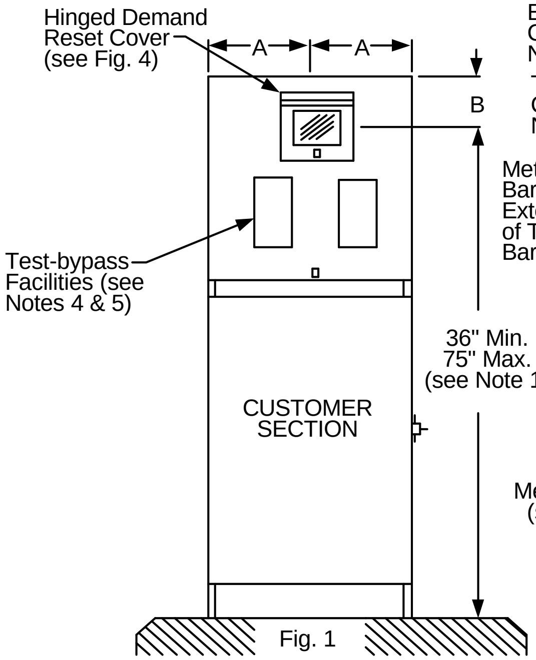


Fig. 1

FRONT VIEW

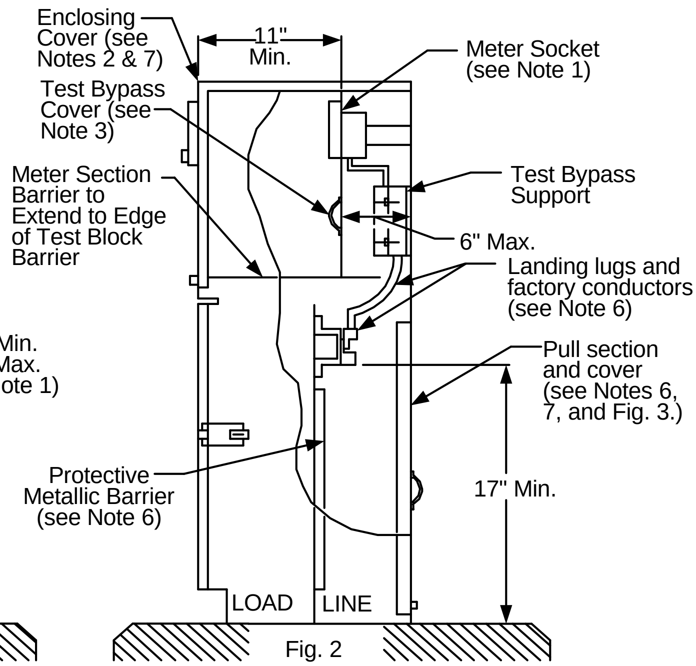


Fig. 2

SIDE VIEW

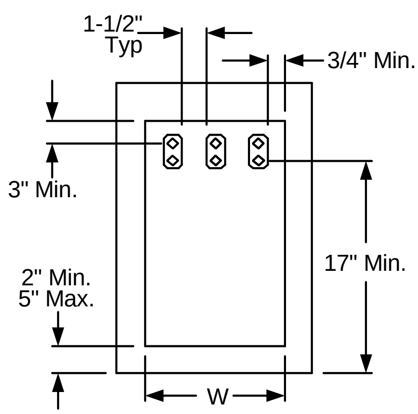


Fig. 3

WIREWAY PULL SECTION

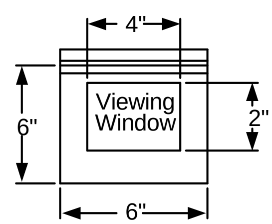


Fig. 4

HINGED DEMAND RESET COVER WITH POLYCARBONATE VIEWING WINDOW

SERVICE	W*	A**	B**
1 Phase	10-1/2"	10"	9"
3 Phase	12-1/2"		

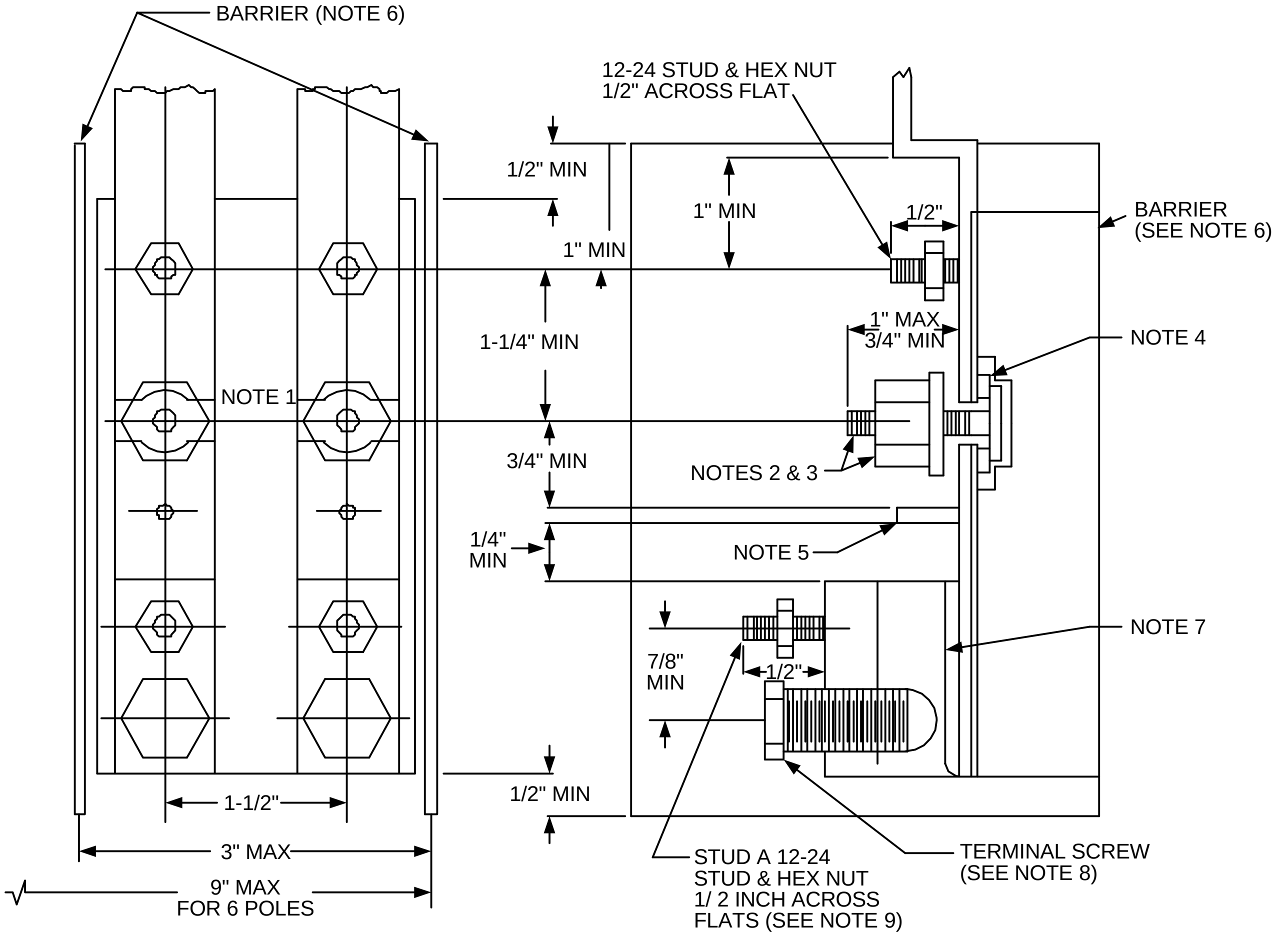
* See Note 6 ** See Note 2

All Dimensions Shown are in Inches

NOTES:

1. The meter socket shall be mounted on a support, attached to the meter panel, and provided with a sealing ring. Ringless sockets are not acceptable. Meter height is measured from the center of the meter-socket.
2. The meter shall be enclosed and the enclosing cover shall meet one of the following conditions:
   a) The cover shall have a fixed top and sides with access to the metering compartment provided through a hinged door. The hinged door shall be equipped with a device to hold the door in the open position at 90 degrees or more.
   b) The cover shall be hinged to allow the top and front to be rotated back, exposing the metering compartment. When the metering compartment side panels are attached to, and lift back with, the hinged cover, the "A" dimension does not apply. The "B" dimension does not apply. The cover shall not exceed a maximum weight of 25 pounds.

   Note: "A" and "B" dimensions are measured from the center of the meter socket to the access opening return flanges.
3. Test-bypass compartment covers shall be sealable and fitted with a lifting handle. Covers exceeding 16 inches in width shall require two lifting handles.
4. Test-bypass blocks with rigid barriers shall be furnished, installed and connected to the meter socket by the manufacturer. Connection sequences shall be LINE-LOAD from left to right and clearly identified by ¾" minimum block letter labeling. See RPM-11 and RPM-12 for test-bypass block details.
5. Test-bypass shall be installed with the following clearances:
   a) 3-inches of vertical clearances from the upper test connector stud to the upper compartment access opening and 3 inches from the center of the cable terminal screw to the lower compartment access opening.
   b) 1-1/2" of side clearance from the rigid insulating barriers to the compartment sides and 1" to the compartment access openings.
6. The terminating pull section shall:
   a) Comply with the minimum dimensions shown in Table 1 (The "W" dimension is measured between the access opening return flanges), accept a minimum 3" conduit, and the cover shall be equipped with a lifting handle.
   b) Be equipped with an aluminum-bodied, pressure-type lugs, with a range of No. 6 AWG through 250 Kcmil, for termination of the service conductors. Insulated cable or bus shall be installed between the termination lugs and the test-bypass facilities.
   c) Have a protective metallic barrier (16 gauge minimum) provided between the pull section and the customer distribution section. There shall be a ¼" minimum clearance between the customer section wall and the barrier to prevent screws and bolts from protruding into the pull section.
7. Utility compartment covers (i.e., meter cover, and pull section) shall be sealable and lockable with a padlock having a 5/16" lockshaft.
8. Internal equipment attached to the outer walls of the enclosure shall be secured in place with devices that may not be loosened from the outside. Screws or bolts requiring special tools for installation or removal are not acceptable.
9. For structural mounting and support of the pedestal consult the appropriate NVE district.

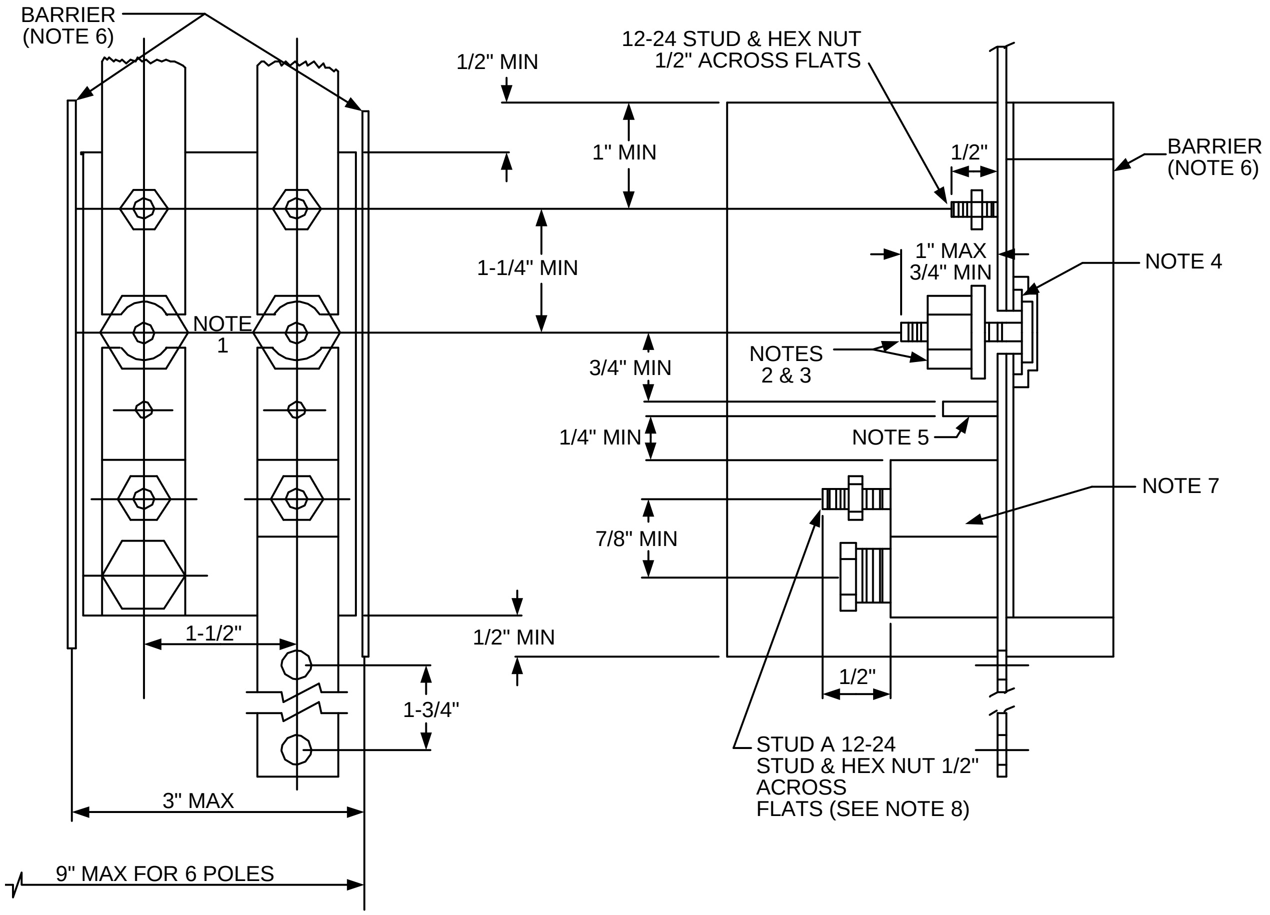


All Dimensions Shown are in Inches

NOTES:

1. Strike distance between upper and lower bus sections shall not be less than when shorting nut is backed off.
2. Circuit-closing nut shall be a hex nut 5/8” across flats with plated copper washer attached and have threads counter-bored at bottom to facilitate re-installation. Bolt head shall be secured in place to prevent turning and backout.
3. The circuit-closing nut and bolt assembly shall maintain the applied contact pressure between the plated copper washer and the bus members of the test-bypass block.
4. Insulating washer shall be made from dimensionally stable, non-tracking material and shall provide a minimum of 1/8” creep distance between the bolt and the bus sections. Bus sections shall be plated.
5. Wire stops shall extend to center of terminal opening or beyond.
6. Rigid insulating barriers shall project at least ¼” beyond any energized parts when the maximum wire size is installed.
7. Terminals shall be aluminum bodied. For required conductor range, see RPM-4 and RPM-5. The opening shall extend through the terminal body and, if wire hole is round, shall be chamfered as necessary to facilitate installation of the largest size wire.

8. The terminal screw may be of the Allen type (3/16” across flats for 100 amp, 5/16” across flats for 200 amp). If stud “A” is a part of the terminal screw, the terminal screw shall be 5/8” hex across flats.
9. Stud “A” shall be located in the clear area between the terminating lug and the circuit-closing nut, and may be positioned on the terminal body, on the terminal screw, on the bus member, or incorporated as part of the wire stop.

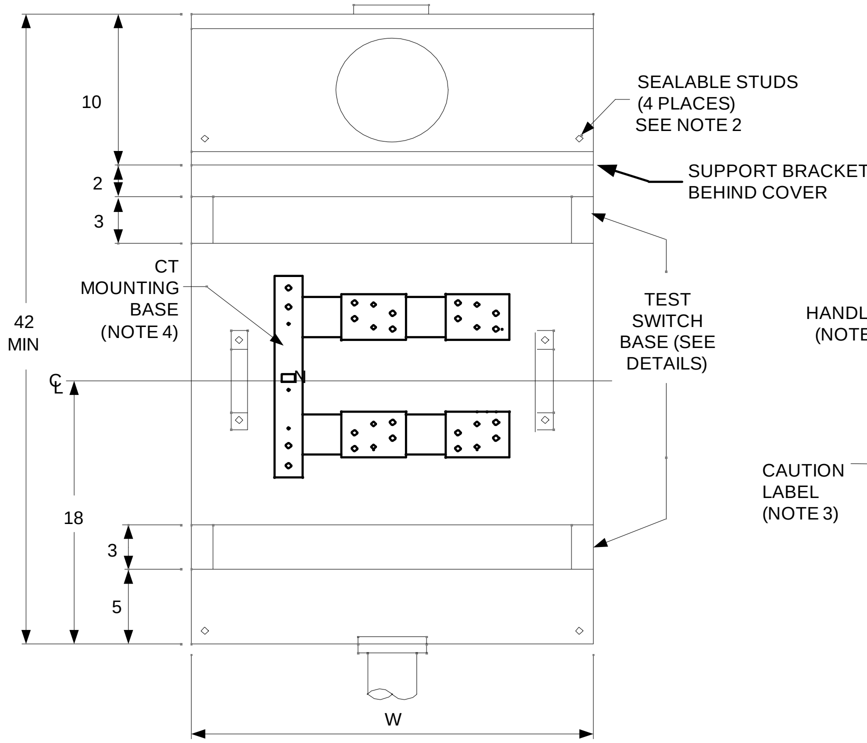


All Dimensions Shown are in Inches

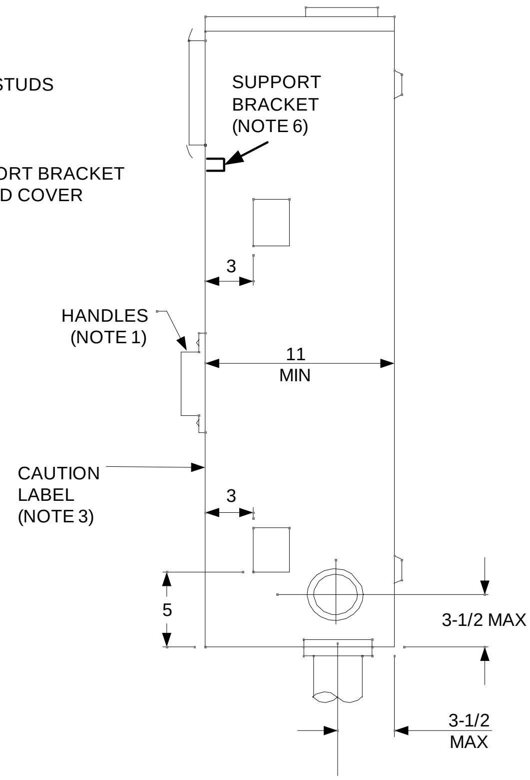
NOTES:

1. Strike distance between upper and lower bus sections shall not be less than ¼" when shorting nut is backed off.
2. Circuit-closing nut shall be a hex nut 5/8" across flats with plated copper washer attached and have threads counter-bored at bottom to facilitate re-installation. Bolt head shall be secured in place to prevent turning and backout.
3. The circuit-closing nut and bolt assembly shall maintain the applied contact pressure between the plated copper washer and the bus members of the test-bypass block.
4. Insulating washer shall be made from dimensionally stable, non-tracking material and shall provide a minimum of 1/8" creep distance between the bolt and the bus sections. Bus sections shall be plated.
5. Wire stops are not required if line and/or load is connected with bus bar. If cable terminals are used, RPM-11 construction requirements shall apply.
6. Rigid insulating barriers shall project at least ¼" beyond any energized parts when the maximum wire size is installed.
7. Termination of bus bar and cable line or load conductors may be cable as per RPM-11 or bus as per this drawing. If bus and cable terminations are used together, proper locations and alignment of stud "A" must be maintained to facilitate the installation of bypass jumper.

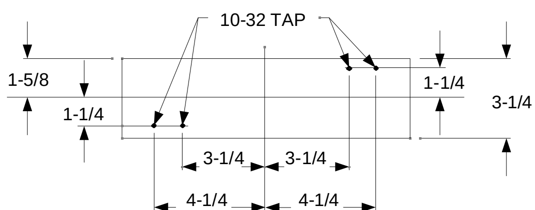
8. Stud “A” shall be located in the clear area between the terminating lug and the circuit-closing nut, and may be positioned on the terminal body, on the terminal screw, on the bus member, or incorporated as part of the wire stop.
9. Serviceability - The line and or load bus is to be connected to the bus block member in a manner which will allow ready replacement of the test-bypass block assembly.



FRONT VIEW



SIDE VIEW



REMOVABLE TEST SWITCH MOUNTING BASE DETAIL

MINIMUM BOX DIMENSIONS

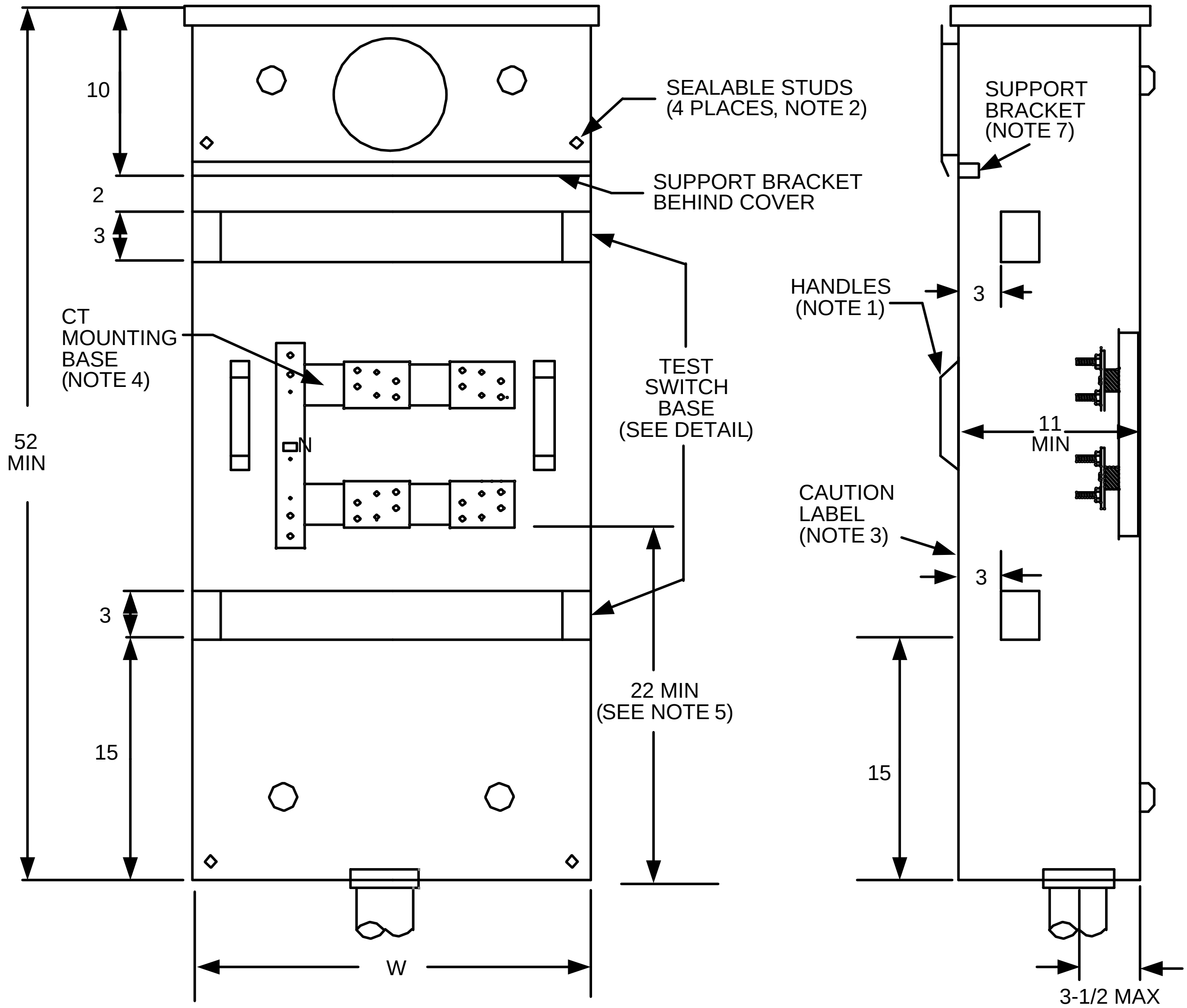
W (MIN)	
3Ø 4 WIRE Y OR Δ	1Ø 3 WIRE
36"	24"

All Dimensions Shown are in Inches

NOTES:

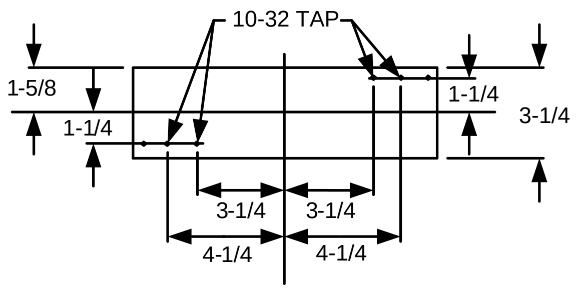
1. Effective July 1, 2009, all cabinet access covers shall be hinged and have two lifting handles.
2. All panels and covers shall be sealable and all securing screws shall be captive.
3. Current-transformer compartment cover shall have handle(s) and a caution label reading “Do Not Break Seals, No Fuses Inside”.
4. See drawings RPM-28A and RPM-29A for C.T. mounting base details.
5. 600 Amps Maximum is allowed for 1 phase, 3 wire services, while 800 Amps Maximum is allowed for 3 phase, 4 wire.
6. A panel support bracket shall be provided as shown for the meter and current transformer panels. The meter panel shall be attached to the bracket with securing screws to prevent the panel from pulling out when the meter is removed from the socket.

THIS PAGE INTENTIONALLY LEFT BLANK



FRONT VIEW

SIDE VIEW



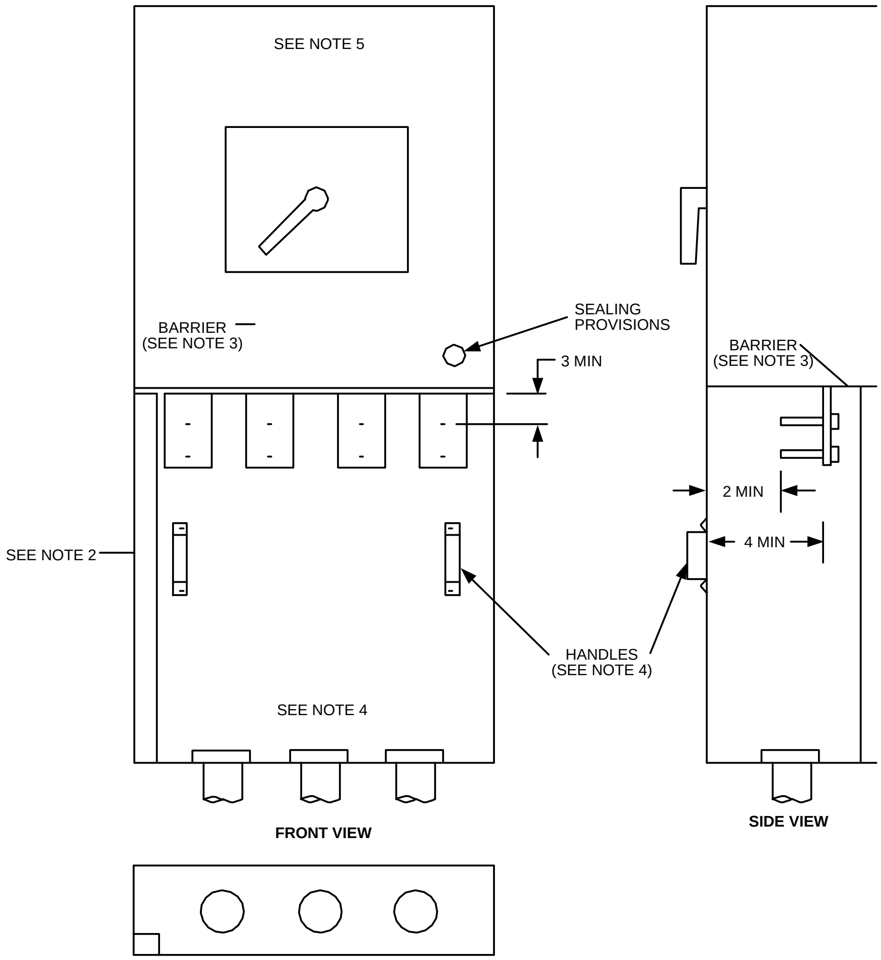
REMOVABLE TEST SWITCH MOUNTING BASE DETAIL

MINIMUM BOX DIMENSIONS

W (MIN)	
3Ø 4 WIRE Y OR Δ	1Ø 3 WIRE
36"	24"

NOTES:

1. Effective July 1, 2009, all cabinet access covers shall be hinged and have two lifting handles.
2. All panels and covers shall be sealable and securing screws shall be captive.
3. Current-transformer compartment cover shall have handle(s) and a caution label reading: “Do Not Break Seals, No Fuses Inside”
4. See drawings RPM-28A and RPM-29A for CT, mounting base details.
5. The height of the lowest neutral cable termination bolt may be reduced to 20” minimum.
6. 600 Amps maximum is allowed for 1phase, 3 wire services, while 800 Amps maximum is allowed for 3 phase, 4 wire.
7. A panel support bracket shall be provided as shown for the meter and current transformer panels. The meter shall be attached to the bracket with securing screws to prevent the panel from pulling out when the meter is removed from the socket.

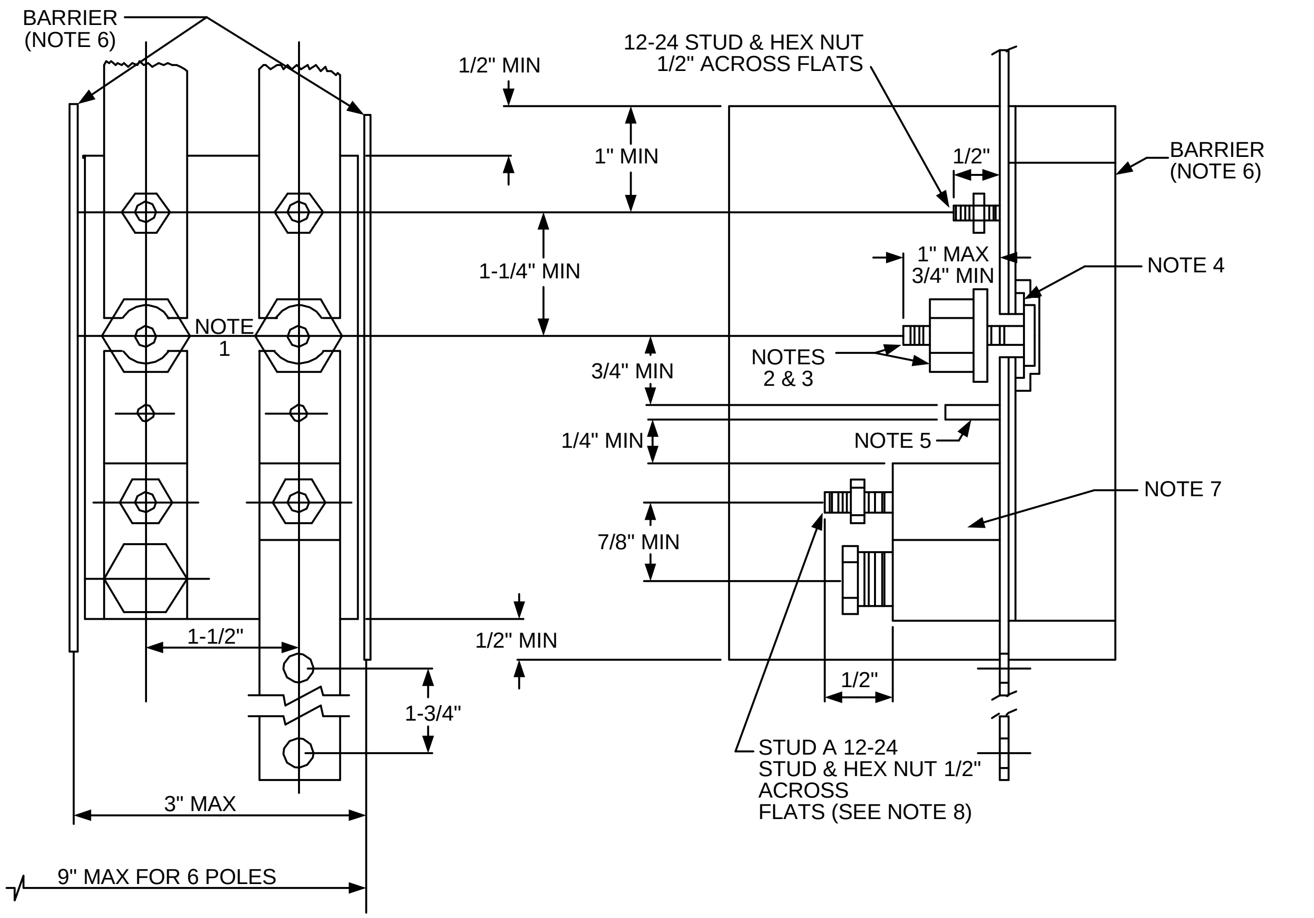


All Dimensions Shown are in Inches

NOTES:

1. A vertical clearance of 3” minimum shall be maintained between the centerline of the top bolts of the terminating facilities to any obstruction. See RPM-43 for terminating enclosure dimensions, and terminating facility clearances and construction details.
2. The grounding electrode conductor may be installed in a fully enclosed, factory installed wireway located in either back corner of the pullbox. The raceway shall not impede the serving utilities required working space or reduce any specified clearances.
3. A full width and depth, insulated, rigid barrier shall be provided to separate the termination and main disconnect compartments.
4. Terminating enclosure covers shall be:
   A. Independent of other equipment and removable without disturbing adjacent panels.
   B. Sealable, and provided with two lifting handles, and limited to a maximum of 9 square feet in area
5. The main disconnect cover shall be sealable.

6. Sealing provisions for removable covers shall consist of two drilled stud and wing nut assemblies located on opposite corners of the cover. Hinged covers shall be sealed on the unsupported side. All security screws shall be captive.



All Dimensions Shown are in Inches

NOTES:

1. Strike distance between upper and lower bus sections shall not be less than ¼” when shorting nut is backed off.
2. Circuit-closing nut shall be a hex nut 5/8” across flats with plated copper washer attached and have threads counter-bored at bottom to facilitate re-installation. Bolt head shall be secured in place to prevent turning and backout.
3. The circuit-closing nut and bolt assembly shall maintain the applied contact pressure between the plated copper washer and the bus members of the test-bypass block.
4. Insulating washer shall be made from dimensionally stable, non-tracking material and shall provide a minimum of 1/8” creep distance between the bolt and the bus sections. Bus sections shall be plated.
5. Wire stops are not required if line and/or load is connected with bus bar. If cable terminals are used, RPM-11 construction requirements shall apply.

6. Rigid insulating barriers shall project at least ¼” beyond any energized parts when the maximum wire size is installed.
7. Termination of bus bar and cable line or load conductors may be cable as per RPM-11 or bus as per this drawing. If bus and cable terminations are used together, proper locations and alignment of stud “A” must be maintained to facilitate the installation of bypass jumper.
8. Stud “A” shall be located in the clear area between the terminating lug and the circuit-closing nut, and may be positioned on the terminal body, on the terminal screw, on the bus member, or incorporated as part of the wire stop.
9. Serviceability - The line and or load bus is to be connected to the bus block member in a manner which will allow ready replacement of the test-bypass block assembly.

THIS PAGE INTENTIONALLY LEFT BLANK

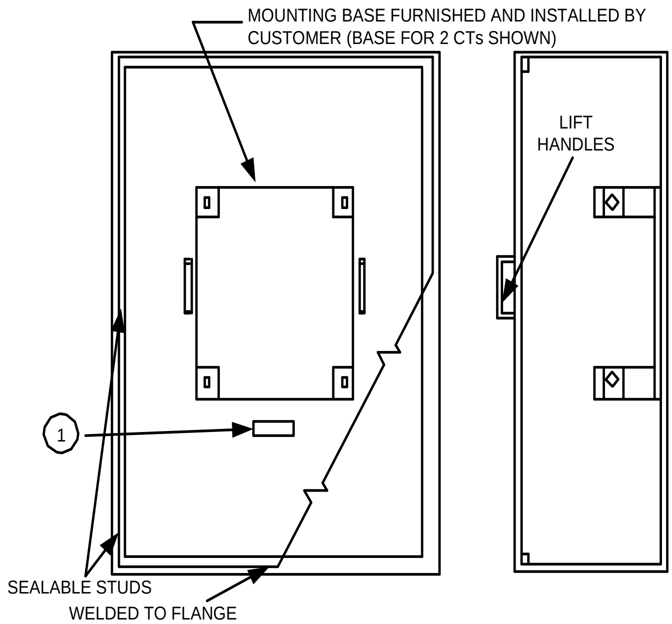


FIGURE 1.
CABINET SHOWING STUD MOUNTED COVER

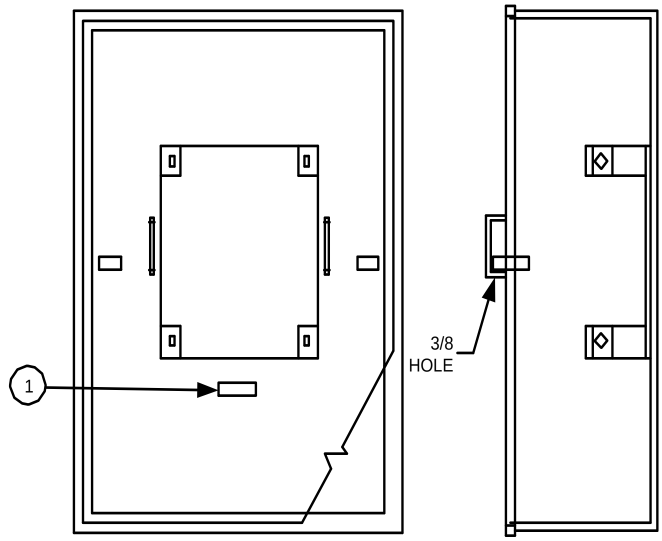


FIGURE 2.
CABINET SHOWING FLANGED COVER FASTENED BY SEALABLE RIVET LATCHES

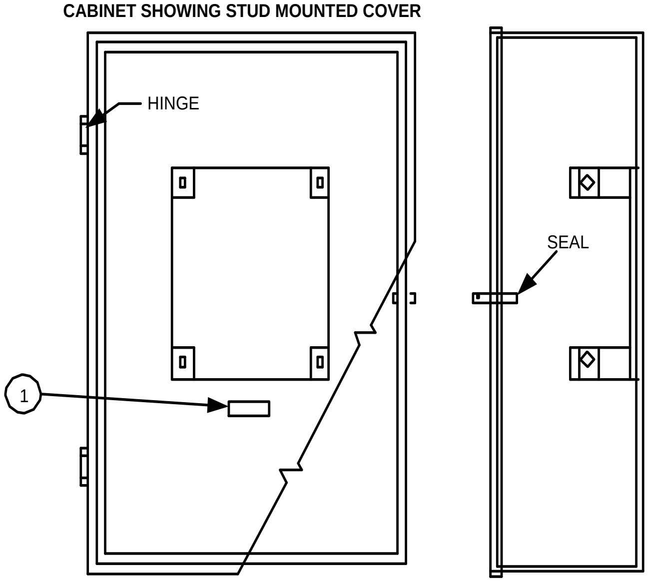


FIGURE 3.
HINGED, FLANGED COVER

TABLE 1

TYPE OF SERVICE	MIN CABINET SIZE	MOUNTING BASE
1Ø 3 WIRE	24"W x 48"H x 12"D	RPM-28A
3Ø 4 WIRE	36"W x 48"H x 12"D	RPM-29A

(1) CAUTION SIGN

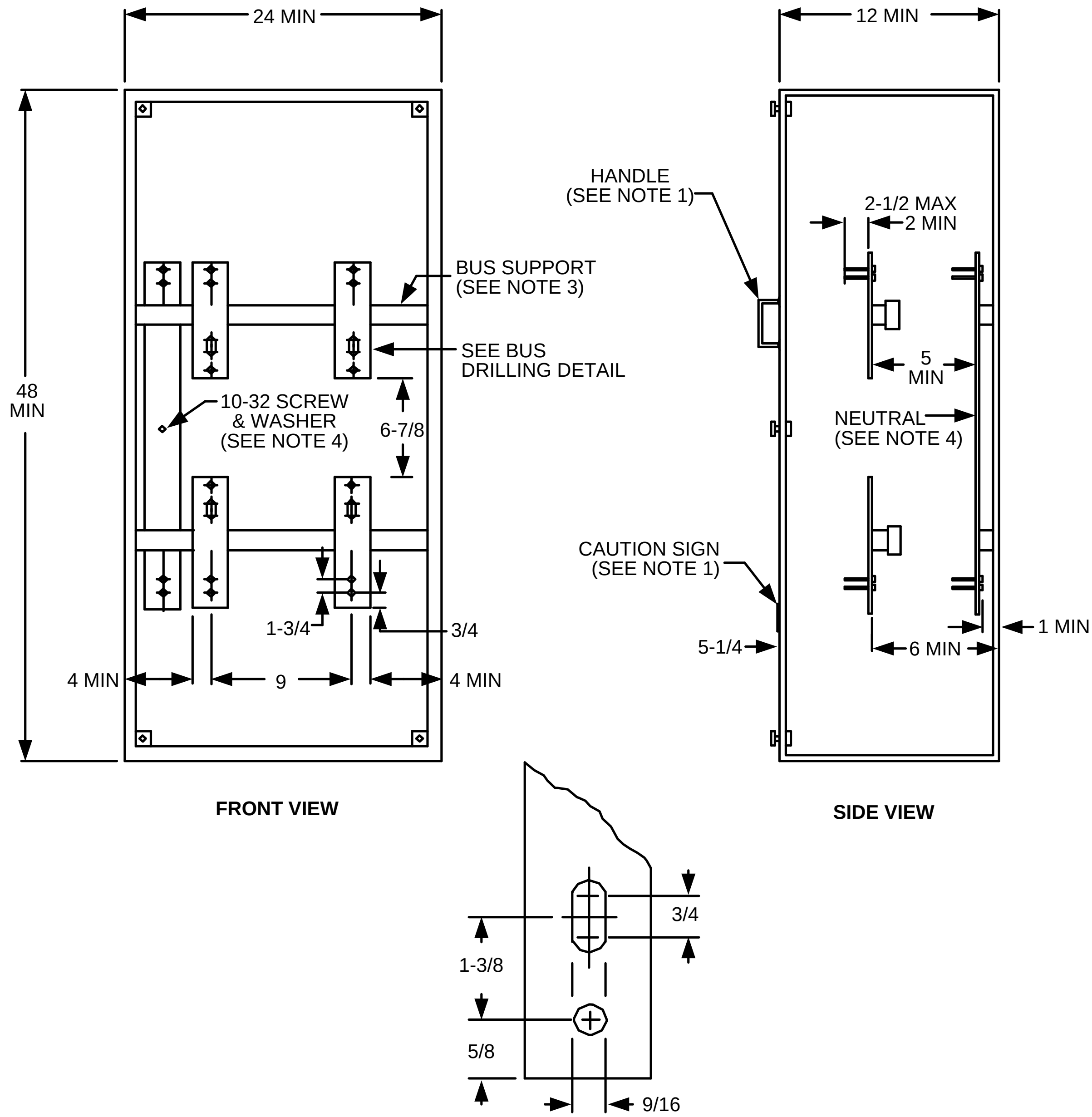
DO NOTE BREAK SEAL
NO FUSES INSIDE

All Dimensions Shown are in Inches

NOTES:

1. Effective July 1, 2009, covers shall be sealable and hinged.
2. Customer shall furnish lugs and connect cable to current-transformer mounting base.
3. Current-transformer cabinet shall not be used as a splicing chamber.
4. When exposed to weather, cabinet shall be weather tight.
5. Grounding lug for minimum No. 8 wire shall be provided internally, for use of utility.

THIS PAGE INTENTIONALLY LEFT BLANK



FRONT VIEW

SIDE VIEW

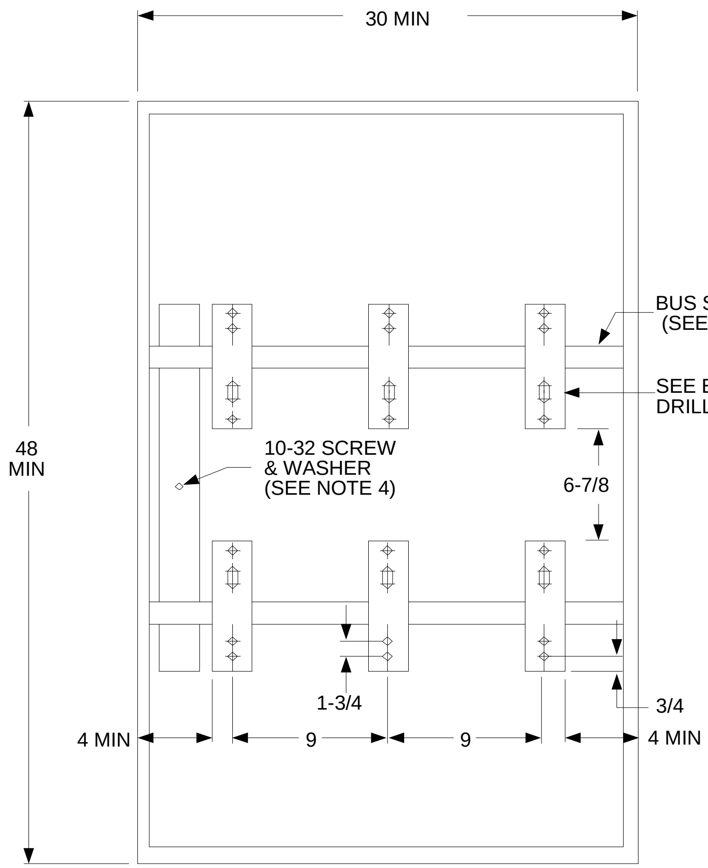
BUS DRILLING DETAIL

All Dimensions Shown are in Inches

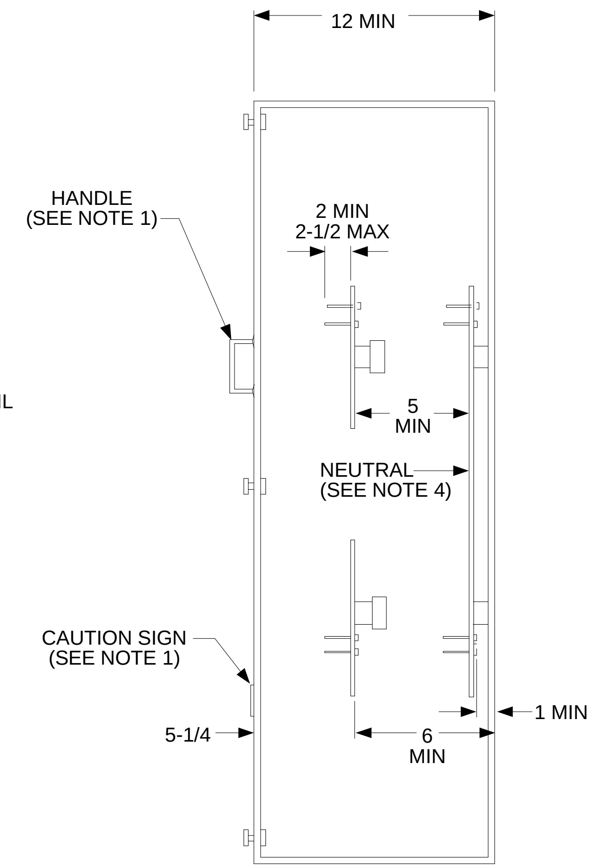
NOTES:

1. Effective July 1, 2009, all cabinet access covers shall be hinged (no removable covers).
2. The cover shall be sealable, equipped with two handles, and have a caution label reading “Do Not Break Seals – No Fuses Inside”. The covers shall be equipped with a device to hold the cover in the open position at 90 degrees or more.
3. Hinged covers shall be sealed on the unsupported side. All securing screws shall be captive.

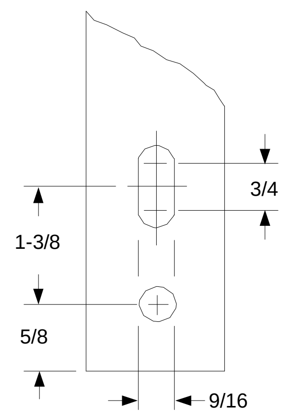
4. The bus support bar shall be rigid to prevent misalignment of the bus units with the cables in place. Bus units shall be anchored to prevent turning.
5. The neutral bus may be located at either side and shall be provided with a 10-32 screw and washer. As an alternate, an insulated, bondable double lug may be provided in place of the neutral bus.
6. Each cable terminating position shall consist of two ½” steel bolts extending from 2” minimum to 2-1/2” maximum from mounting surface and spaced on 1-3/4” vertical centers. Each bolt shall be furnished with a spring washer and a nut. The spring washer may be either a cone type (Belleville) or a split-ring washer and a flat washer. All parts shall be plated to prevent corrosion.
7. For meter enclosure details, see RPM-39.
8. [Obsolete specification after July 1, 2009, per Note 1] Removable covers shall be limited to a maximum size of 9 square feet in area. Sealing provisions for removable covers shall consist of two drilled out and wing nut assemblies located on opposite sides of the cover.



FRONT VIEW



SIDE VIEW



BUS DRILLING DETAIL

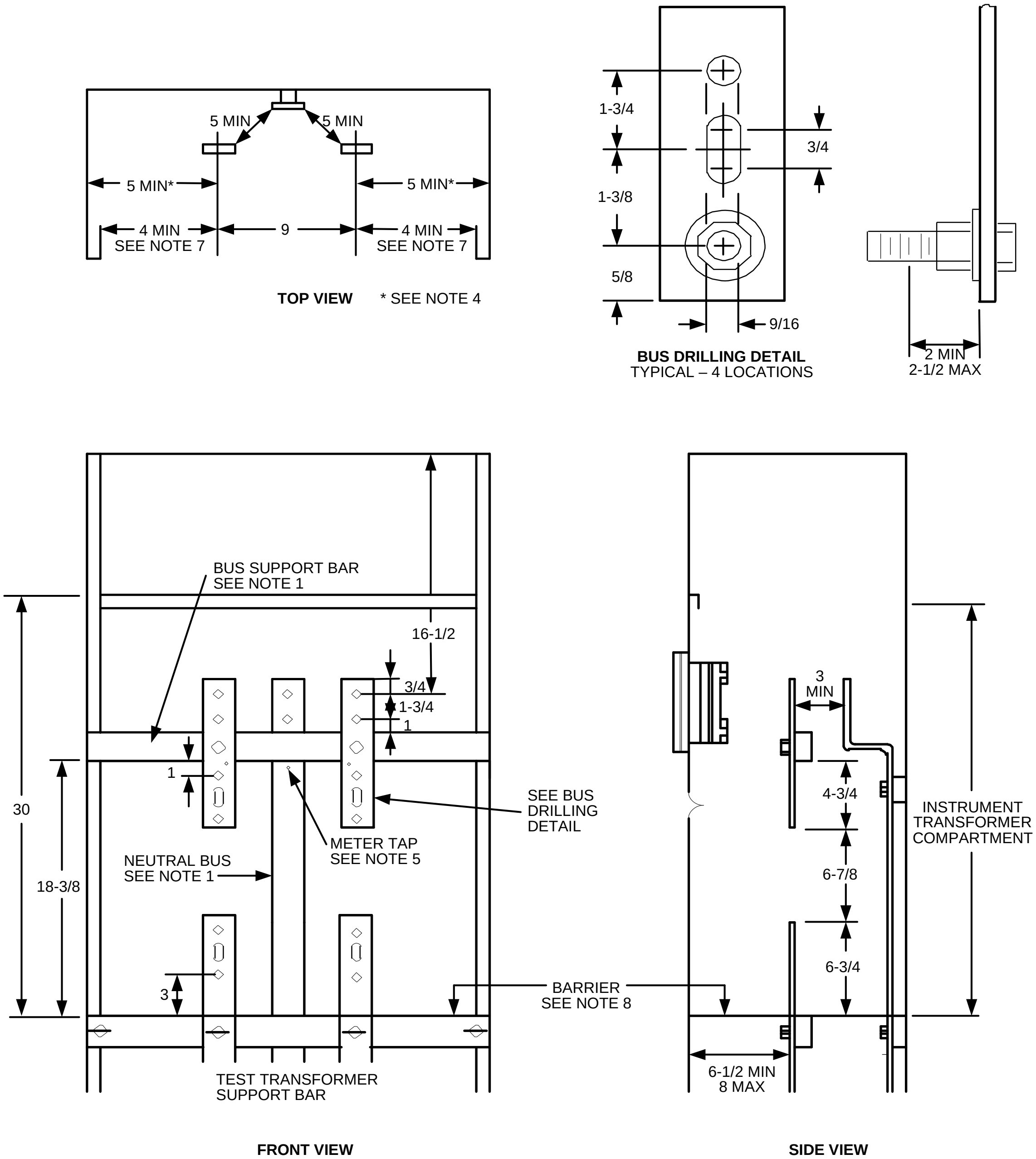
All Dimensions Shown are in Inches

NOTES:

1. Effective July 1, 2009, all cabinet access covers shall be hinged (no removable covers).
2. The cover shall be sealable, equipped with two handles, and have a caution label reading "Do Not Break Seals – No Fuses Inside". The covers shall also be equipped with a device to hold the cover in the open position at 90 degrees or more.
3. Hinged covers shall be sealed on the unsupported side. All securing screws shall be captive.

NVEnergy				Electric Service Requirements	RPM-18
Drawn:	Eng:	Appr:	Date:	**Current Transformer Cabinet: 3∅, 4 Wire, 800A Maximum**	Revision: 2
DH	ME	KL	2/23/09x		

4. The bus support bar shall be rigid to prevent misalignment of the bus units with the cables in place. Bus units shall be anchored to prevent turning.
5. The neutral bus may be located at either side and shall be provided with 10-32 screw and washer. As an alternate, an insulated, bondable double lug may be provided in place of the neutral bus.
6. Each cable terminating position shall consist of two ½" steel bolts extending from 2" minimum to 2-1/2" maximum from the mounting surface and spaced on 1-3/4" vertical centers. Each bolt shall be furnished with a spring washer and a nut. The spring washer may be either a cone type (Belleville) or a split-ring washer and a flat washer. All parts shall be plated to prevent corrosion.
7. For meter enclosure details, see RPM-39.
8. [Obsolete specification after July 1, 2009, per Note 1] Removable covers shall be limited to a maximum size of 9 square feet in area. Sealing provisions for removable covers shall consist of two drilled out and wing nut assemblies located on opposite sides of the cover.



All Dimensions Shown are in Inches

NVEnergy				Electric Service Requirements	RPM-19
				Instrument Transformer Compartment for Switchboards: 0-600 Amps, 1∅, 3 Wire	
Drawn:	Eng:	Appr:	Date:		Revision: 1
DH	DH	DA	1106		Page 1 of 2

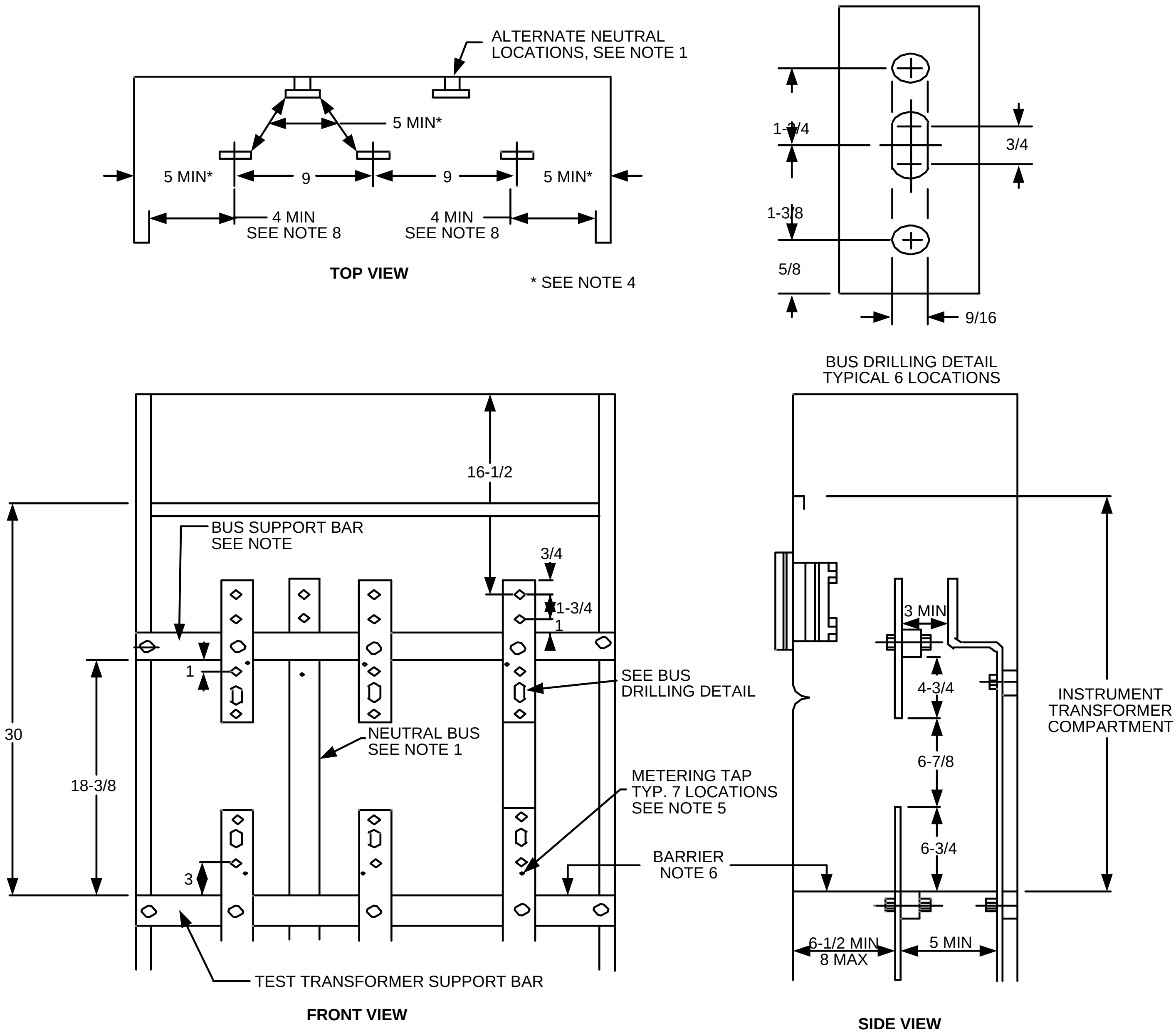
NOTES:

1. Bus arrangement and supports shall be provided as shown, except the neutral bus may be located at either side or on either side wall. Bus supports shall be constructed of a continuous bar of insulating material and shall be rigid to prevent misalignment of the bus units with the cables.
2. The bus units may be supplied from the top or bottom, and shall be anchored to prevent turning. Bus units shall be constructed of rectangular bus and when laminated shall have no space between laminations. Bus dimensions shall be provided as follows:

   Minimum: ¼" x 2"

   Maximum: ¾" x 2"

   Note: When supplied from the top, the upper bus unit width may be increased to 4".
3. When the compartment is supplied from horizontal cross-bussing, the bussing shall pass through the compartment or in the sealed area above the compartment. No other conductors shall pass through the compartment.
4. A clear unobstructed work space shall be provided around the current-transformer bus units from the barrier to the upper support bar.
5. Taps for attachment of meter wiring shall be provided on the neutral bus unit shown, or when the compartment is supplied from the cross-bussing a tap may be provided on the neutral cross-bus, or on a bus bar extension provided from the neutral cross-bus. A 10-32 screw and washer shall be provided for the neutral bus. Tap locations shall be centered between phase bus units, or at either side, and shall be readily accessible under energized conditions and with the current-transformers in place.
6. The barrier shall be constructed of a rigid insulating material resistant to ARC tracking, and shall be secured in place with a maximum deflection of ½" from an applied force of 25 pounds downward. Openings in the barrier (i.e., peripheral gaps around barrier, cutouts around bus bars, and hole diameters provided for ventilation) shall not exceed 3/8". The barrier shall be attached with nonconductive fasteners.
7. Dimension measured to inside edge of the compartment access opening.



All Dimensions Shown are in Inches

NV Energy				Electric Service Requirements	RPM-20
				Instrument Transformer Compartment for Switchboards: 0-1000 Amps, 3∅, 4 Wire	
Drawn:	Eng:	Appr:	Date:		Revision: 1
DH	DH	DA	1106		Page 1 of 2

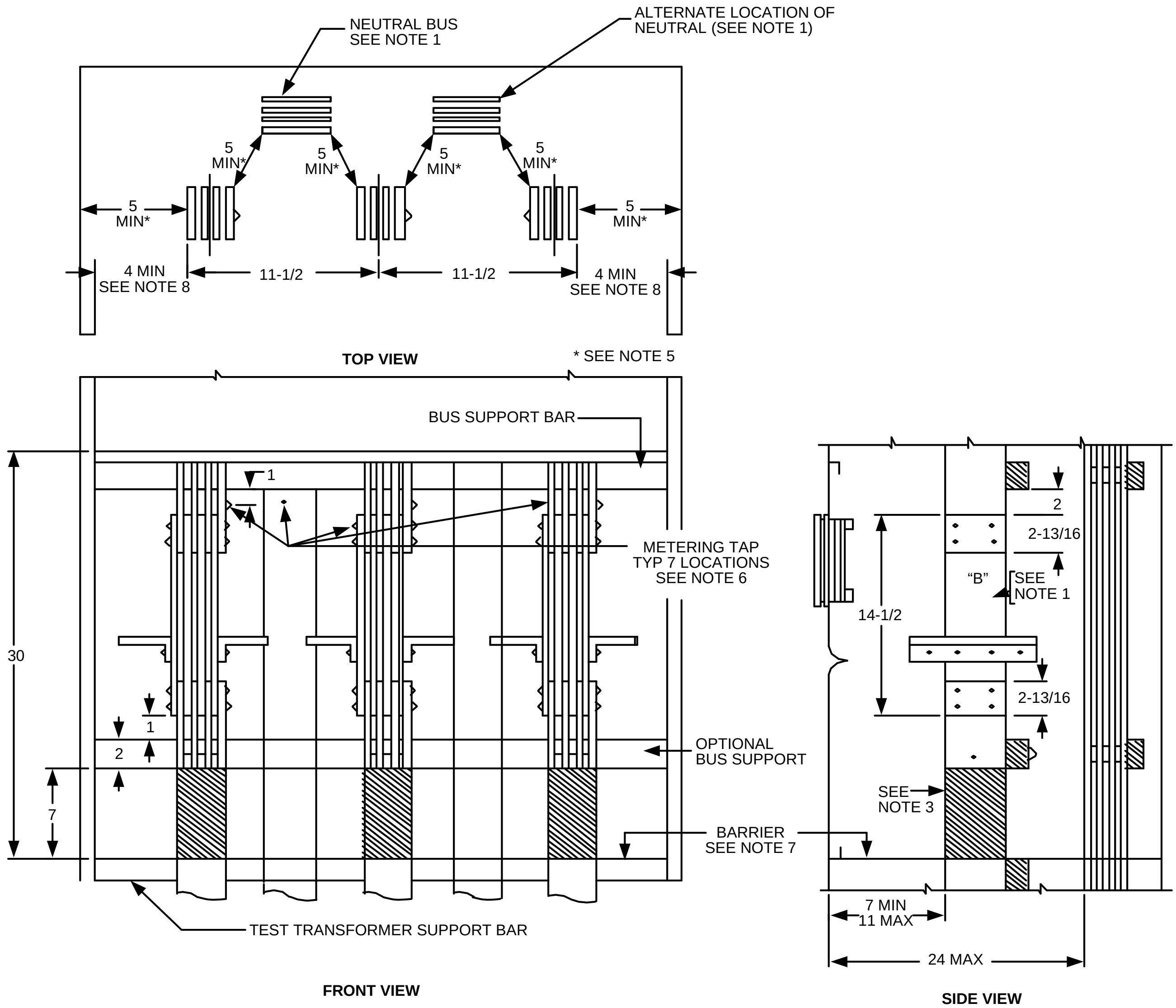
NOTES:

1. Bus arrangements and supports shall be provided as shown, except the neutral bus may be located at either side or on either side wall. Bus supports shall be constructed of a continuous bar of insulating material and shall be rigid to prevent misalignment of the bus units with the cables in place.
2. The bus units may be supplied from the top or bottom and shall be anchored to prevent turning. Bus units shall be constructed of rectangular bus and when laminated shall have no space between laminations. Bus dimensions shall be provided as follows:

   Minimum: ¼” x 2”

   Maximum: ¾” x 2”

   Note: When supplied from the top, the upper bus unit width may be increased to 4”.
3. When the compartment is supplied from horizontal cross-bussing, the bussing shall pass through the compartment or in the sealed area above the compartment. No other conductors shall pass through the compartment.
4. A clear unobstructed work space shall be provided around the current-transformer bus units from the barrier to the upper support bar.
5. Taps for attachment of meter wiring shall be provided as follows:
   A. One tap on each upper and lower phase bus unit with a 10-32 screw and washer provided for each phase bus in either the upper or lower position.
   B. One tap on the neutral bus unit shown, or when the compartment is supplied from cross-bussing a tap may be provided on the neutral cross-bus, or on a bus bar extension provided from the neutral cross-bus. A 10-32 screw and washer shall be provided for the neutral bus. Tap locations shall be centered between phase bus units, or at either side, and shall be readily accessible under energized conditions and with current-transformers in place.
6. The barrier shall be constructed of a rigid insulating material resistant to ARC tracking, and shall be secured in place with a maximum deflection of ½” from an applied force of 25 pounds downward. Openings in the barrier (i.e., peripheral gaps around barrier, cutouts around bus bars, and hole diameters provided for ventilation) shall not exceed 3/8”. The barrier shall be attached with nonconductive fasteners.
7. The power leg bus for a 4-wire delta service shall be identified by an orange outer finish, or by tagging or other effective means.
8. Dimensions measured to the inside edge of the compartment access opening.
9. For busses wider than 2”, voltage taps on the top and bottom are necessary.

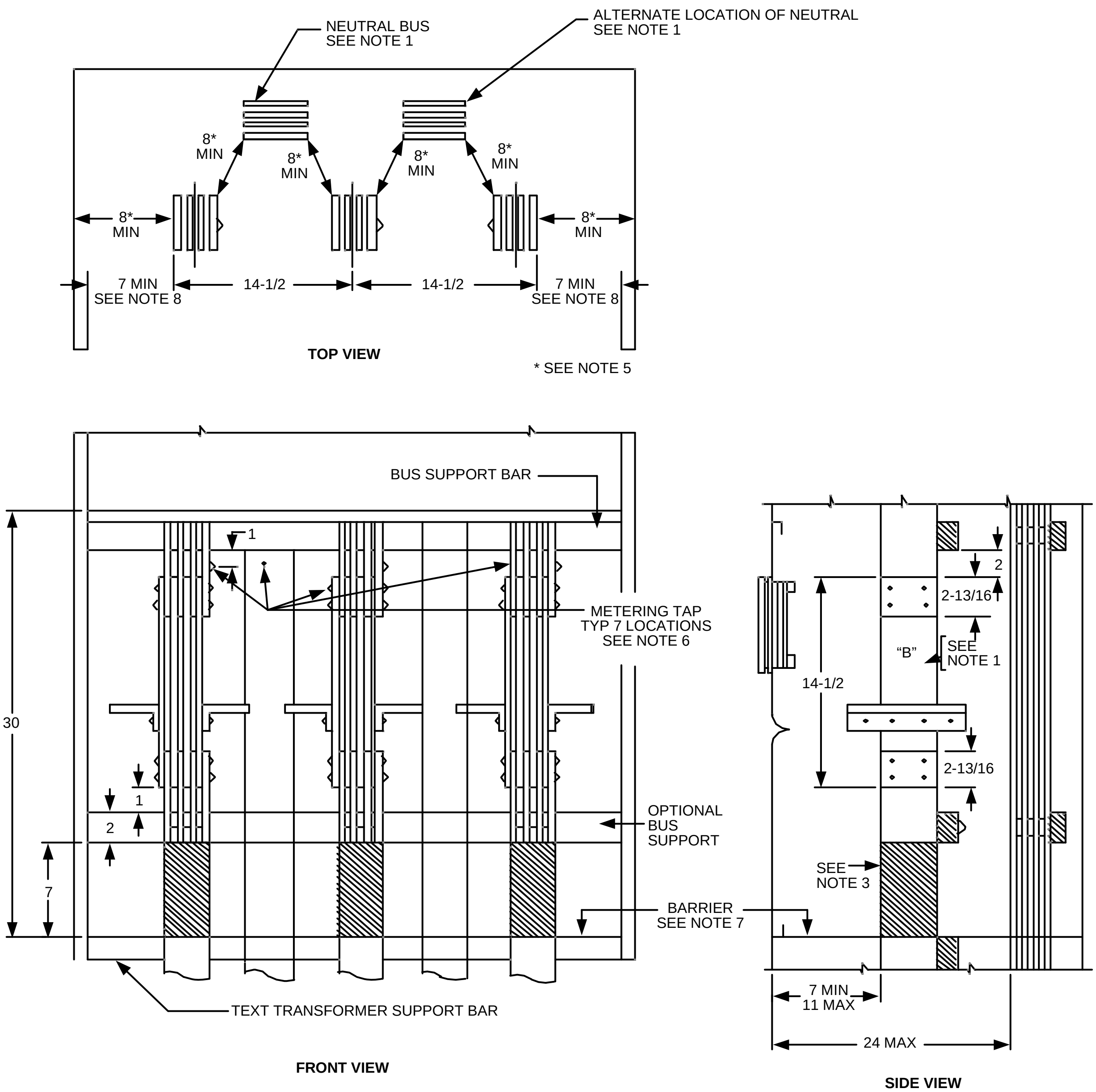


All Dimensions are in Inches

NOTES:

1. Bus arrangements and supports shall be provided as shown, except the neutral may be located at either side or on either side wall. Bus units shall be anchored so that busses will remain in position when section "B" is removed. For details of section "B" and the insulated current-transformer support, see RPM-30. Bus supports shall be constructed of a continuous bar of insulating material.
2. The bus units may be supplied from the top or bottom, and shall be constructed of rectangular bus. Maximum allowable bus size shall be four ¼"x4" bars spaced ¼".
3. Bus units shall be insulated as shown and the insulating material shall be rated for the serving voltage. Round bus corners as necessary to prevent damage to insulation.

4. When the compartment is supplied from horizontal cross-bussing, the bussing shall pass through the compartment or in the sealed area above the compartment. No other conductors shall pass through the compartment.
5. A clear unobstructed work space shall be provided around the current-transformer bus unit units from the barrier to 2" above the removable current-transformer bus sections ("B").
6. A 10-32 tap for attachment of meter wiring shall be provided as follows:
   A. One tap on each upper and lower phase bus unit with a 10-32 screw and washer provided for each phase bus in either the upper or lower position.
   B. One tap on the neutral bus unit shown, or when the compartment is supplied from cross-bussing a tap may be provided on the neutral cross-bus, or on a bus bar extension provided from the neutral cross-bus. A 10-32 screw and washer shall be provided for the neutral bus. Tap locations shall be centered between phase bus units, or at either side, and shall be readily accessible under energized conditions and with the current-transformers in place.
7. Barrier shall be constructed of a rigid insulating material resistant to ARC tracking and shall be secured in place with a maximum deflection of ½" from an applied force of 25 pounds downward. Openings in the barrier (i.e., peripheral gaps around barrier, cutouts around bus bars, and hole diameters provided for ventilation) shall not exceed 3/8".
8. Dimension measured to inside edge of the compartment access opening.

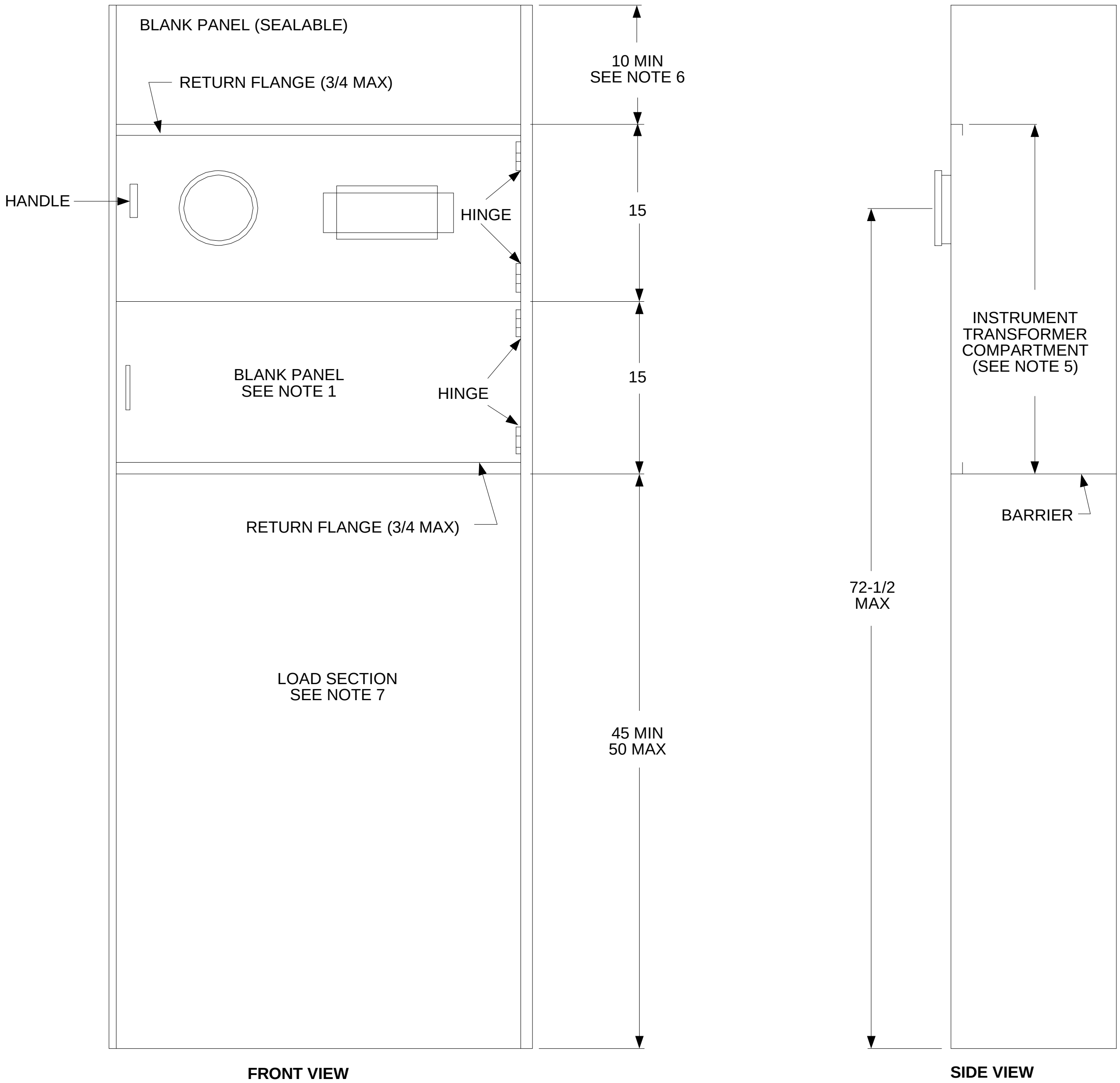


All Dimensions Shown are in Inches

NOTES:

1. Bus arrangements and supports shall be provided as shown, except the neutral bus may be located at either side or on either side wall. Bus units shall be anchored so that busses will remain in position when section "B" is removed. For details of section "B" and the insulated current-transformer support, see RPM-30 for 4" bus and RPM-31 for 5" bus. Bus supports shall be constructed of a continuous bar of insulating material.
2. The bus units may be supplied from the top or bottom, and shall be constructed of rectangular bus. Maximum allowable bus size shall be four ¼"x4" (or 5") bars spaced ¼".

3. Bus units shall be insulated as shown and the insulating material shall be rated for the serving voltage. Round bus corners as necessary to prevent damage to insulation.
4. When the compartment is supplied from horizontal cross-bussing, the bussing shall pass through the compartment or in the sealed area above the compartment. No other conductors shall pass through the compartment.
5. A clear unobstructed work space shall be provided around the current-transformer bus units from the barrier to 2” above the removable current-transformer bus sections (“B”).
6. A 10-32 tap for attachment of meter wiring shall be provided as follows:
   - A. One tap on each upper and lower phase bus unit with a 10-32 screw and washer provided for each phase in either the upper or lower position.
   - B. One tap on the neutral bus unit shown, or when the compartment is supplied from cross-bussing a tap may be provided on the neutral cross-bus, or on a bus bar extension provided from the neutral cross-bus. A 10-32 screw and washer shall be provided for the neutral bus. Tap locations shall be centered between phase bus units, or at either side, and shall be readily accessible under energized conditions and with the current-transformers in place.
7. The barrier shall be constructed of a rigid insulating material resistant to ARC tracking and shall be secured in place with a maximum deflection of ½” from an applied force of 25 pounds downward. Openings in the barrier (i.e., peripheral gaps around barrier, cutouts around bus bars, and hole diameters provided for ventilation) shall not exceed 3/8”. The barrier shall be attached with nonconductive fasteners.
8. Dimension measured to inside edge of the compartment access opening.

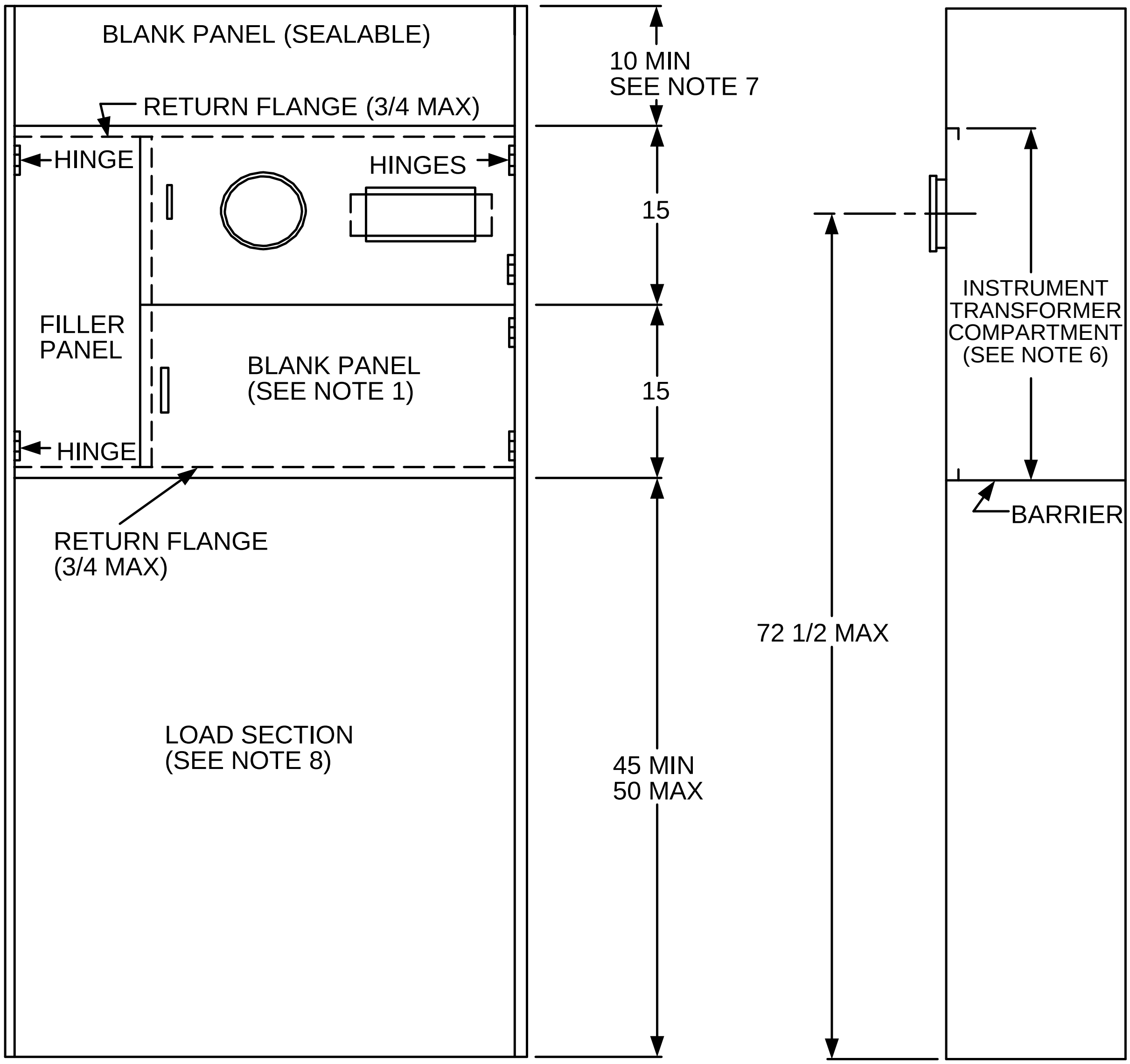


All Dimensions Shown are in Inches

NOTES:

1. Socket meter panel with blank meter panel shown. Consult Meter Department regarding alternate meter panel arrangements. Blank meter panel shall be constructed of 12 gauge (minimum) steel. See RPM-32 and RPM-33 for socket meter panel details.
2. Meter panels shall be equipped with stops to prevent inward swinging beyond the front surface of the service section.
3. Hinges shall be readily interchangeable, left or right, on the job site.

4. Removable or hinged panels enclosing unmetered bus or cable shall be sealable. All securing screws shall be captive.
5. For requirements regarding instrument – transformer compartments, see:
   0-1000 Amps see RPM-19 and RPM-20.
   1001 – 3000 Amps see RPM-22
   3001 Amps and above see RPM-24
6. Dimension may be reduced if the service section is supplied from horizontal cross-bussing or bus duct.
7. When used as a utility terminating section in a bottom-fed service section, see; RPM-27, figure 3.
8. For outdoor applications, see RPM-54 for weatherproof enclosure requirements.



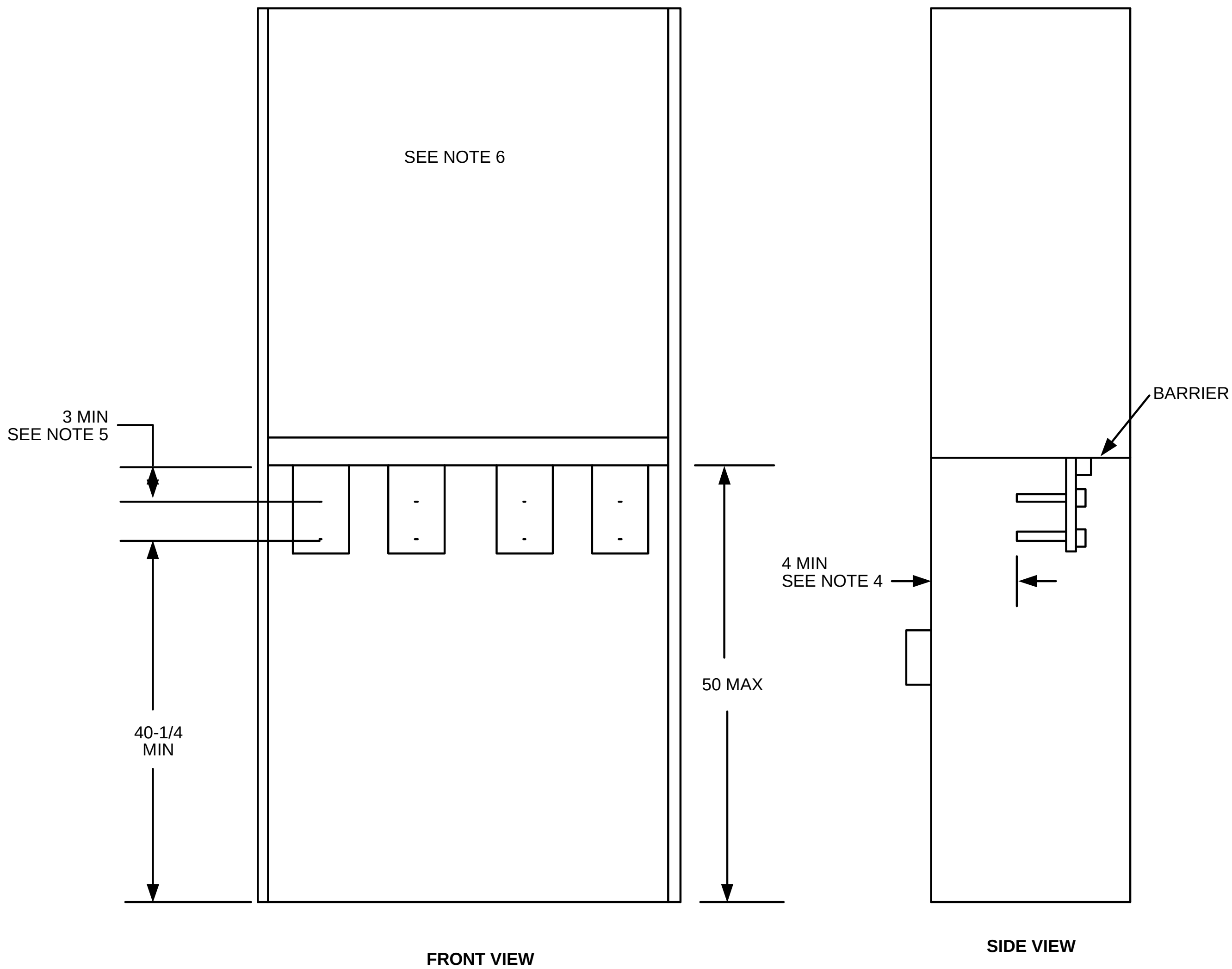
FRONT VIEW **SIDE VIEW**

All Dimensions Shown are in Inches

NOTES:

1. Socket meter panel with blank meter panel shown. Consult Meter Department regarding alternate meter panel arrangements. Blank meter panel shall be constructed of 12 gauge (minimum) steel. See RPM-32 and RPM-33 for socket meter panel details.
2. Filler panels shall be used where the service section width exceeds the meter panel width. Meter panels, either socket or blank, shall not be hinged to hinged filler panels. Non-hinged filler panels shall not extend into the required instrument-transformer compartment access opening.
3. Meter panels and filler panels shall be equipped with stops to prevent inward swinging beyond the front surface of the service section.

4. Hinges shall be readily interchangeable, left or right, on the job site.
5. Removable or hinged panels enclosing unmetered bus or cable shall be sealable. All securing screws shall be captive.
6. For requirements regarding instrument-transformer compartments, see
   0-1000 Amps See RPM-19 and RPM-20
   1001-3000 Amps See RPM-22
   3001 Amps and above See RPM-24
7. Dimension may be reduced if the service section is supplied from horizontal cross bussing or bus duct.
8. When used as a utility terminating section in a bottom-fed service section, see RPM-27, Figure 3.
9. For outdoor applications, see RPM-54 for weatherproof enclosure requirements.

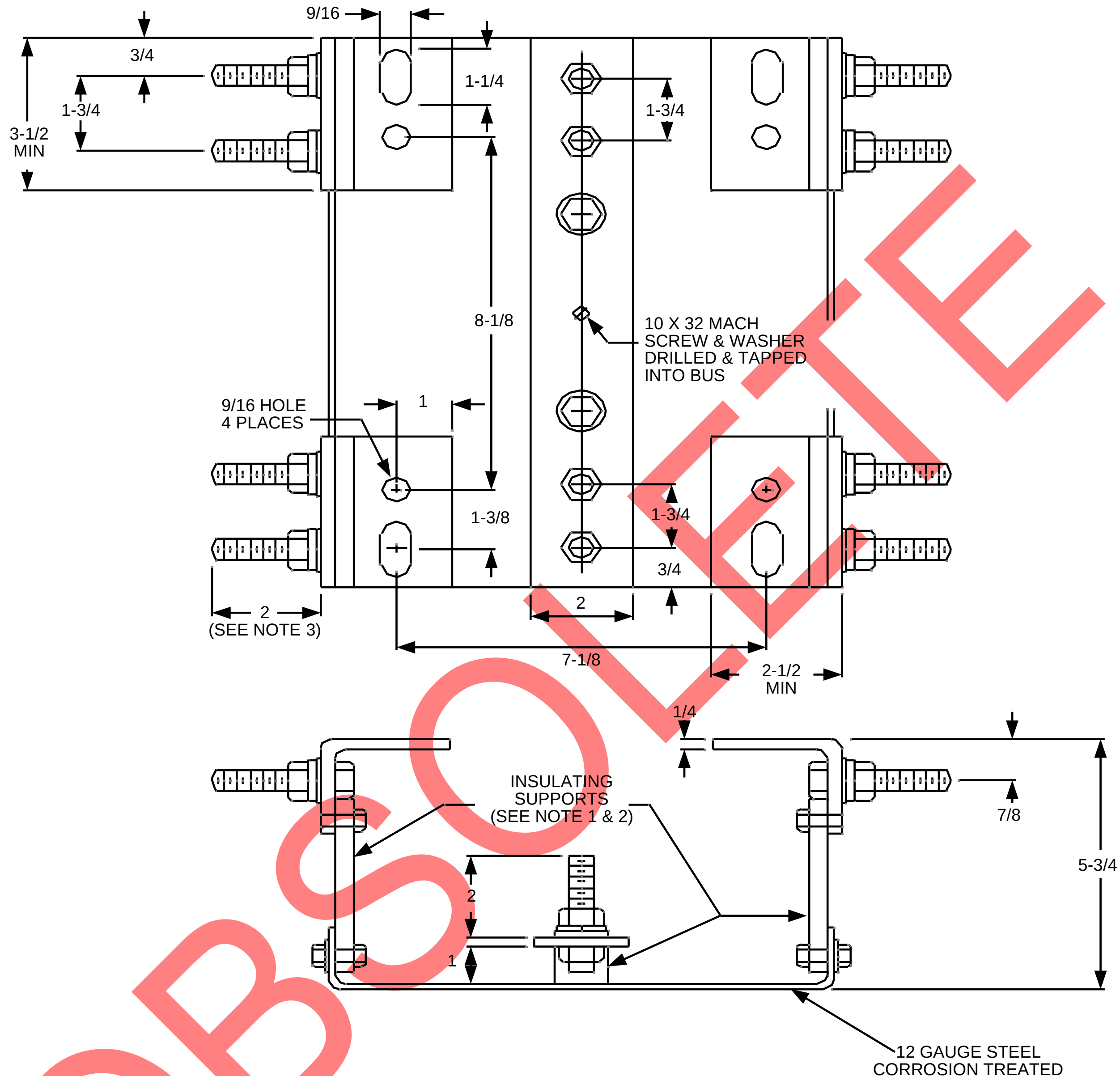


All Dimensions Shown are in Inches

NOTES:

1. The termination section may supply either a current transformer compartment or a main service disconnect device.
2. Pull section cover shall be:
   A. Independent of other equipment and removable without disturbing adjacent panels.
   B. Sealable, provided with two lifting handles, and limited to a maximum of 9 square feet in area.
3. The pull section shall be equipped with terminating facilities complying withRPM-47. Terminating facilities shall be secured to prevent misalignment and shall be rigid without the installation of current transformers.
4. The clearance from the energized bus to the pull section removable access covers may be reduced if safety barrier is provided by the manufacturer. For additional clearance and barrier requirements, see RPM-45

5. A vertical clearance of 3” minimum shall be maintained between the centerline of the top bolts of the terminating facilities to any obstruction.
6. When the upper section is:
   A. An instrument transformer compartment, see RPM-25 and RPM-26 for additional service section requirements.
   B. A main service disconnect device:
      i. A full width and depth, insulated, rigid barrier shall be provided to separate the pull section and main service disconnect compartment.
      ii. The main service disconnect cover shall be sealable.
7. Sealing provisions for removable covers shall consist of two drilled stud and wing-nut assemblies located on opposite sides of the cover. Hinged covers shall be sealed on the unsupported side.

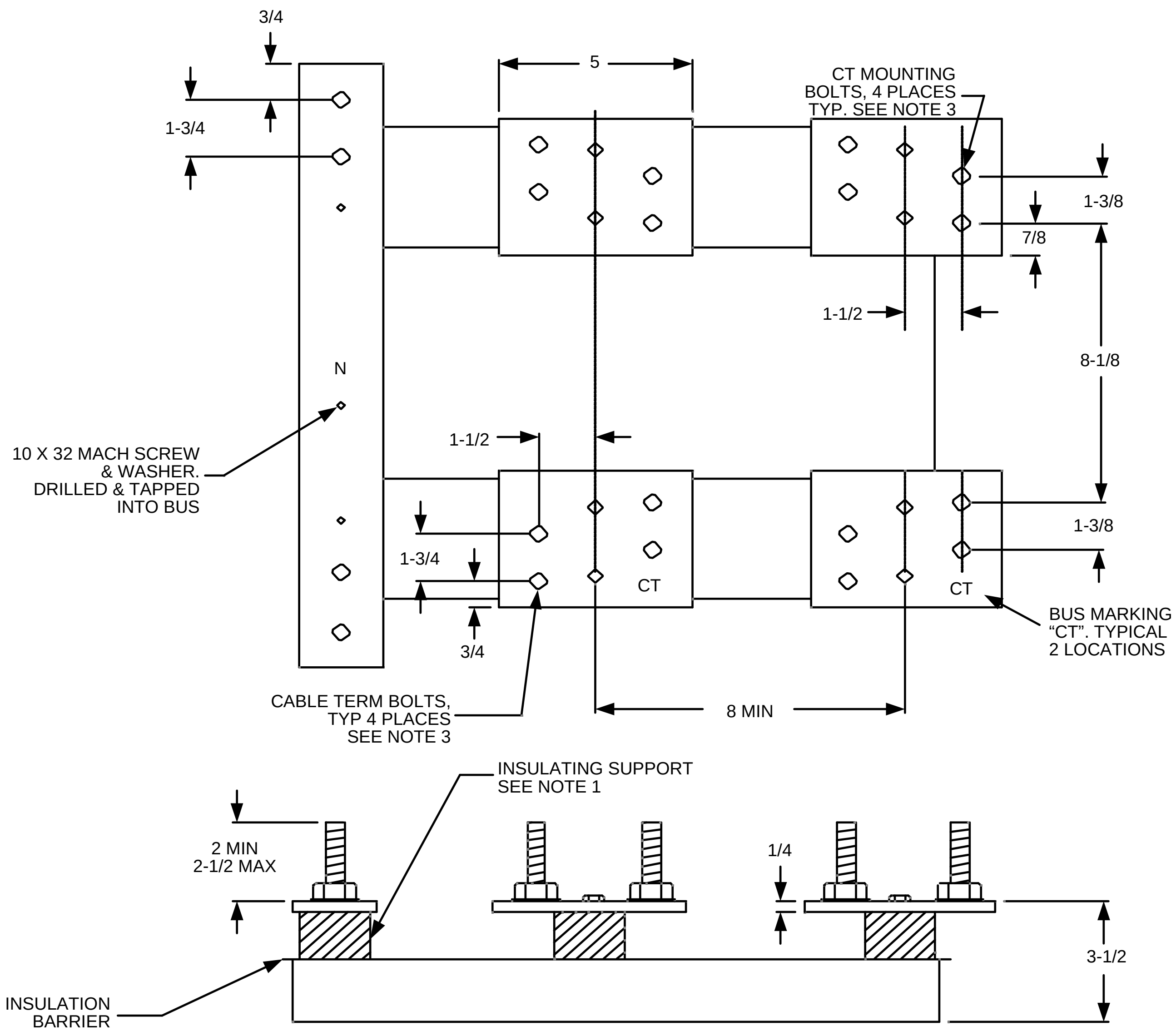


All Dimensions Shown are in Inches

NOTES:

1. Insulated supports shall be rated for the serving voltage and have sufficient mechanical strength for the application.
2. An insulated, bondable bus shall be provided for terminating a neutral conductor.
3. Two ½" steel bolts shall be provided for each cable terminating position and each bolt shall be furnished with a spring washer and a nut. The spring washer may be either a cone-type (Belleville) or a split ring washer and a flat washer. Bolts shall be secured in place and spaced as shown. All parts shall be plated to prevent corrosion.
4. For applications, see RPM-13, RPM-14, and RPM-16.

THIS PAGE INTENTIONALLY LEFT BLANK

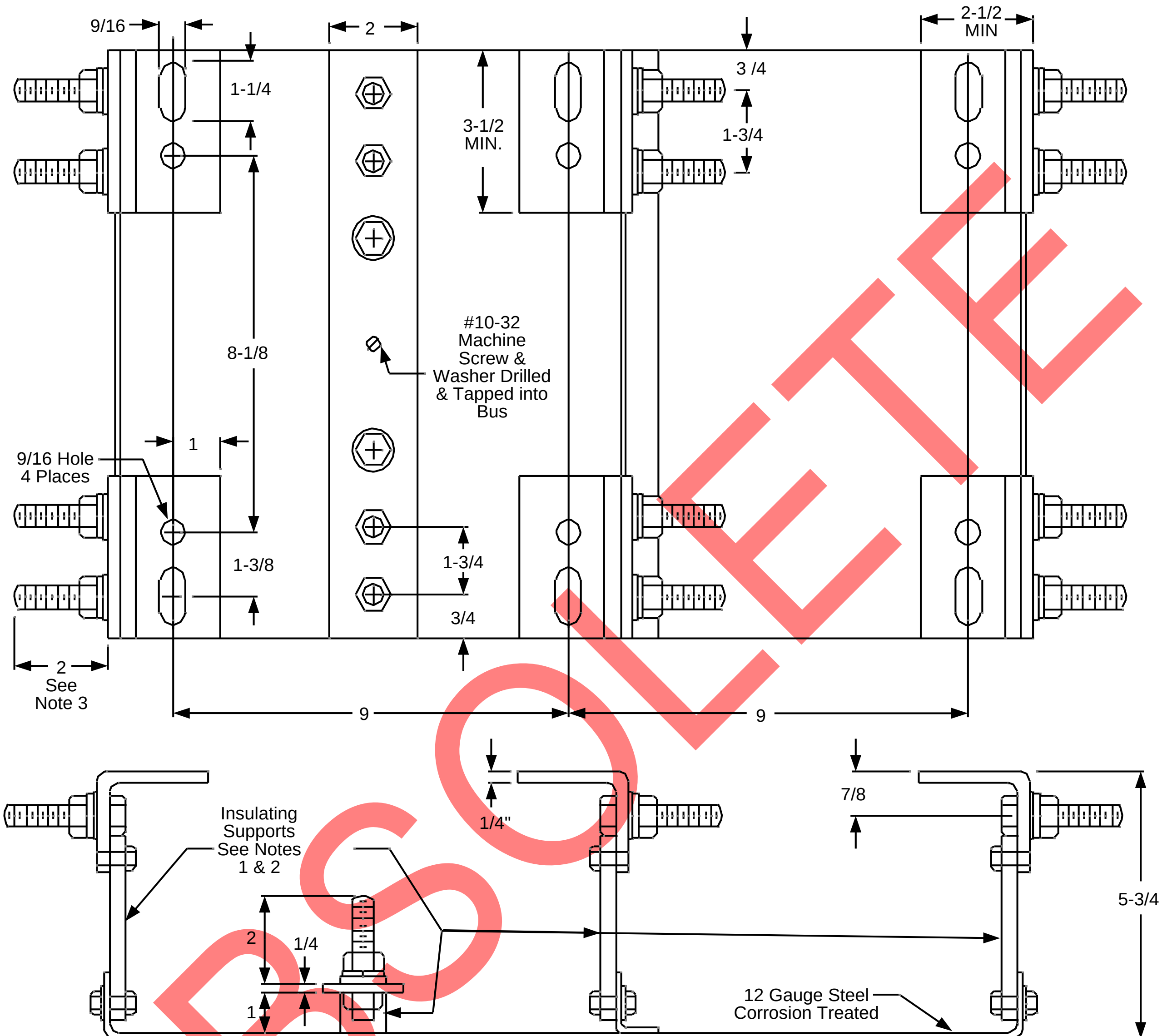


All Dimensions Shown are in Inches

NOTES:

1. Insulated supports shall be rated for the serving voltage and have sufficient mechanical strength for the application.
2. An insulated, bondable bus shall be provided for terminating a neutral conductor.
3. Two ½" steel bolts shall be provided for each cable terminating position and each bolt shall be furnished with a spring washer and a nut. The spring washer may be either a cone-type (Belleville) or a split ring washer and a flat washer. Bolts shall be secured in place and spaced as shown. All parts shall be plated to prevent corrosion.
4. For applications, see RPM-13, RPM-14, and RPM-16.

THIS PAGE INTENTIONALLY LEFT BLANK

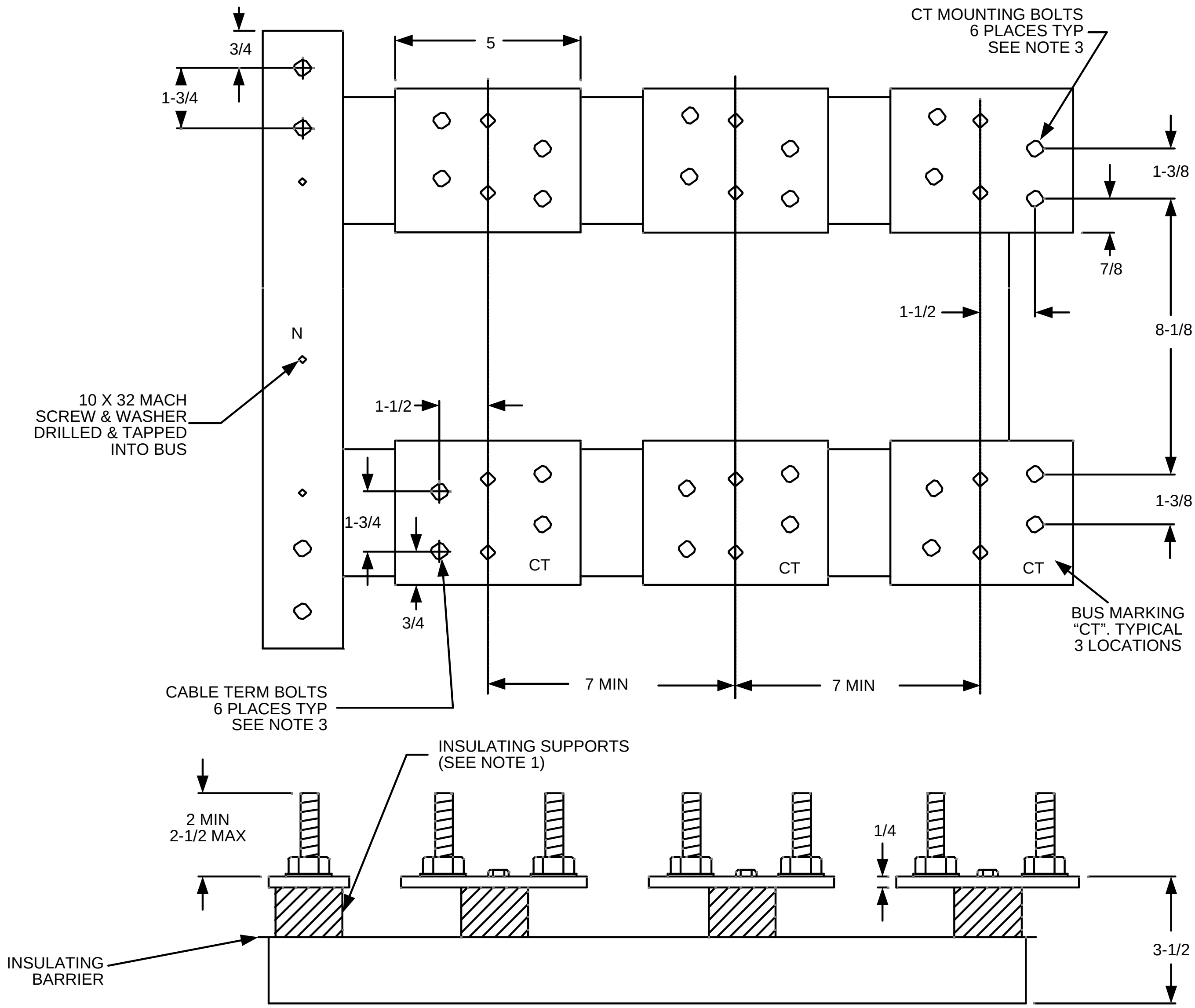


All Dimensions Shown are in Inches

NOTES:

1. Insulated supports shall be rated for the serving voltage and have sufficient mechanical strength for the application.
2. An insulated, bondable bus shall be provided for terminating a neutral conductor.
3. Two ½" steel bolts shall be provided for each cable terminating position and each bolt shall be furnished with a spring washer and a nut. The spring washer may be either cone-type (Belleville) or a split-ring washer and a flat washer. Bolts shall be secured in place and spaced as shown. All parts shall be plated to prevent corrosion.
4. For applications, see RPM-13, RPM-14, and RPM-16.

THIS PAGE INTENTIONALLY LEFT BLANK

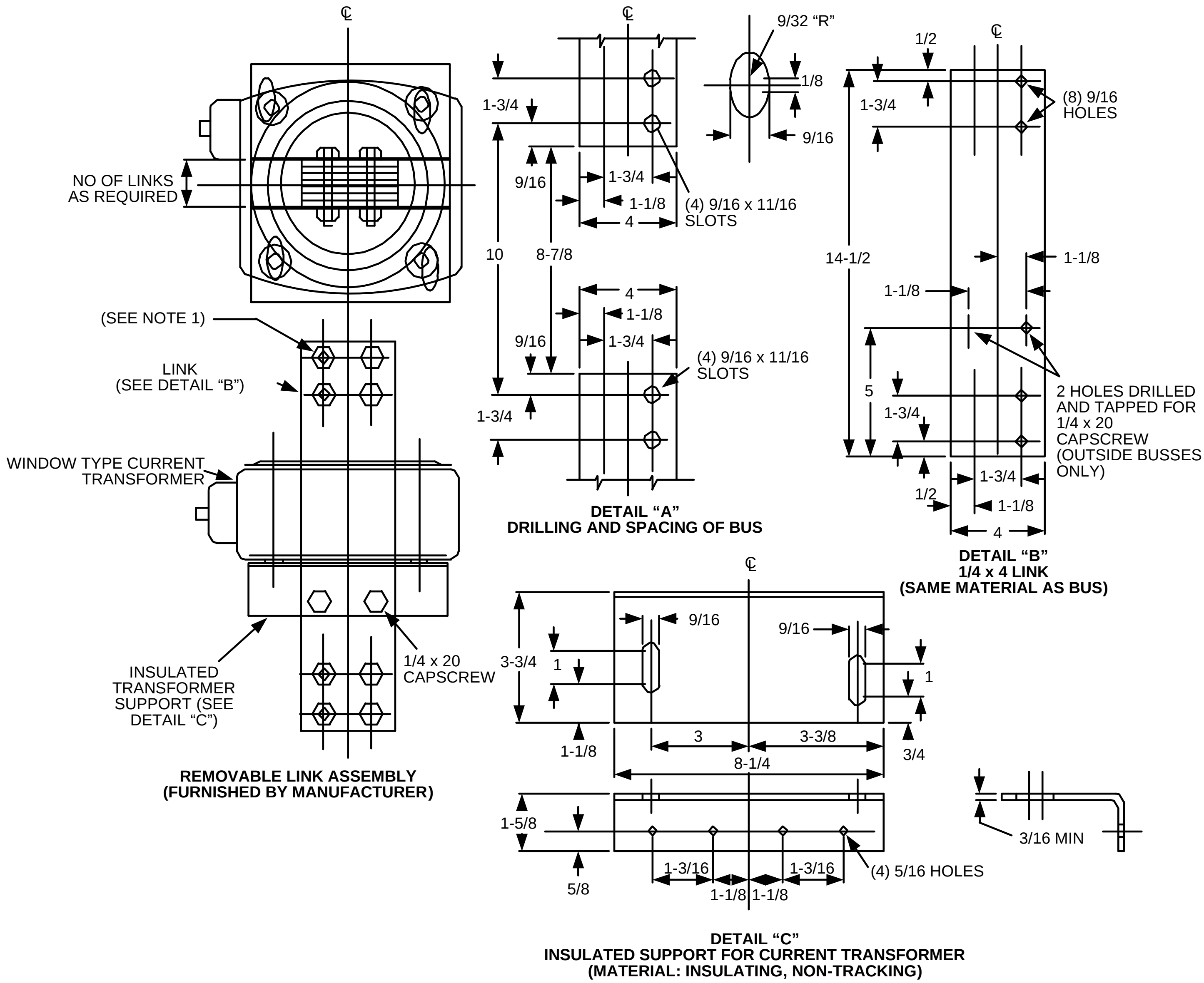


All Dimensions Shown are in Inches

NOTES:

1. Insulated supports shall be rated for the serving voltage and have sufficient mechanical strength for the application.
2. An insulated, bondable bus shall be provided for terminating a neutral conductor.
3. Two ½" steel bolts shall be provided for each cable terminating position and each bolt shall be furnished with a spring washer and a nut. The spring washer may be either cone-type (Belleville) or a split-ring washer and a flat washer. Bolts shall be secured in place and spaced as shown. All parts shall be plated to prevent corrosion.
4. For applications, see RPM-13, RPM-14, and RPM-16.

THIS PAGE INTENTIONALLY LEFT BLANK

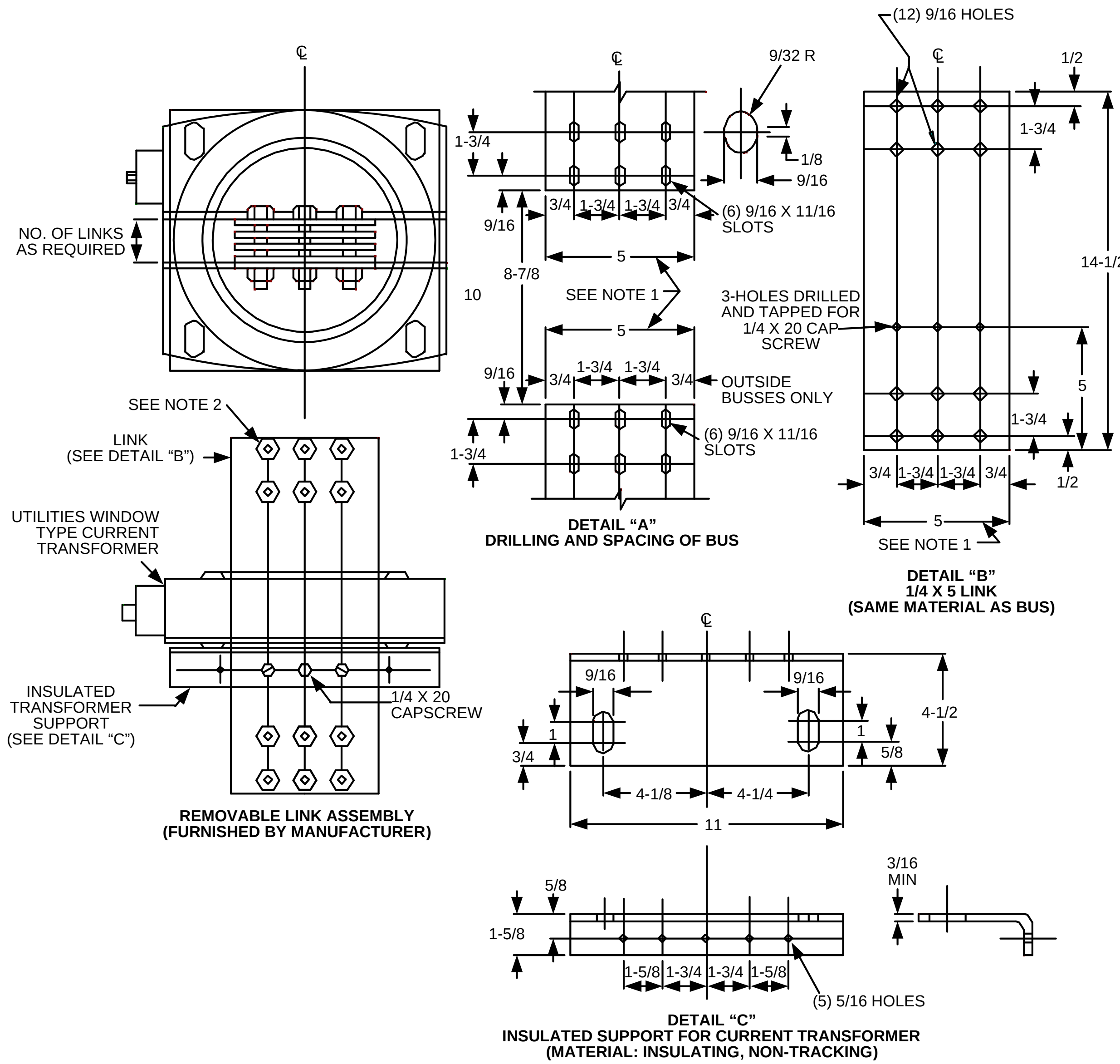


All Dimensions Shown are in Inches

NOTES:

1. Manufacturer shall secure the removable bus link to the upper and lower current transformer bus units using ½" hex-head (grade 5) steel bolts with associated washers and nuts. Each bolt shall be provided with a flat washer, a spring washer, and a nut. Spring washers may be either a cone-type (Belleville or flat) shall be 2-1/4" minimum. Use of Belleville washers requires a label on each phase of the bus link assembly indicating proper torque setting.
2. Drill and tap two holes as shown on the outer bus units for ¼" x 20 cap screws.

THIS PAGE INTENTIONALLY LEFT BLANK

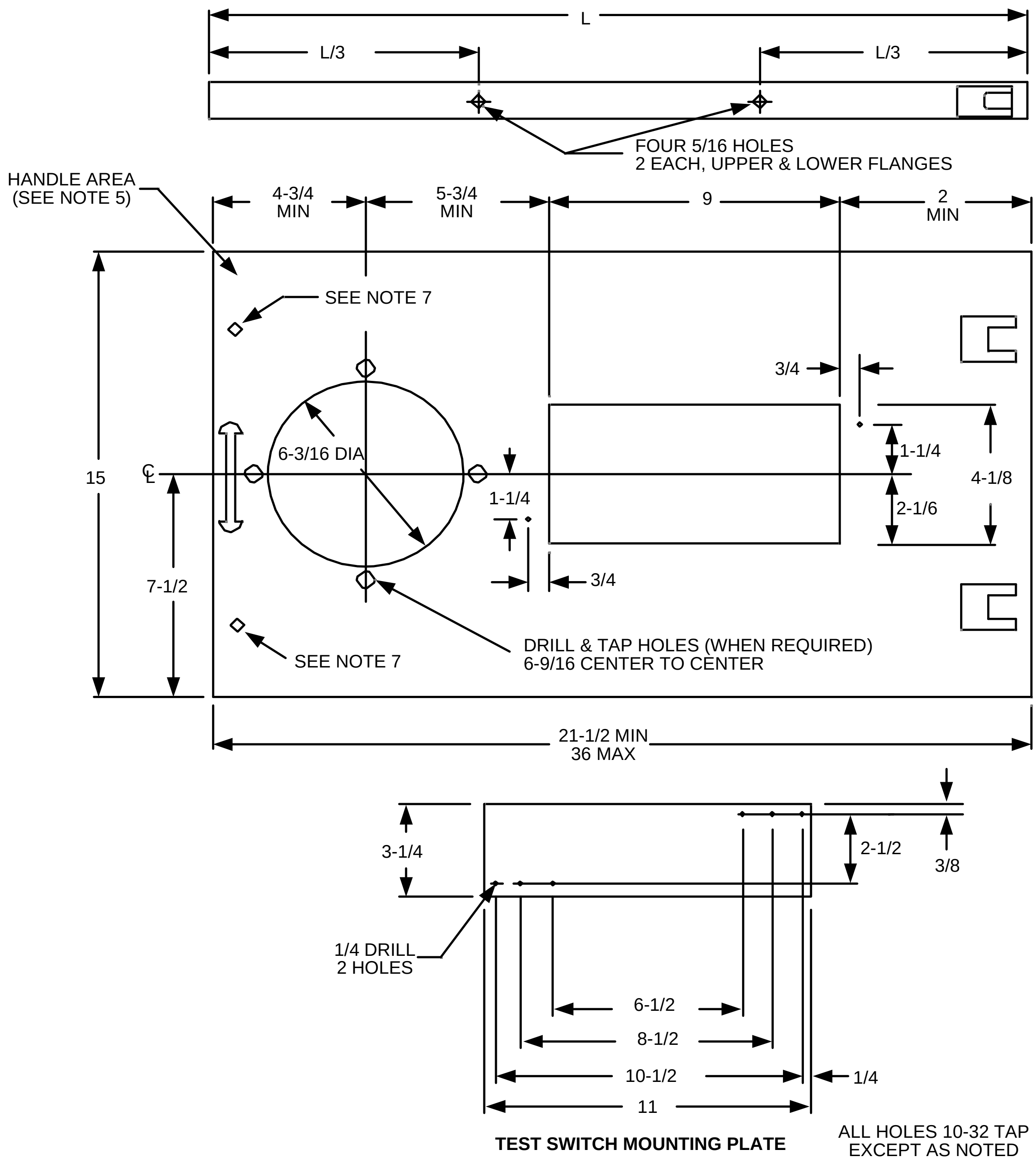


All Dimensions are in Inches

NOTES:

1. Consult NVE for use of bus bars larger than 5 inches.
2. Manufacturer shall secure the removable bus link to the upper and lower current transformer bus units using ½” (grade 5) hex-head steel bolts. Each bolt shall be provided with two Belleville washers installed on opposite sides of the bus units and a nut. Use of Belleville washers requires a label on each phase of the bus link assembly indicating proper torque setting.
3. Drill and tap two holes as shown on the outer bus units for ¼” x 20 capscrews.

THIS PAGE INTENTIONALLY LEFT BLANK

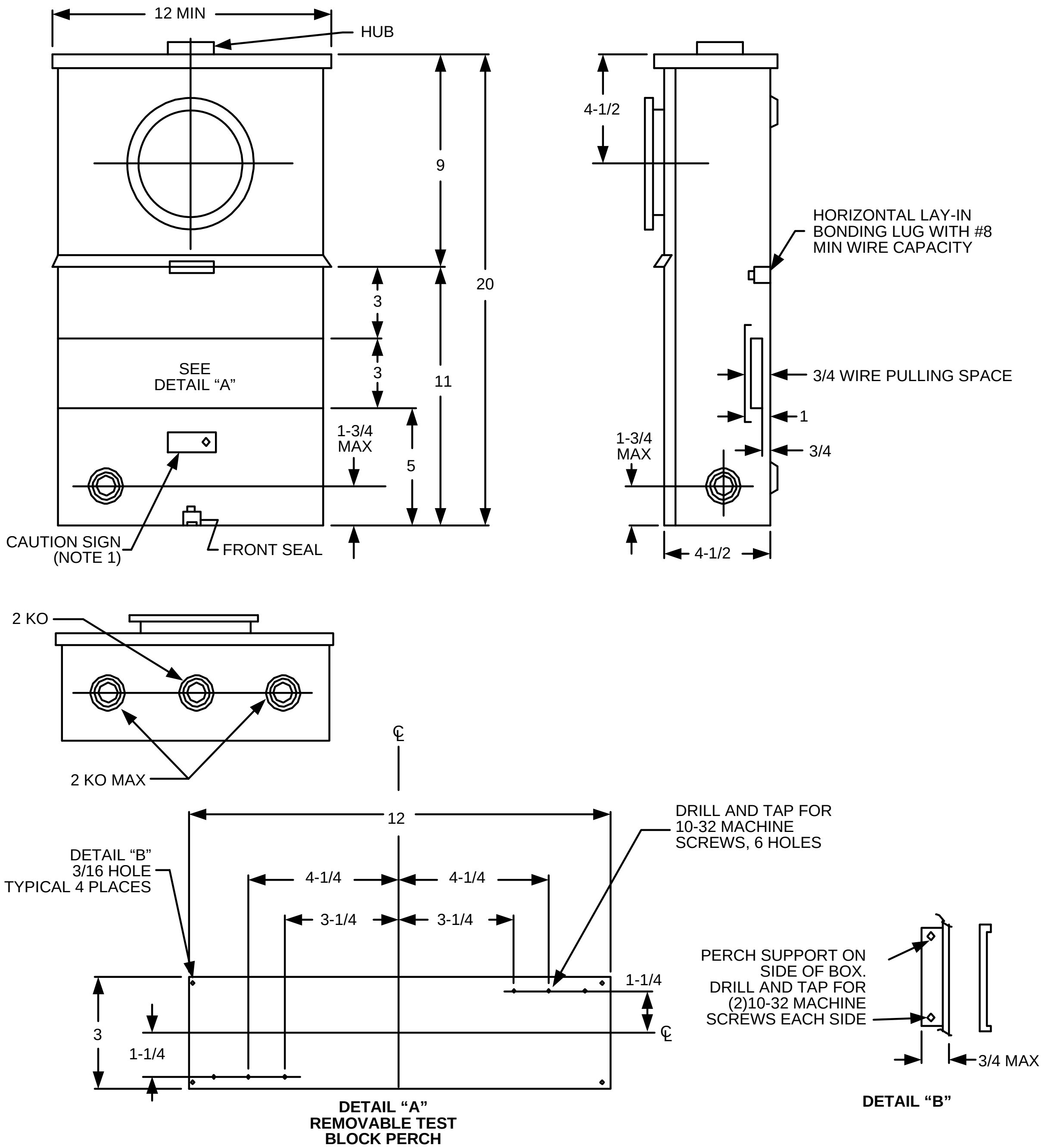


All Dimensions Shown are in Inches

NOTES:

1. The panel shall be constructed of 12 gauge (minimum) steel and furnished with a meter socket, sealing ring, and a slotted opening and removable plate for installation of a secondary test switch. The slotted opening and removable plate edges shall be smooth to prevent damage to meter wiring.

2. The removable plate shall be attached to the rear of the panel with set screws that do not protrude through the face of the panel.
3. The meter socket shall be designed for back connection.
4. The panel shall be equipped with hinges. The hinges shall permit the panel to open to 90° and shall be readily interchangeable, right or left, on the meter socket panel. For clevis or removable pin type hinges, the pin shall be removable from the top.
5. The panel shall be equipped with a handle on the unsupported end. The handle shall be interchangeable, right or left, on the meter socket panel and maintain a 1-inch (minimum) clearance from the meter socket flange and slotted opening.
6. The panel shall support a 25 pound load applied at the unsupported end when fully opened with a maximum sag of 1/8”.
7. All securing screws and sealing screws shall be captive. Stud and wing-nut assemblies shall be sealable when used.
8. See RPM-G, page 2, for correct meter socket configuration.



All Dimensions Shown are in Inches

NOTES:

1. All section covers shall be independently removable. Upper cover shall be non-removable when meter is in place. Lower cover shall be sealable and permanently labeled: "Do Not Break Seals, No Fuses Inside".
2. For meter socket requirements, see RPM-G.

THIS PAGE INTENTIONALLY LEFT BLANK

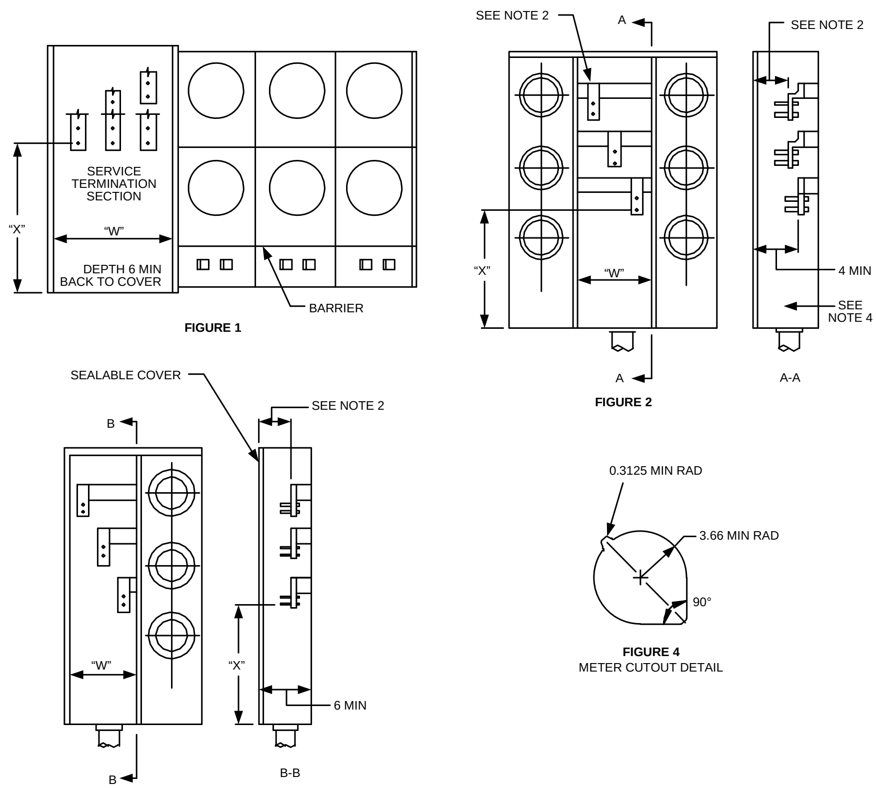


FIGURE 1

FIGURE 2

FIGURE 3

FIGURE 4
METER CUTOUT DETAIL

All Dimensions Shown are in Inches

Typical Arrangement for Underground Service Terminating Facilities

Equipment Rating	"X" Dimension	"W" Dimension
0 - 200 Amps	11" Min	10-1/2"
201 - 600 Amps	22" Min	10-1/2"

NOTES:

1. Termination enclosure covers shall be:
   - A. Independent of other service equipment and removable without disturbing adjacent panels
   - B. Sealable, provided with two lifting handles, and be limited to 9 square feet in area.
2. Terminating facilities for service supply conductors shall be provided as follows:
   - A. For equipment rated 200 amps, terminations may be aluminum-bodied, pressure-type lugs with a range of 1/0 AWG through 250 MCM.
   - B. For equipment rated 201-600 amps, terminations shall be single-position studs complying with RPM-47.
3. The neutral terminating position shall be identified.
4. Where service supply conductors cross over horizontal bussing, the bus shall be barriered or fully insulated. The shaded space shown in the terminating enclosure is reserved for the service supply conductors.

5. Meter Panels shall be removable to provide access to the customer's equipment with utility meters and tamper proof rings in place. Where there is more than one meter socket per panel, the minimum cutout opening as detailed in Figure 4 shall apply.
6. Dimension "W" is the minimum access opening for the terminating enclosure.

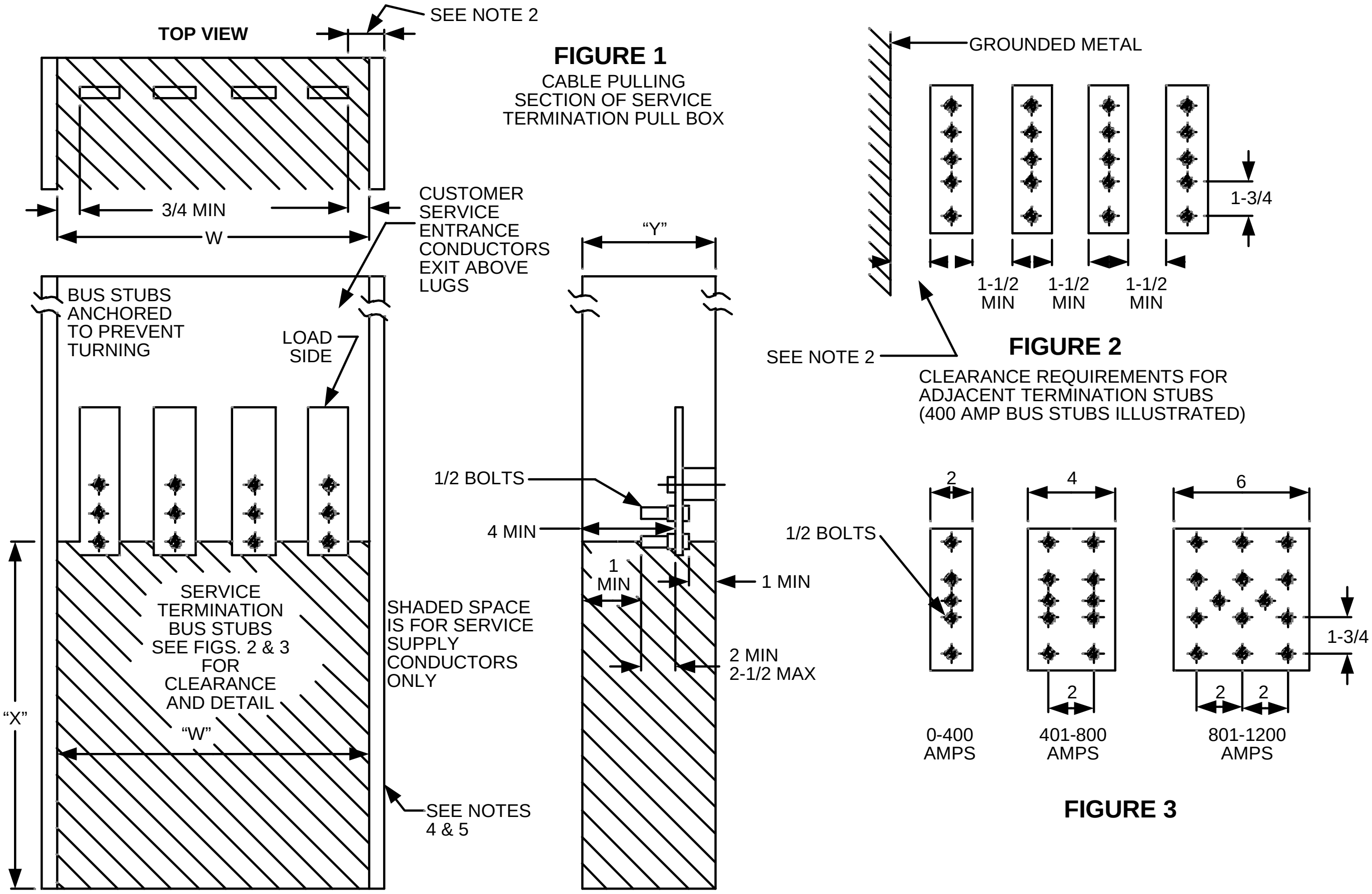


FIGURE 1
CABLE PULLING SECTION OF SERVICE TERMINATION PULL BOX

FIGURE 2
CLEARANCE REQUIREMENTS FOR ADJACENT TERMINATION STUBS (400 AMP BUS STUBS ILLUSTRATED)

FIGURE 3

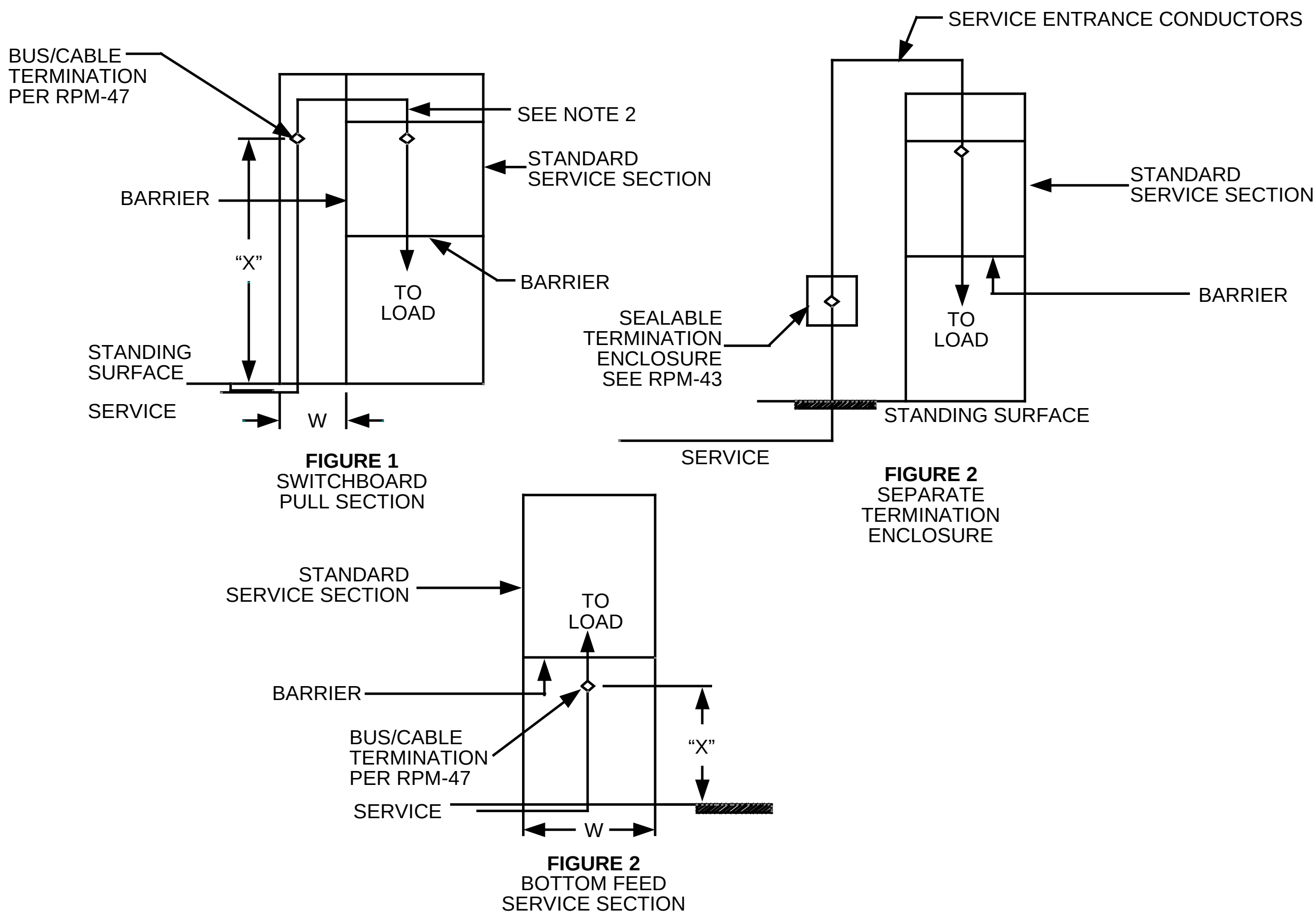
All Dimensions Shown in Inches

Table 1. Minimum Pullbox Dimensions

Service Ampacity	"W" 1 PH, 3-Wire	"W" 4-Wire	"Y" Depth	Lug "X" Height	Minimum Conduit Requirements
0 – 200	10-1/2"	14"	6"	11"	1 – 4"
201 – 400	10-1/2"	14"	6"	22"	2 – 4"
401 – 600	16-1/2"	22"	11"	26"	3 – 4"
601 – 800	---	22"	11"	26"	3 – 4"
801 – 1200	---	30"	11"	26"	5 – 5"

NOTES:

1. The above dimensions are for the case where the conduit enters the bottom of the pull box and all load conductor exit above the terminals. Where the service conduit enters from the side or back of the pull box the “X” dimensions shall be taken from the closest portion of the conduit to the nearest termination bolt. Consult the Metering Department where the service exceeds 1200 amperes.
2. See RPM-47 for minimum termination clearances and for termination bus and bolt details.
3. Pull box covers shall be removable, sealable, provided with two lifting handles, and limited to a maximum size of 9 square feet in area.
4. Clear working space shall be maintained. Return flanges shall not intrude into the shaded space.
5. Dimension “W” is the minimum width of the pull box access opening.
6. Ensure clear identification of the bus phasing, as well as the neutral position, for termination compartments, with labeling directly above the termination.



SEE RPM-27 FOR CONSTRUCTION REQUIREMENTS

Table 1. Minimum Pull Section Dimensions

Switchboard Rating (Amperes)	Minimum Access Opening Dimension (W) See Note 4		Termination Height (X)
	3 Wire	4 Wire	
Below 400	Consult Serving Agency		
400 – 800	24”	24”	42” Min – 72” Max
801 – 1200	24”	30”	42” Min – 72” Max
1201 – 2000	30”	35”	42” Min – 72” Max
2001 – 3000	---	42”	60” Min – 72” Max
3001 – 4000	---	44”	60” Min – 72” Max

NOTES:

1. A switchboard pull section as shown in Figure 1, a separate (nonattached) termination enclosure as shown in Figure 2, or a combination switchboard service section and pull section (bottom feed) as shown in Figure3 shall be provided for underground services.
2. Bus bars or cables may extend from the pull section into switchboard service sections rated up to 800 amperes. Bus bars are required when the service section rating exceeds 800 amperes or multiple metering is supplied.
3. When the service section is supplied from a switchboard pull section as shown in Figure 1, the bus bars or cables shall enter through the side or back of the sealable section above the current transformer compartment, or by means of horizontal cross bussing in back of the metering compartment.
4. The minimum pull section access opening (W) is measured between the left side and right side return flanges.
5. Side or rear entry of service entrance cables into the pull section may require greater dimensions than shown in Table 1. Consult NVE Meter Department for requirements.
6. All terminating enclosure (i.e., pull boxes and pull sections) shall have full front access. Cover panels shall be removable, sealable, provided with two lifting handles, and limited to a maximum of 9 square feet in area.
7. Sealing provisions shall consist of two drilled stud and wing-nut assemblies on opposite sides of the panels. All securing screws shall be captive.
8. Configurations such as shown in Figure 3 and that found in RPM-27 are not acceptable above 2000 amps.
9. See RPM-47 for construction details and clearance requirements for terminating facilities in pullboxes and pull sections. In switchboard pull sections, the 4” minimum clearance from any energized part to any removable access cover may be reduced to 1-1/2” when a safety barrier is provided by the manufacturer. The safety barrier shall:
    - A. Be constructed of a rigid insulating material, resistant to damage by impact or puncture, with a minimum thickness of 1/8”.
    - B. Extend a minimum of 10” below terminating bus and extend upward to cover all energized parts that infringe into the 4” minimum clearance dimensions, and be removable.

      Note: Brackets and associated hardware used to mount the safety barrier shall not extend into the provided access opening
    - C. Have a caution sign affixed to the barrier reading “WARNING: THIS BARRIER MUST BE INSTALLED BEFORE REPLACING PULL SECTION COVERS”. Additional caution signs shall be affixed to exterior of all pull section access covers reading “DO NOT REPLACE PULL SECTION COVERS UNTIL SAFETY BARRIER IS IN PLACE”.
10. Ensure clear identification of the bus phasing, as well as the neutral position, for termination compartments, with labeling directly above the termination.

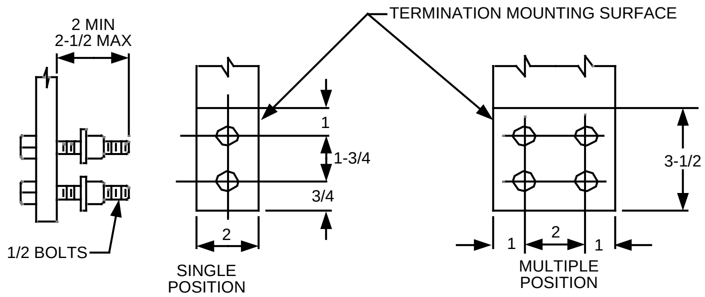


FIGURE 1
TERMINATING BOLT AND DRILLING DETAIL OF TERMINATING FACILITIES

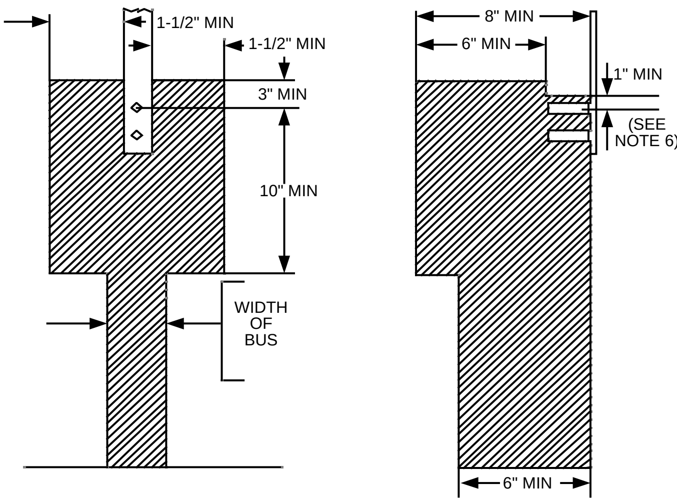


FIGURE 4
REQUIRED UNOBSTRUCTED WORKING SPACE FOR ALL TERMINATIONS

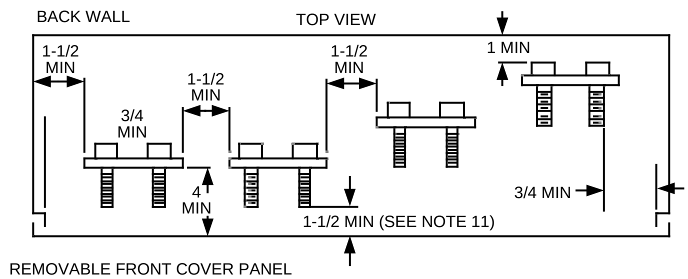


FIGURE 2
SPACING REQUIREMENTS FO TERMINATING FACILITIES (SIDE BY SIDE OR STAGGERED)

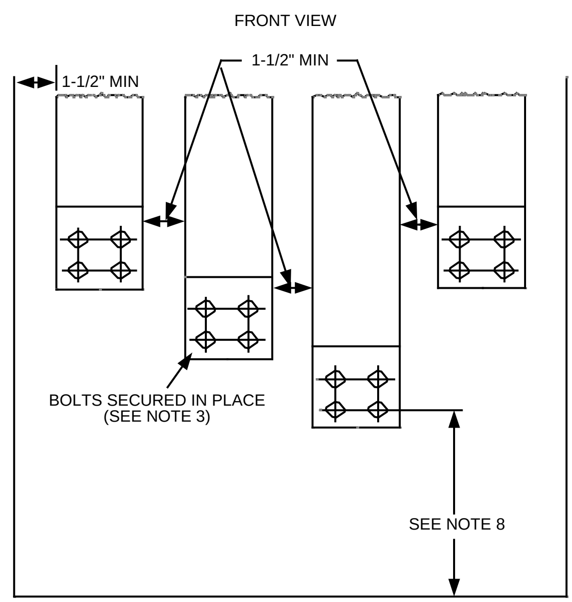


FIGURE 5
SPACING REQUIREMENTS FOR TOP TO BOTTOM STAGGER OF TERMINATING FACILITIES

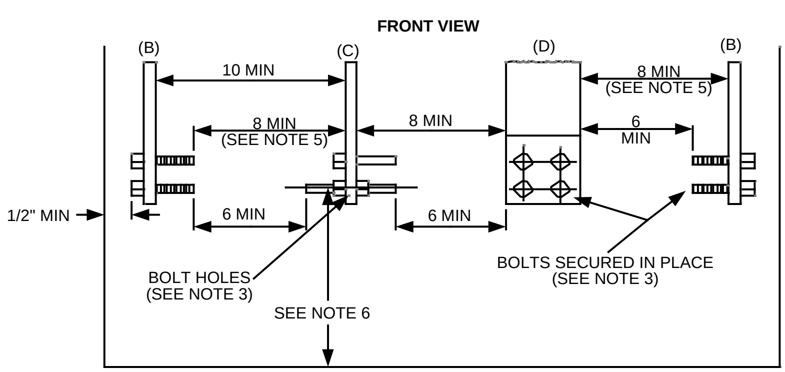


FIGURE 3
SPACING REQUIREMENTS FOR TERMINATING FACILITIES ACCESSIBLE FROM (A) FRONT ONLY, (B) ONE SIDE ONLY, OR (C) FROM EITHER SIDE (SEE NOTES 3 & 4)

4 INCH MIN REQUIRED [ASSURE 1 INCH MINIMUM CLEARANCE FROM BODY OF TERMINATING LUG (WHEN IN PLACE) TO FRONT PANEL SEE NOTES 4 & 5

NOTES:

1. One landing position is required for each 400 amps (or portion thereof) of service ampacity up to 1200 (consult Metering Department for services exceeding 1200 amps). Each landing position shall consist of two ½" steel bolts spaced on 1-3/4" vertical centers and extending from 2" to 2-1/2" from the mounting surface. When multiple positions are required, provide a minimum of 2" of horizontal spacing between positions.

Exception: Edgewise terminating facilities may consist of 9/16” holes having the same spacing as specified for the ½” bolts as specified above and in Figure 1. The unobstructed working space shall be provided on both sides of the termination bus (see Figure 3).

2. Each terminating bolt shall be provided with a spring washer and a nut. The spring washer may be either a cone-type (Belleville) washer or a split-ring washer and a flat washer. All parts shall be plated to prevent corrosion. Terminating bolts shall not be used to secure the termination bus in place.
3. Terminating bolts must be secured in place. “Secured in place” shall mean that the stud will not turn, back out, or loosen in any manner when tightening or loosening terminal nuts (including cross threaded situations).
4. In the terminal mounting area, which is defined as the area of the terminating facilities shown in Fig.1, a clear space (barrel of proximity) of 1-1/2” minimum is required around any terminating facility including its bolts and bolt heads, any other bus, any other terminating facility, or any grounded surface, except:
   A. The minimum clearance to the back of the pull section may be reduced to 1”.
   B. The minimum clearance to any fully insulated horizontal bus behind the terminating facility may be reduced to 1”.
   C. The neutral terminating facility may have a minimum clearance of 1” from any grounded surface.
5. Each terminating facility shall have an unobstructed working space, accessible from the front of the pull section as viewed from the access compartment opening, in front of the entire mounting surface as shown in figure 4.

   Exception: For terminating facilities with bolts facing the access opening as shown in Fig 2, the required 1-1/2” side clearance (bus to access opening return flange) may be reduced to ¾”.
6. The clearance directly above and measured from the center of the top termination bolt may be reduced to 1” to either an insulated surface or bus of the same potential.
7. No more than one termination facility may be mounted along any sidewall.
8. See RPM-2, RPM-3, RPM-42, RPM-43 and RPM-45 for the minimum distance from the lowest bolt on the termination facility to the bottom of the termination enclosure.
9. Terminating facilities shall be secured to prevent turning or bus misalignment when cables are installed.
10. Uninsulated busses of different potentials shall not be permitted below or behind any terminating position as viewed from the front of the pull section. If cross-bussing is installed below or behind a terminating position, the cross-bussing shall be fully insulated or barriered.
11. For switchboard pull sections, a 1-1/2” minimum dimension is permitted from an energized part to a removable access cover panel when a safety barrier is provided by the manufacturer. Where a safety barrier is not provided, the minimum clearance shall be increased to 4”. For barrier requirements, see RPM-45, Note 8.
12. Ensure clear identification of the bus phasing, as well as the neutral position, for termination compartments, with labeling directly above the termination.

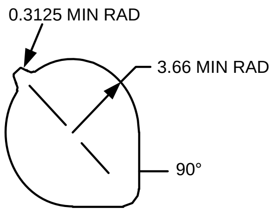


FIGURE 1
METER CONDUIT DETAIL

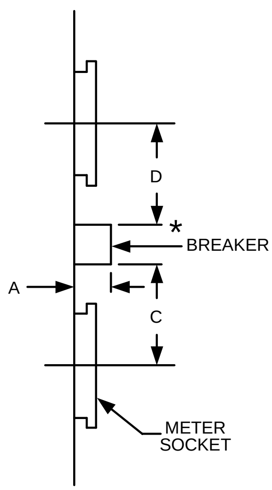
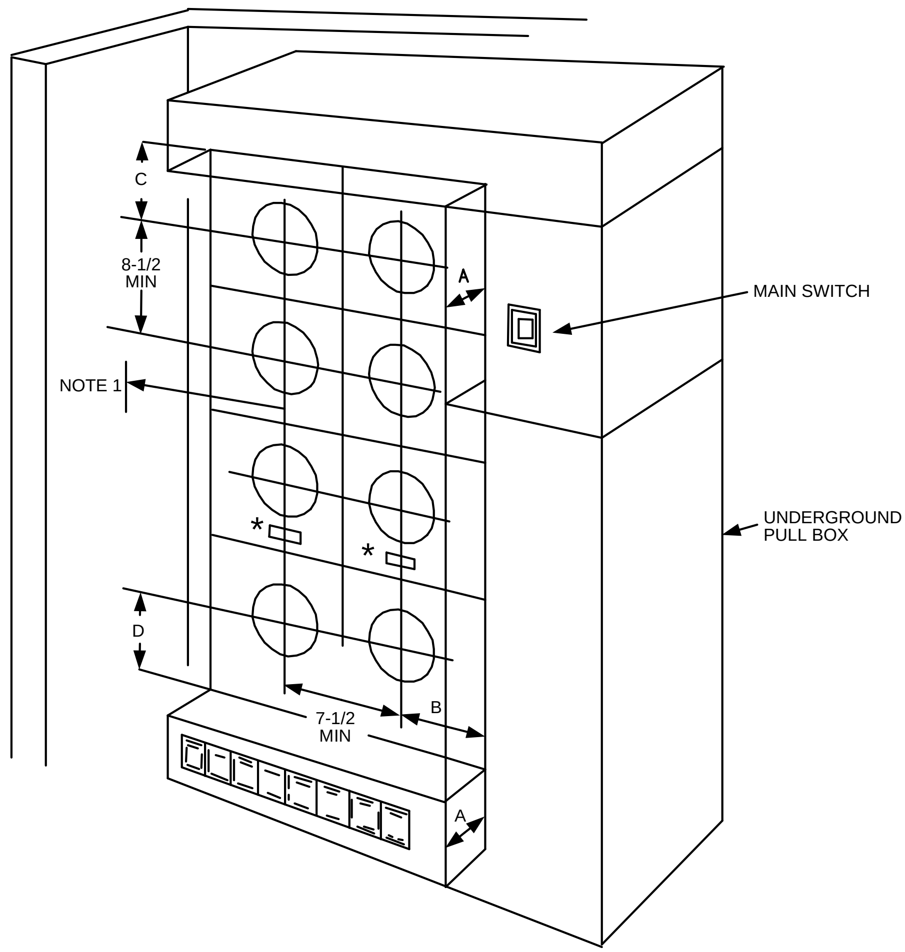


FIGURE 2
SIDE VIEW DETAIL



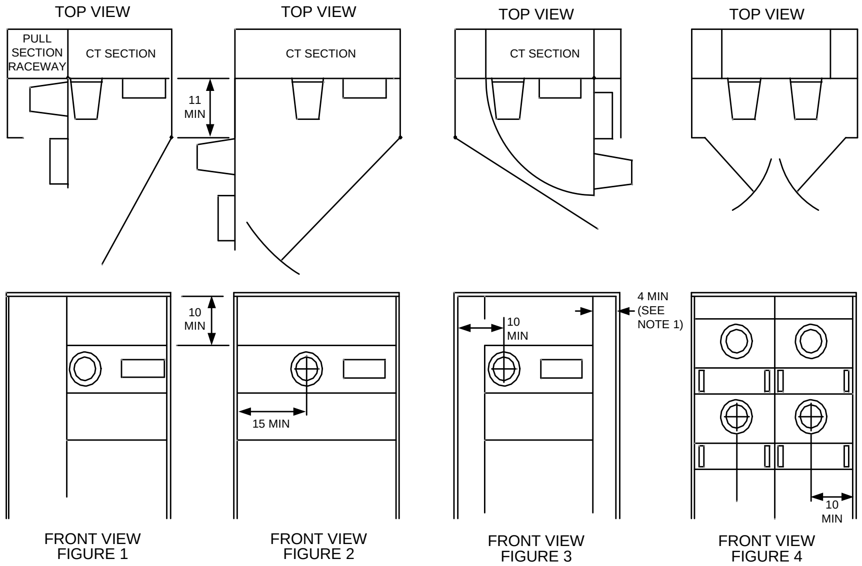
All Dimensions Shown are in Inches

***Alternate Breaker Position below Meter Socket; see Side View Detail for Clearance Dimension**

"A" (PROTRUSIONS)	"B" MIN	"C" MIN	"D" MIN
0" (No Protrusions)	3-3/4"	4"	4-3/4"
Greater than 0" to 1 1/8"	4-1/4"	4"	4-3/4"
Greater than 1 1/8" to 2"	4-1/4"	4-1/4"	6-1/4"
Greater than 2" to 4"	6-1/4"	4-1/4"	8"
Greater than 4" to 11" Max	6-1/4"	10"	8"

NOTES:

1. Where an adjacent wall or other obstruction extends more than 11” perpendicular from the face of the meter panel, a minimum dimension to the meter socket axis is required. For obstructions extending 11” or less from the meter panel, the side clearance shall conform to that of Dimension “B”.
2. Panels shall be removable to provide access to the customer’s equipment with the utility meters and tamper proof sealing rings in place. When there is more than one meter socket per panel, the minimum meter cutout opening, as detailed in Fig. 1 above shall apply.
3. Underground landing lugs shall not be placed under any socket cover.
4. See RPM-G for meter maximum and minimum heights.
5. Removable meter panel covers shall not exceed 6 square feet in area.
6. Distribution conductors shall be barriered from metering compartment.

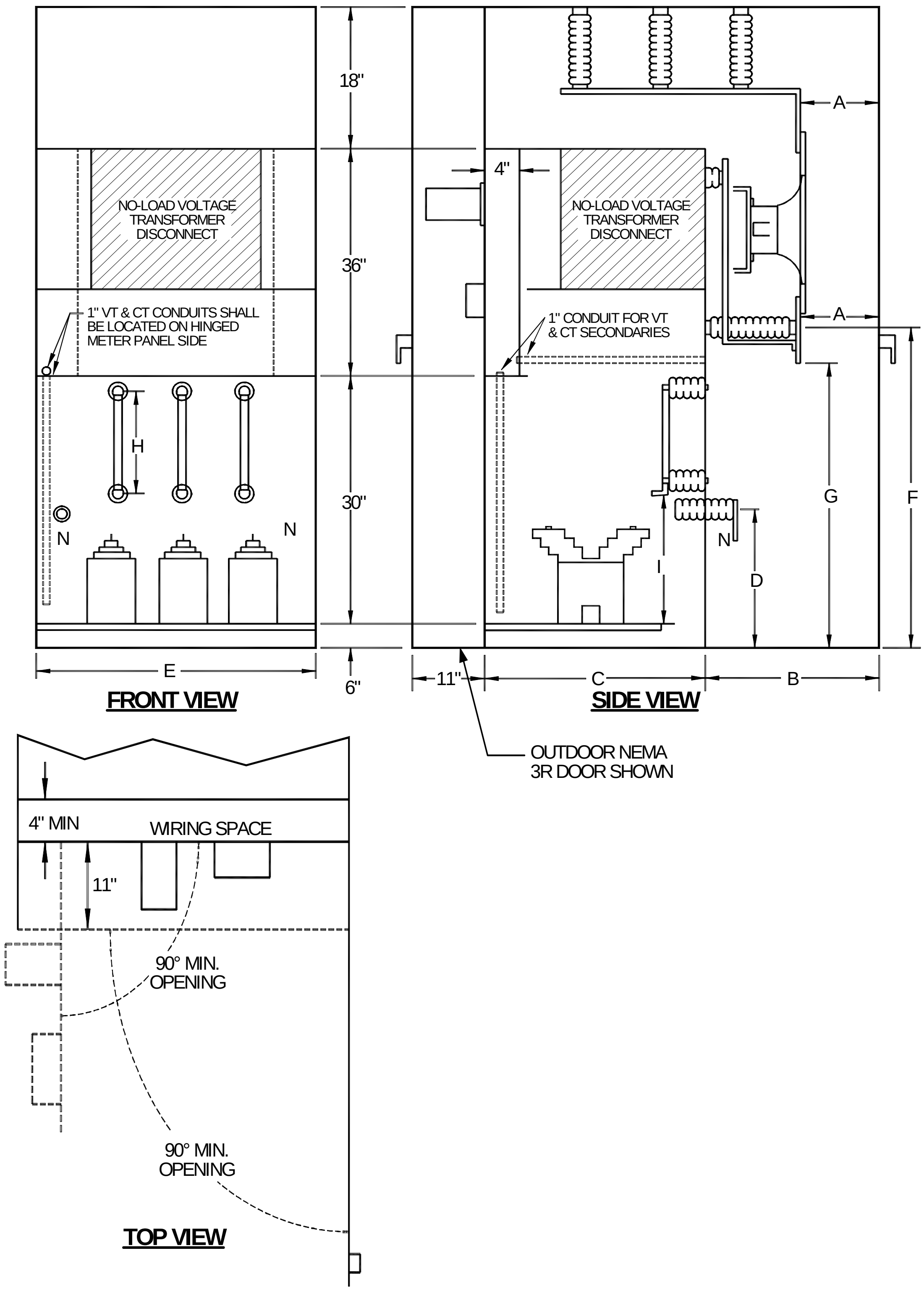


All Dimensions Shown are in Inches

NOTES:

1. Hinged meter panels shall be capable of being opened 90° with meter and test facilities in place, and provide the following clearances to any obstruction – 11" at the meter socket and 4" at the test –switch slotted opening. See RPM-32 and RPM-33 for hinged meter panels construction details.
2. Meter panels, either socket or blank, shall not be hinged to a hinged filler panel. Non-hinged filler panels shall not extend into the required instrument-transformer compartment access opening.
3. Enclosure doors providing access to utility compartments (i.e., metering sections and pull sections) shall be:
   A. Equipped with a device to secure the doors in the open position at 90° or more.
   B. Secured in the closed position with a single, handle-operated, latching system. When provided with a locking means, each door, or set of doors, shall be equipped with an approved double-locking device, accepting padlocks with a 5/16" lockshaft, to allow access by both NVE and the customer.
4. The enclosure top cover panels providing access to unmetered bus, and internal equipment attached to the outer walls of the enclosure shall be secured in place with devices that may not be loosened from the outside. Screws or bolts requiring special tools for installation or removal are not acceptable.

THIS PAGE INTENTIONALLY LEFT BLANK

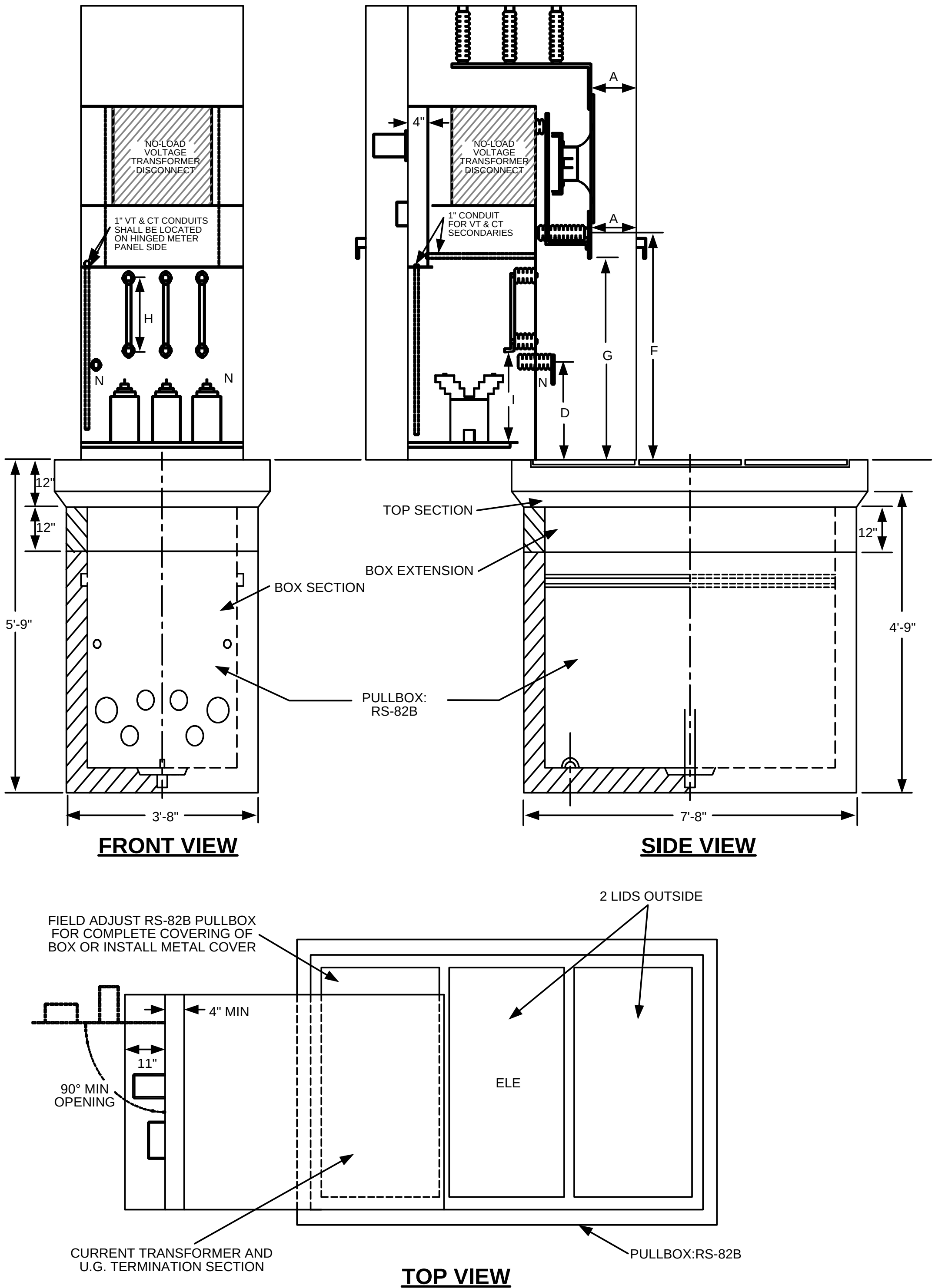


NV Energy				Electric Service Requirements	RPM-401
				High Voltage Metering Enclosure: 2,400-27,000 Volts	
Drawn:	Eng:	Appr:	Date:		Revision: 1
DH	DH	MES	7/07		Page 1 of 4

NOTES:

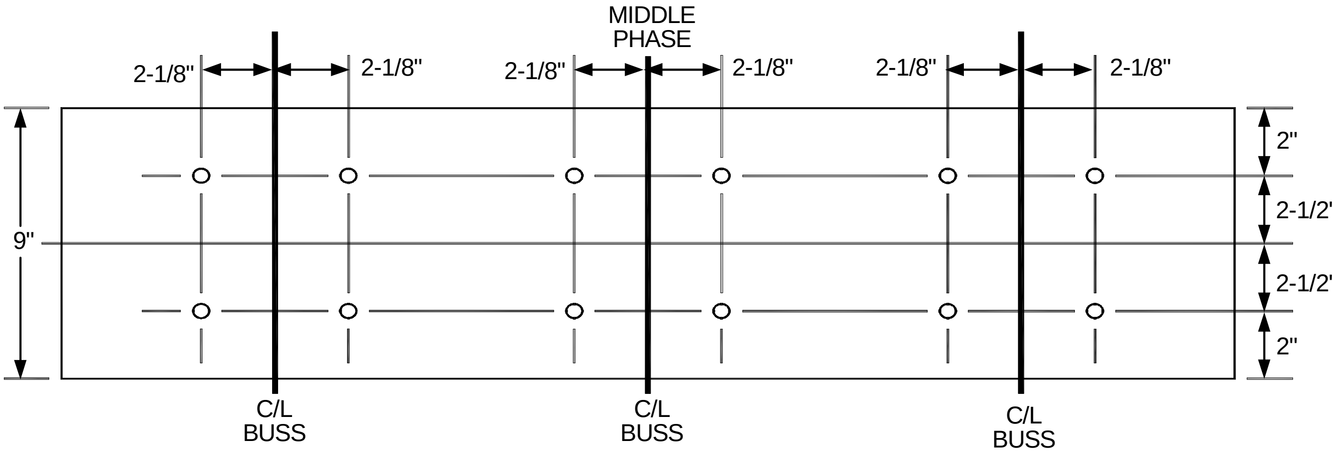
1. For rear access door requirements, refer to RPM-400.
2. Consult the NVE Metering Department for wiring space requirements behind meter panel. Flush-mounted meters require a minimum, 10' wiring space.
3. Consult the NVE Metering Department for neutral bushing requirements
4. Primary taps for VTs shall be connected to line side of metering CTs.
5. Preliminary taps for VTs shall be connected to line side of metering CTs.

SPECIFICATIONS	VOLGATGE RATING			
	2400	**4160/4800**	**7200/17000**	**20800/25000**
MIN. BARE BUS CLEARANCE (Ø TO GROUND)	3-1/2"	3-1/2"	6"	7-1/2"
MIN. BARE BUS CLEARANCE (ØTO Ø)	5"	5"	7-1/2"	9"
DIMENSION A	5" MIN 10" MAX	5" MIN 10" MAX	8" MIN 10" MAX	9" MIN 15" MAX
DIMENSION B	24" MIN	24" MIN	24" MIN	36" MIN
DIMENSION C	24" MIN	24" MIN	24" MIN	36" MIN
DIIMENSION D	12" MIN	12" MIN	12" MIN	12" MIN
DIMENSION E	36" MIN	48" MIN	48" MIN	60" MIN
DIMENSIOIN F	42" MIN 48" MAX	42" MIN 48" MAX	42" MIN 48"MAX	56" MIN 60" MAX
DIMENSION G	36" MIN	36" MIN	36" MIN	48" MIN
DIMENSION H (FUSE MOUNTING CLIP CENTER)	8-1/2"	8-1/2"	11-1/2"	15"
DIMENSION H (FUSE FERRULE DIAMETER)	1-5/8"	1-5/8"	1-5/8"	1-5/8"
DIMENSION I	18"	18"	18"	CONSULT UTILITY

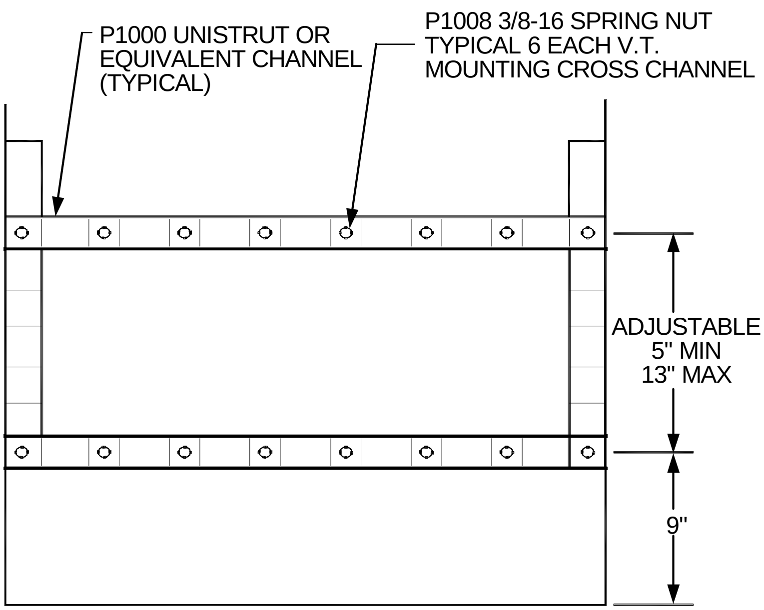


NV Energy				Electric Service Requirements	RPM-401
				High Voltage Metering Enclosure: 2,400-27,000 Volts	
Drawn:	Eng:	Appr:	Date:		Revision: 1
DH	DH	MES	7/07		Page 3 of 4

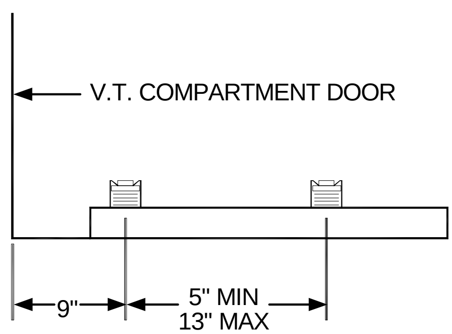
THIS PAGE INTENTIONALLY LEFT BLANK



CURRENT TRANSFORMER
MOUNTING BASE
NOTE: ALL HOLES TAP 3/8-16



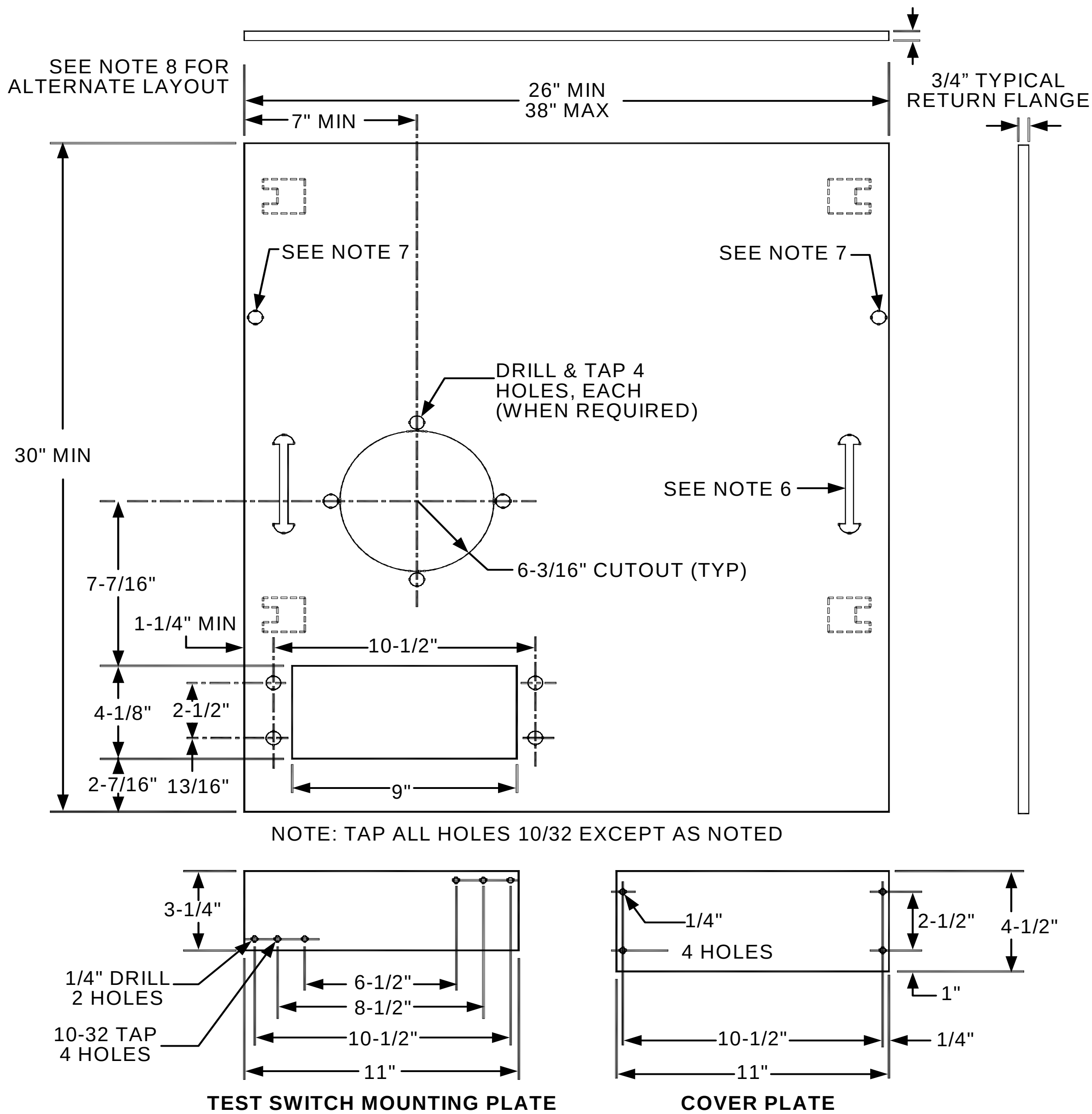
TOP VIEW OF COMPARTMENT



SIDE VIEW OF VT MOUNTING

VOLTAGE TRANSFORMER
MOUNTING RAIL DETAIL

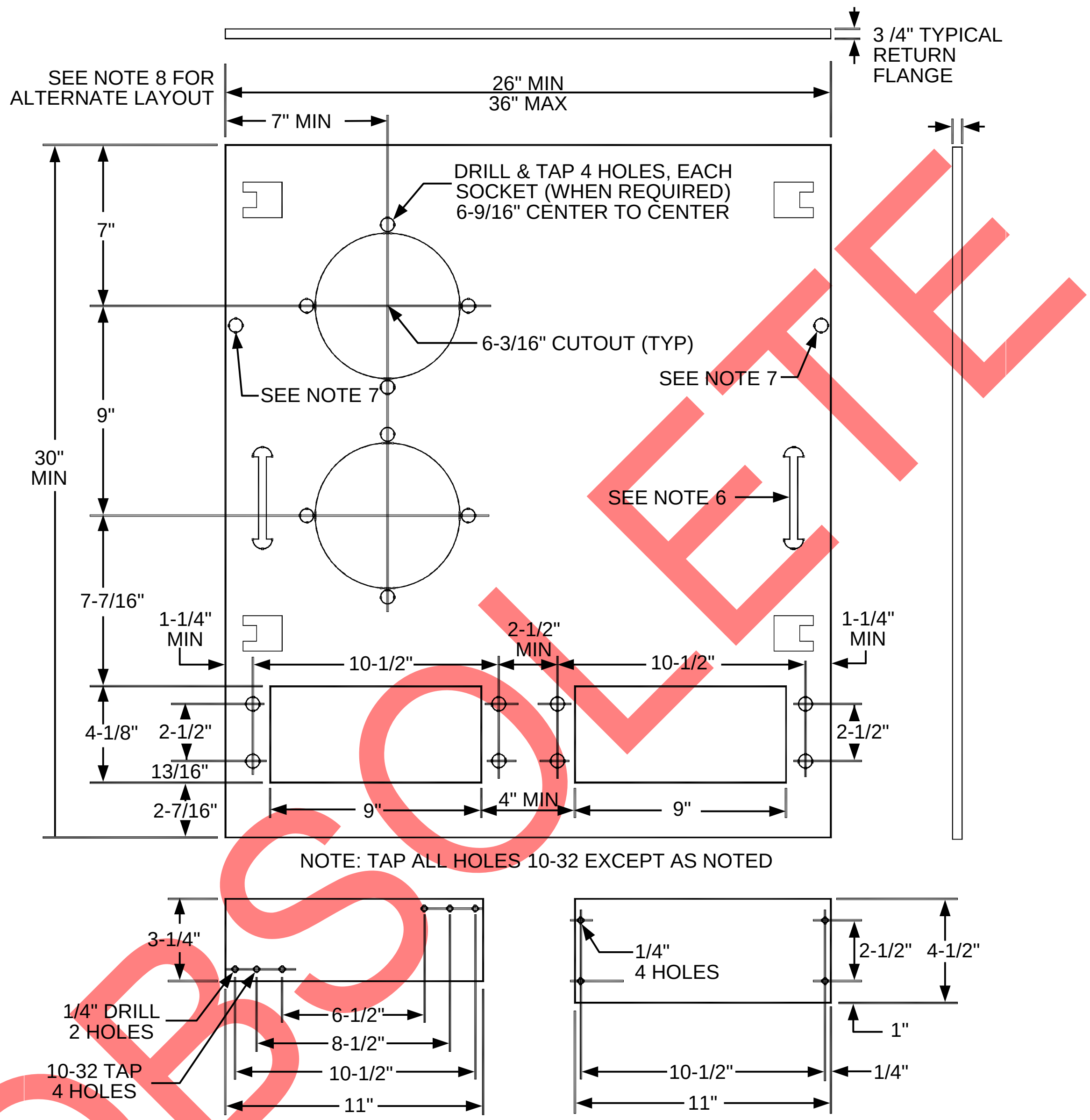
THIS PAGE INTENTIONALLY LEFT BLANK



NOTES:

1. The panel shall be constructed of 12 gauge (min.) steel and furnished with meter sockets, sealing rings, slotted openings, a removable plate for installation of a secondary test switch, and a cover plate. Slotted openings and removable plate edges shall be smooth to prevent damage to meter wiring.
2. The removable plates shall be attached to the rear of the panel with screws that do not protrude through the face of the panel.
3. Meter sockets shall be designed for back connection.

4. Hinges shall be readily interchangeable, right or left, on panel and permit the panel to open 90° with meter and test facilities in place. For recessed or enclosed meter panels refer to drawing RPM-407. Clevis or removable pin type hinges shall be removable from the top.
5. The panel shall support a 25 pound load applied at the unsupported end when fully opened with a maximum sag of 1/8".
6. The panel shall have a handle attached to both sides.
7. All securing and sealing screws on panel shall be captive. Stud and wing nuts shall be sealable when used.
8. Consult NVE for panel widths more than 36" and see RPM-G for meter socket requirements.



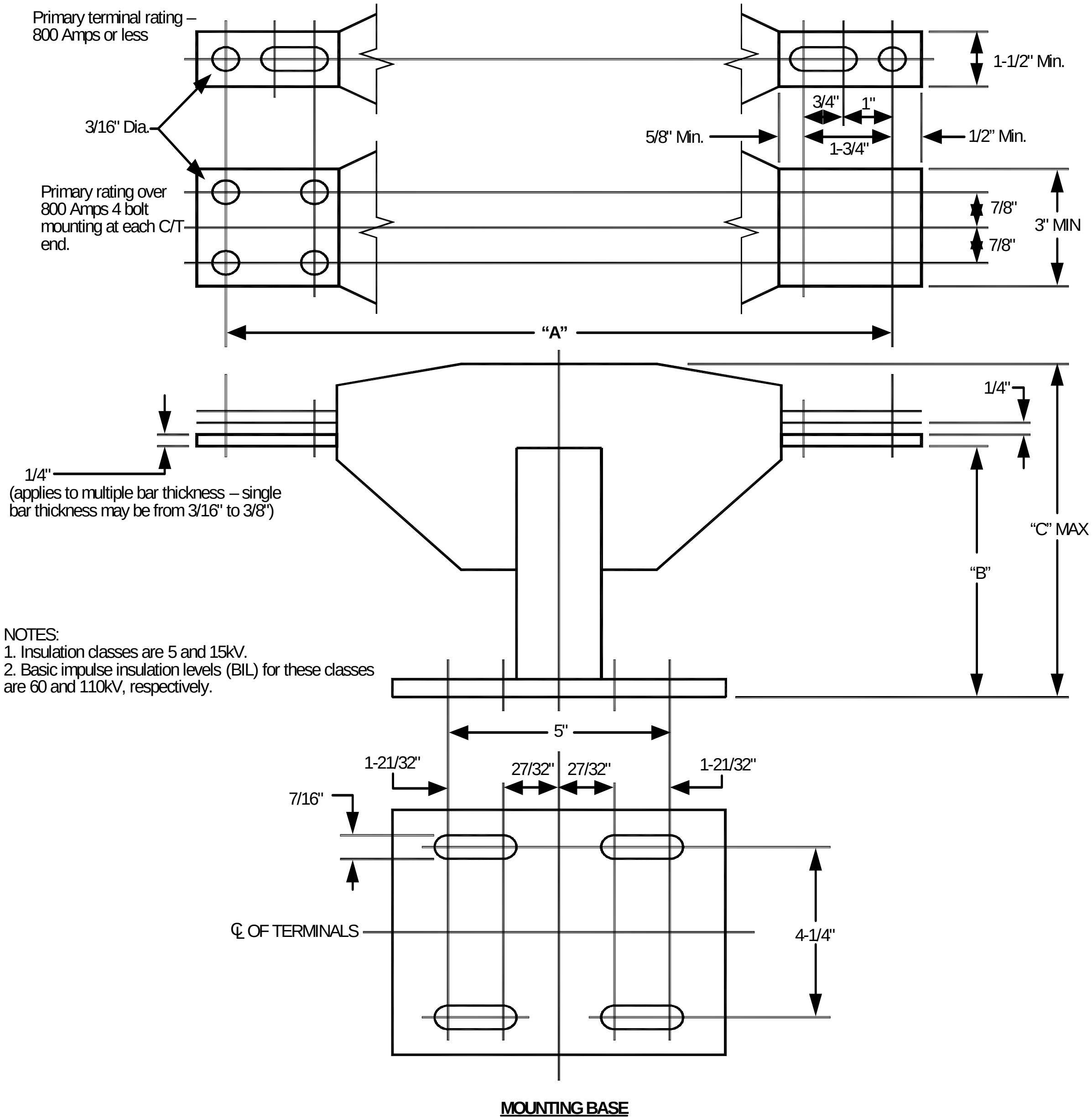
TEST SWITCH MOUNTING PLATE

COVER PLATE

NOTES:

1. The panel shall be constructed of 12 gauge (min.) steel and furnished with meter sockets, sealing rings, slotted openings, a removable plate for installation of a secondary test switch, and a cover plate. Slotted openings and removable plate edges shall be smooth to prevent damage to meter wiring.
2. The removable plates shall be attached to the rear of the panel with screws that do not protrude through the face of the panel.
3. Meter sockets shall be designed for back connection.

4. Hinges shall be readily interchangeable, right or left, on panel and permit the panel to open 90° with meter and test facilities in place. For recessed or enclosed meter panels refer to drawing 407. Clevis or removable pin type hinges shall be removable from the top.
5. The panel shall support a 25 pound load applied at the unsupported end when fully opened with a maximum sag of 1/8”.
6. The panel shall have a handle attached to both sides.
7. All securing screws on panel shall be captive. Stud and wing nuts shall be sealable when used.
8. Consult NVE for panel widths more than 36” and see RPM-G for meter socket requirements.

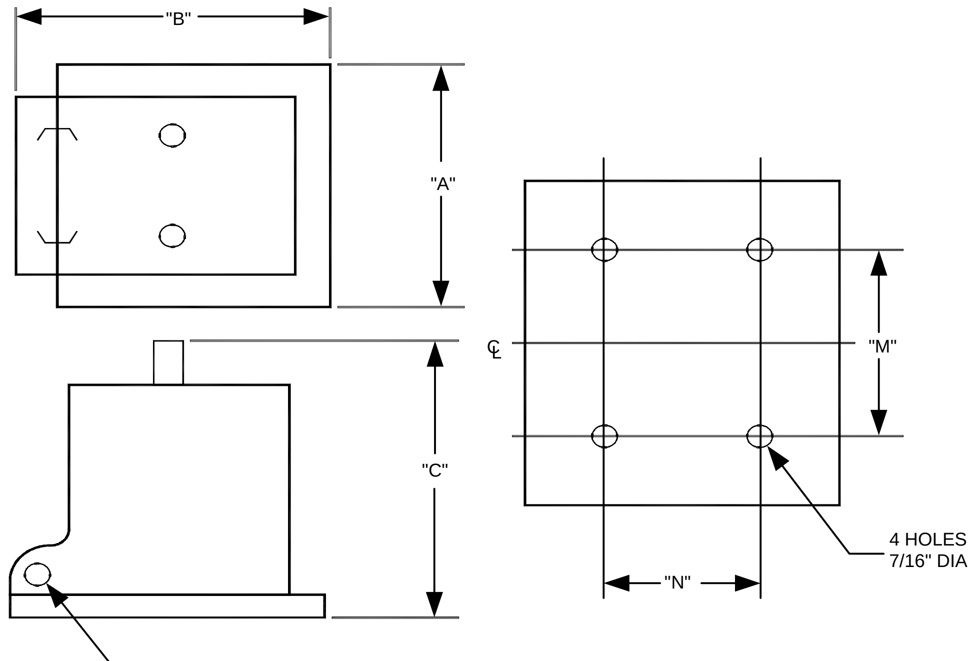


INSULATION CLASS KV	DIMENSIONS (INCHES)					
	"A" AMPERES		"B" AMPERES		"C" (MAX) AMPERES	
	10-800	1200-2000	10-800	1200-2000	10-800	1200-2000
5.0	14	---	5-3/4	---	8	---
15.0	22	---	9	---	11-1/4	---

* Unless otherwise indicated tolerance, plus or minus 1/16"

NV Energy				Electric Service Requirements	RPM-408
				Indoor CT Dimensions for Metering Purposes: 5kV through 15kV	
Drawn:	Eng:	Appr:	Date:		Revision: 1
DH	DH	DA	2/07		Page 1 of 2

THIS PAGE INTENTIONALLY LEFT BLANK

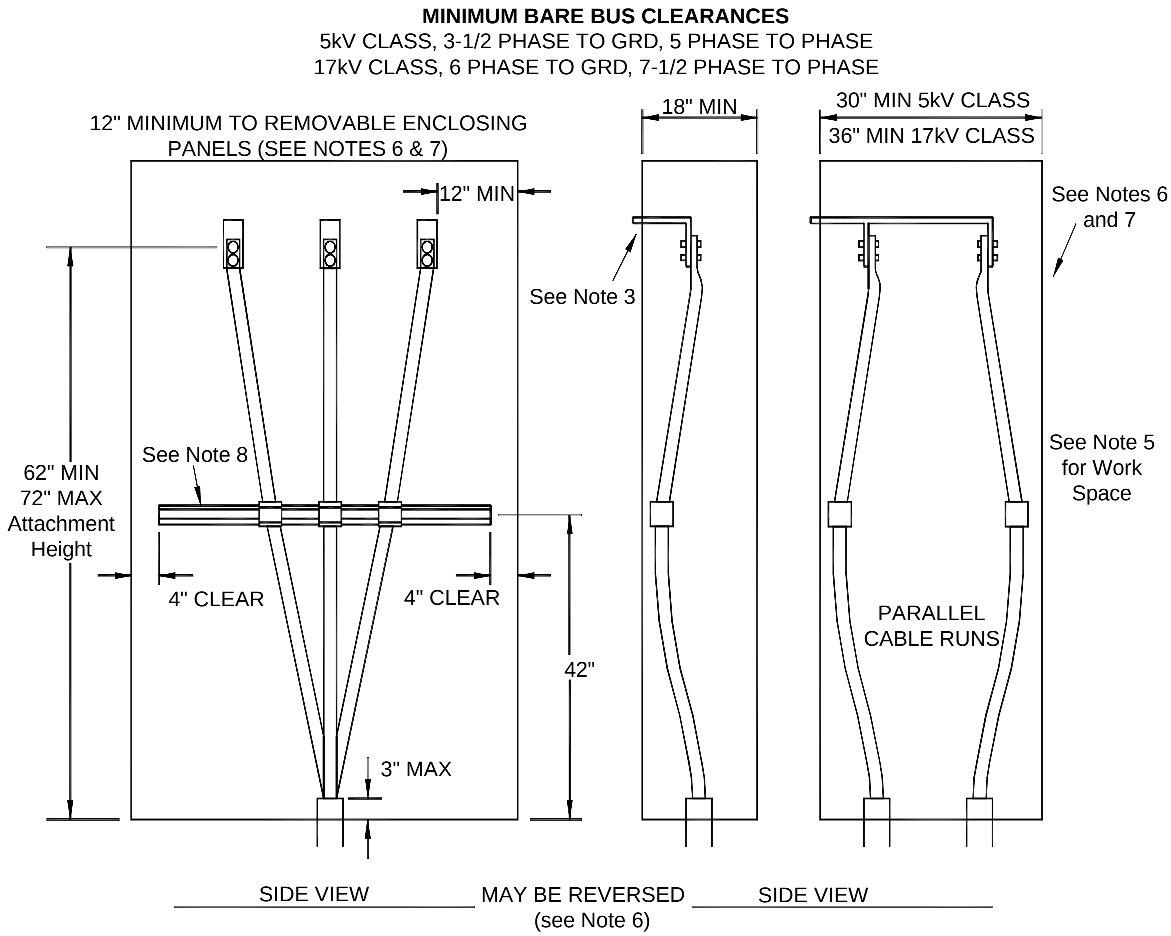


INSULATION CLASS KV	DIMENSIONS (INCHES*) WITHOUT MOUNTING BRACKET				
	MAXIMUM OVERALL DIMENSIONS			MOUNTING DIMENSIONS	
	"A"	"B"	"C"	"M"	"N"
5.0	11-1/2	13	13	8-1/2	6-1/4
8.7	14-1/2	15-1/2	18-1/2	10	8-5/8
15.0	14-1/2	15-1/2	18-1/2	10	8-5/8

* Unless otherwise indicated tolerance, plus or minus 1/16 inch.

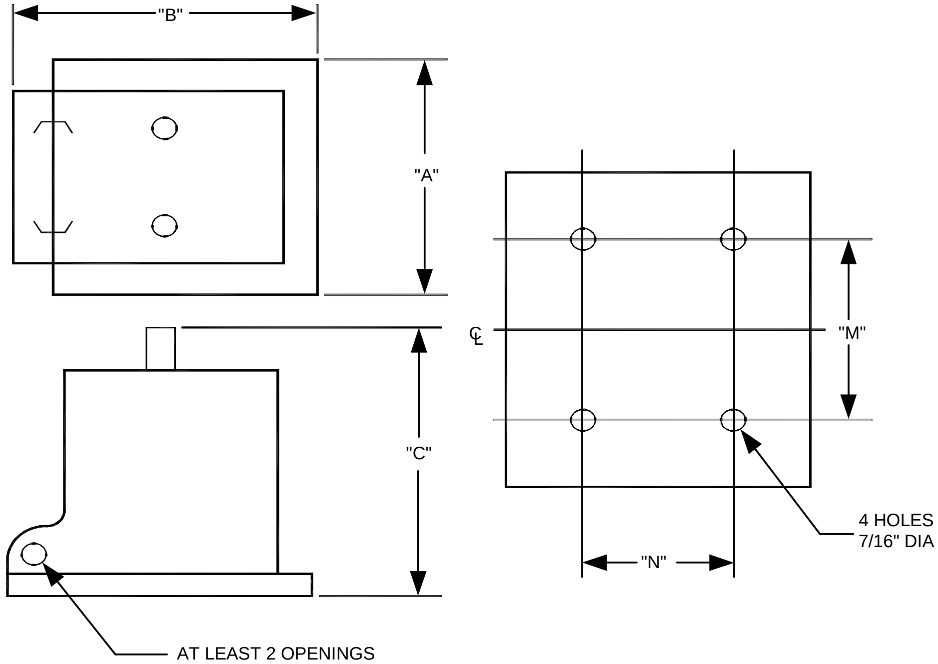
INSULATION, RATIO, VOLTAGE, AND BIL DATA			
INSULATION CLASS KV	MARKED RATIO	PRIMARY VOLTAGE RATING, VOLTS	KV BIL
5.0	20:1	2400	60
5.0	35:1	4200	60
5.0	40:1	4800	60
8.7	35:1	4200	75
8.7	40:1	4800	75
15.0	60:1	7200	110
15.0	70:1	6400	110
15.0	100:1	12000	110
15.0	120:1	14400	110
15.0	150:1	16500	110

THIS PAGE INTENTIONALLY LEFT BLANK



NOTES:

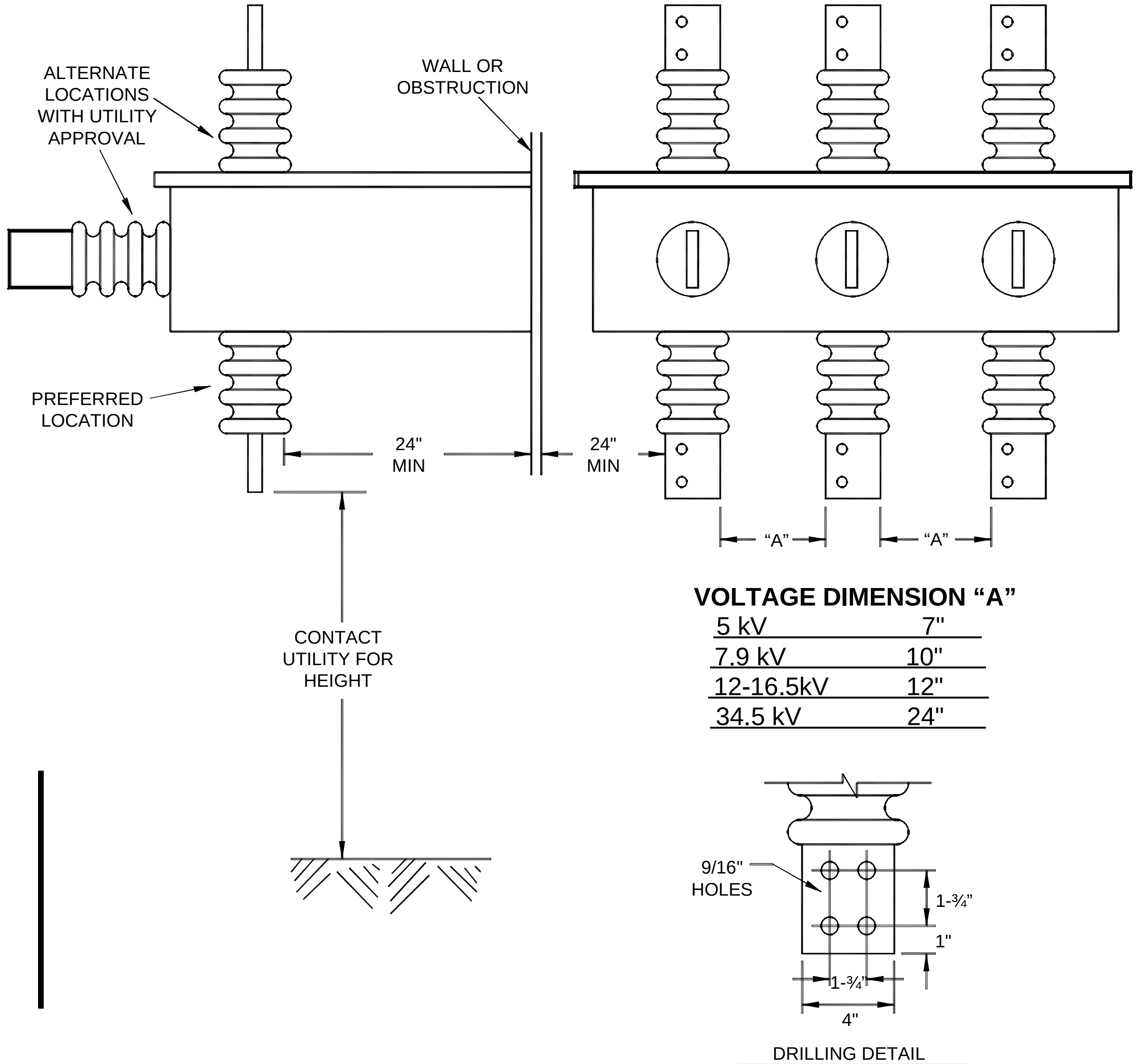
1. Consult NVE Meter Services regarding the metering cubicle requirements.
2. Consult NVE New Business for number of service cables, number, size, and location of service conduits; type of pull section and type of termination required.
3. The metering sequence may be either main–metering or metering-main.
4. An insulated neutral landing is required.
5. See RPI-2 for required clear working space in front of the removable enclosing panels.
6. The removable enclosing panels shall normally be front or back. Consult NVE for special permission to locate the removable enclosing panels on the side. Removable enclosing panels shall be provided with a 12” minimum access distance to busses, measured from the busses to the panels with the panels in place. Consult NVE for full door requirements.
7. The removable enclosing panels shall each be sealable, provided with two lifting handles, and limited to a maximum size of 9 square feet.
8. Furnish and install one piece of Unistrut p 1000 (or equivalent) channel as shown.
9. BIL for the pull section shall be not less than that for the customer’s associated switchgear



INSULATION CLASS KV	DIMENSIONS (INCHES*) WITHOUT MOUNTING BRACKET				
	MAXIMUM OVERALL DIMENSIONS			MOUNTING DIMENSIONS	
	"A"	"B"	"C"	"M"	"N"
5.0	11-1/2	13	13	8-1/2	6-1/4
8.7	14-1/2	15-1/2	18-1/2	10	8-5/8
15.0	14-1/2	15-1/2	18-1/2	10	8-5/8

* Unless otherwise indicated tolerance, plus or minus 1/16 inch.

INSULATION, RATIO, VOLTAGE, AND BIL DATA			
INSULATION CLASS KV	MARKED RATIO	PRIMARY VOLTAGE RATING, VOLTS	KV BIL
5.0	20:1	2400	60
5.0	35:1	4200	60
5.0	40:1	4800	60
8.7	35:1	4200	75
8.7	40:1	4800	75
15.0	60:1	7200	110
15.0	70:1	6400	110
15.0	100:1	12000	110
15.0	120:1	14400	110
15.0	150:1	16500	110



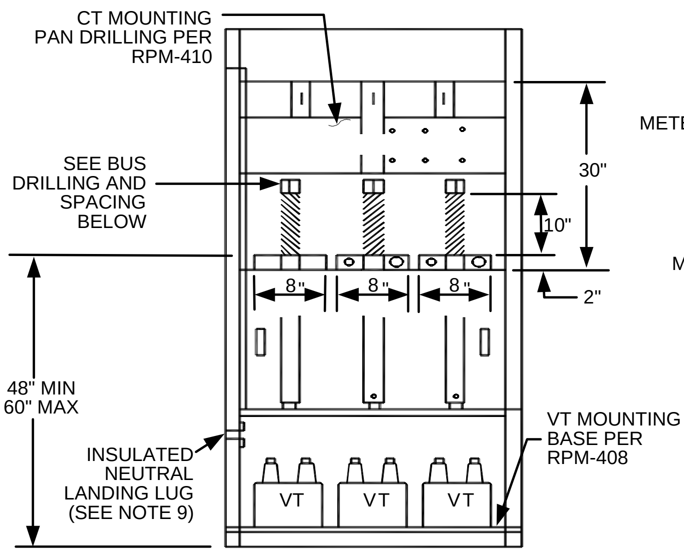
VOLTAGE DIMENSION "A"

5 kV	7"
7.9 kV	10"
12-16.5kV	12"
34.5 kV	24"

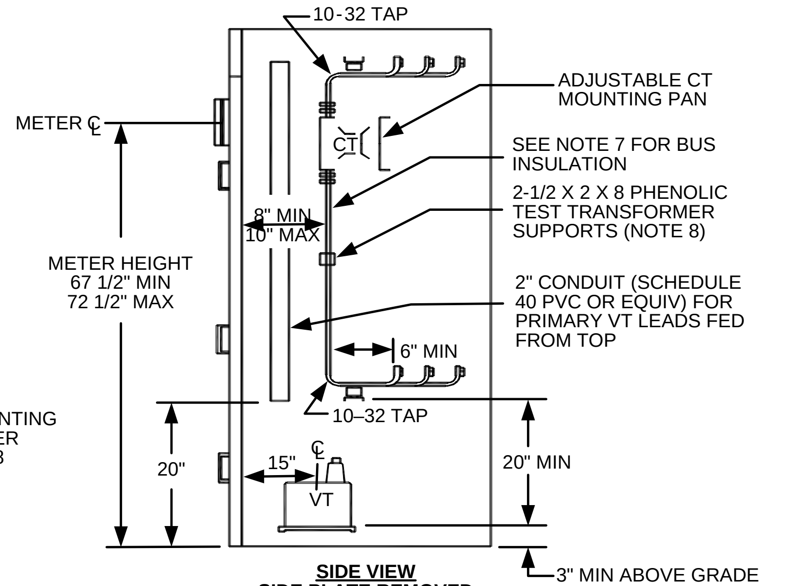
NOTES:

1. Number and size of lugs to be specified by utility.
2. Bushings to be spaced as shown in table above.
3. All bushings shall meet NEMA standards for creep distance, except 16.5kV which shall have 15" minimum creep distance.

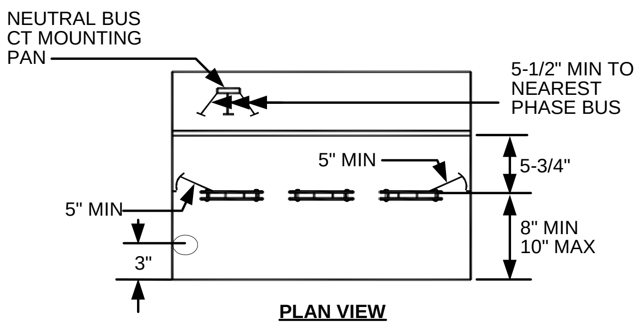
THIS PAGE INTENTIONALLY LEFT BLANK



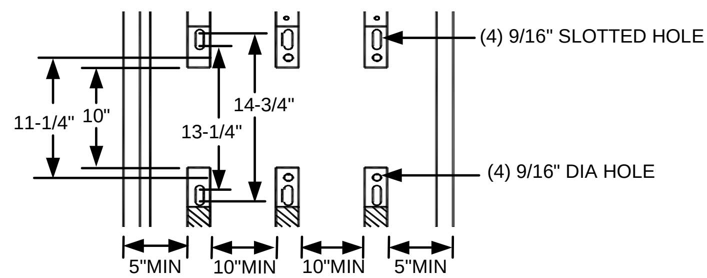
FRONT VIEW
CT & VT COMPARTMENT COVERS REMOVED



SIDE VIEW
SIDE PLATE REMOVED



PLAN VIEW
CT COMPARTMENT ONLY

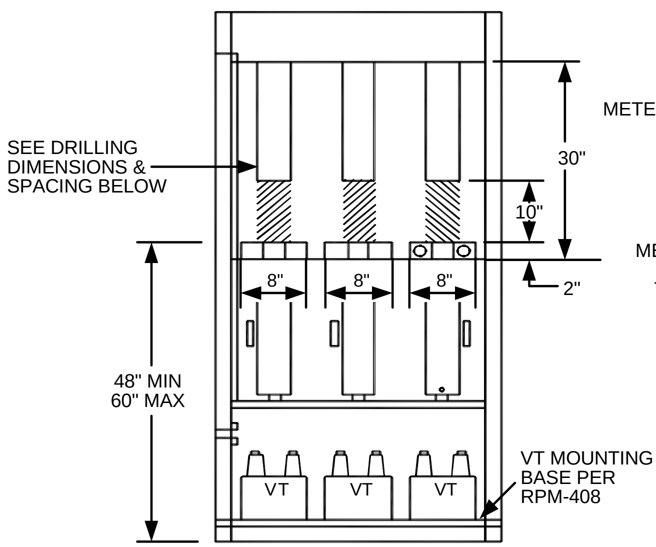


CT COMPARTMENT DETAIL

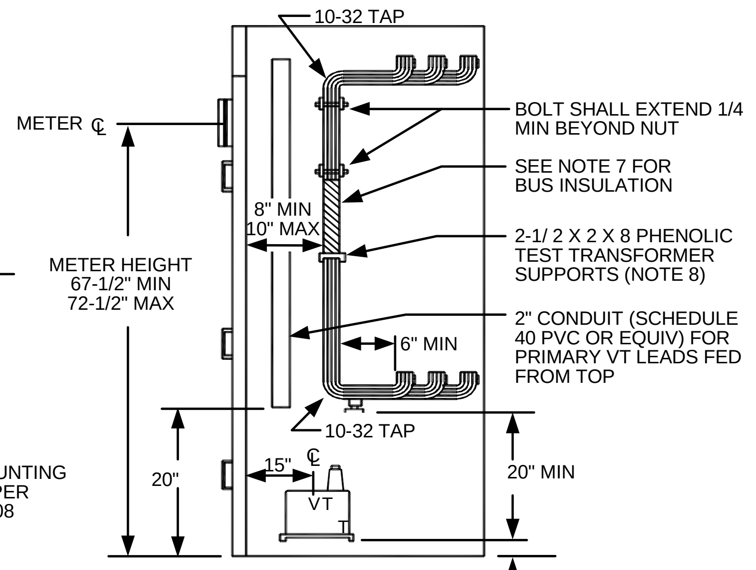
NOTES:

1. Bus Insulation and supports are required as shown above.
2. Bus dimensions: Maximum- ¾"x2"; Minimum- ¼"x1-1/2".
3. Access panels shall be equipped with two handles and attached with studs and wing nuts or may be side hinged. Panels shall not exceed 9 square feet in area.
4. Serving agency shall specify sequence of metering.
5. Clearance to side of cubicle shall be increased by the amount by which the corner angle exceeds 1-1/2".
6. Direction of feed may be from bottom to top or from top to bottom.
7. Bus insulation in test section: Round bus corners to prevent damage to tape, six layers of 7 Mil VC tape, tow layers of friction tape, finish with insulating varnish, or equal taping methods may be used. Equivalent phenolic insulated bus may be used in lieu of taping.
8. A continuous bar of insulating material may be installed across the compartment in lieu of the supports shown.
9. An insulated neutral landing lug shall be provided for 4-wire service.

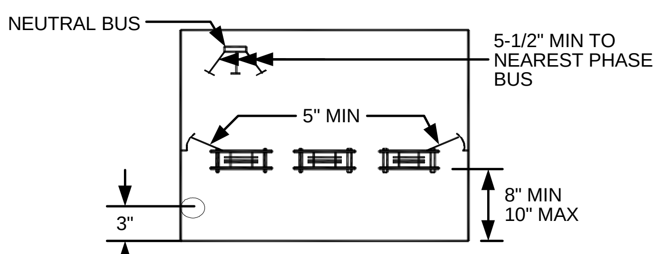
THIS PAGE INTENTIONALLY LEFT BLANK



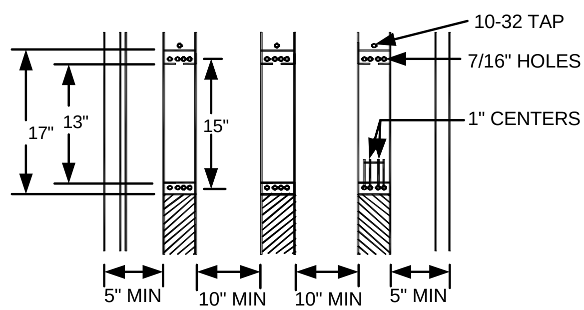
FRONT VIEW
CT & VT COMPARTMENT COVERS REMOVED



SIDE VIEW
SIDE PLATE REMOVED



PLAN VIEW
CT COMPARTMENT ONLY



CT COMPARTMENT DETAIL

NOTES:

1. Bus insulation and supports are required as shown above.
2. Maximum permissible bus unit: Four ¼” x 4” bars spaced ¼”.
3. Access panels shall be equipped with two lifting handles and attached with studs and wing nuts or may be side hinged. Panels shall not exceed 9 square feet in area.
4. Serving agency shall specify sequence of metering.
5. Clearance to side of cubicle shall be increased by the amount by which the corner angle exceeds 1-1/2”.
6. Direction of feed may be from bottom to top or top to bottom.
7. Bus insulation in test section: Round bus corners to prevent damage to tape, six layers of 7 Mil VC tape, two layers of friction tape, finish with insulating varnish, or equal taping methods may be used. Equivalent phenolic insulated bus may be used in lieu of taping.
8. A continuous bar of insulating material may be installed across the compartment in lieu of the supports shown.
9. An insulated neutral landing lug shall be provided for 4 wire services.

THIS PAGE INTENTIONALLY LEFT BLANK

Table of Contents

THIS PAGE INTENTIONALLY LEFT BLANK

1. Table of Contents

2. Purpose

The purpose of this document is to present the Utility's planning and design requirements for generators connected to and operating in parallel with the Electric Systems to ensure the safety of people and property and the integrity of the Electric System.

This document is applicable to those individual generators located at a single electrical location with an aggregate nameplate capacity less than 10 MW. For purposes of complying with NV Energy's Rule 15 interconnection tariff, Energy Storage Devices (ESD) including electrical batteries are considered to be generators within this document.

3. Definitions

3.1. The Utility: NV Energy (NVE).

3.2. System User: Any customer connected to the Transmission or Distribution System.

3.3. Electric System: The combined Distribution and Transmission System of the Utility and all connected loads and generation sources.

3.4 Energy Storage Device (ESD): A device that captures energy produced at one time, stores that energy for a period of time, and delivers that energy as electricity for use at a future time. It is considered a generator within this standard document.

3.5. Distribution System: Those electric facilities owned, controlled, and operated by the Utility that are not classified as part of the transmission system by the Federal Energy Regulatory Commission and subject to Utility's open access transmission tariff (OATT) on file with the FERC.

3.6. Transmission System: Those facilities that are owned, controlled, and operated by the Utility that are classified as part of the transmission function in the Utility's open access transmission tariff (OATT) on file with the FERC.

3.7. Parallel Generator: A generator that is interconnected to and operates in parallel with the Electric System.

3.8. Interconnection Study: The Interconnection Study examines steady state effects caused by parallel generators on the Utility Electric System.

3.9. Network Studies: The Network Study is performed using computer programs to determine the nature of any system impacts and to identify the corrective actions necessary to minimize theses effects.

3.10. Parallel Operation: The operation of a system in which generation can be connected to a bus common with the Electric System for more than fifteen seconds such that power transfer between the Parallel Generator's facilities and the Distribution System may result.

3.11. Capacity: The nameplate rating or aggregate total of the nameplate ratings of all of the units at one location.

3.12. WECC: Western Electric Coordinating Council

3.13 Backup Equipment: The hardware and control system that interrupts a Net Metering System's and Energy Storage Device's Parallel Operating functions, disconnects a power source from the Utility grid, and changes over to a Backup Operation mode.

3.14 Backup Operation: The disconnection from the Utility grid and continuing operation of a power source in the event of the loss of Utility power service. Also called a "Microgrid". All devices must be effectively isolated from the Utility grid while in a Backup Operation mode.

4. Disclaimers

The standards outlined in Section 8.0 herein are for the protection of the Utility and System Users and are not for the protection of the Parallel Generator. The Utility's recommendations for Parallel Generator protection are included in Section 9.0. Such recommendations are not intended to be a comprehensive and exhaustive list of relays or equipment required to protect the Parallel Generator. The Parallel Generator is responsible for the protection of the generator and associated equipment.

5. Interconnection and Network Study Requirements

An Interconnection Study, (See Attachments 2 & 3 for required data) which develops requirements and alternatives with supporting cost estimates for the required interconnection facilities, will be required when the Utility determines that the addition of the proposed Parallel Generation has the potential to cause the circuit to operate outside normal operating parameters. In addition a Network Study may also be required when the Utility believes that the size and location of the proposed generation has the potential to result in system conditions that might adversely impact the system during transient conditions. The customer must submit additional technical data if a Network Study (see attachments 2 & 3) must be conducted. The Utility will coordinate all necessary studies.

5.1 Interconnection Study

The Interconnection Study examines steady effects caused by the Parallel Generators on the Electric System. The study is computer based and models the Parallel Generation within the Electric System.

The Study will determine the optimum interconnection alternative for the project and recommend a system that meets the Utility's reliability and quality of service standards.

5.2 Network Study

Network Studies are normally only required for specific applications of Parallel Generators over 5 MW. When justified by potential operating problems, which maybe caused by generation being added to the Electric System, Network Studies may be required. The Network Study is performed using a computer program to determine the nature of any system impacts and to identify the corrective actions necessary to minimize their affects, thereby assuring compliance with all WECC and the Utility reliability standards. Depending on the size of the Parallel Generator, the Network Studies may require internal the Utility review and possibly review by a WECC Study Group. All Network Studies are required to meet this WECC and the Utility Assessment Practices Document. The need for a Network Study will be determined by preliminary analysis of the Interconnection Study. The following factors influence the need for a Network Study.

- Size of the Parallel Generator.
- Location of the Parallel Generator with respect to the other generators or System User's loads.
- Probability of islanding the Parallel Generator with other loads.
- Electrical Strength of the interconnected Electric System.
- Connection to the EHV (230kV and above) system.
- Location and use of series capacitors-SSR

6. Metering Arrangements

Metering installations shall comply with the Utility's Electric Services and Metering Requirements.

7. Interconnection Agreement, Application Forms and Data Forms

The Parallel Generator must execute an interconnection agreement with the Utility prior to the interconnection and operation of the Parallel Generator.

8. Utility Design Requirements: Parallel Generator

The requirements include equipment standards, design standards, and some operating standards. The requirements are broken into two groups. The two groups are; Net Metering Systems (RE03) and all other Parallel Generators up to 10 MW.

8.1 Net Metering Systems

Refer to the Utility's Net Metering System Design and Operating Procedures, RE03, for requirements.

8.2 All Other Parallel Generators

8.2.1. Parallel Generators with a capacity of 10 MW or less (not including Net Metering Systems) shall meet all of the requirements of:

A. The National Electric Code,

B. Underwriters laboratories Inc.

C. Institute of Electrical and Electronic Engineers with IEEE Standard 1547 having particular application (The optional visible and lockable disconnects of IEEE 1547 are required).

D. National Electric Safety Code

8.2.2. In addition Parallel Generators with a capacity of 10MW or less (Not including Net Metering Systems) shall comply with the following:

8.2.2.1. Protective Functions shall be equipped with automatic means to prevent reconnection of the Generating Facility with the Distribution System unless the electric System service voltage and frequency is of specified settings and has been stable for a minimum of five minutes.

8.2.2.2. Circuit breakers or other interrupting devices at the Point of Delivery must be Certified or "Listed" (as defined in Article 100, the Definitions Section of the National Electrical Code) as suitable for the application. This includes being capable of interrupting maximum available fault current. For Parallel Generators with a capacity of one MVA or greater or where total generation capacity on a line segment is greater than 50% of the minimum load on that line segment, the Parallel generator shall be designed so that the failure of any one device shall not potentially compromise the safety and reliability of the Electric System. A line segment is a portion of a line that can be automatically isolated to create an island by the Utility's protective devices.

8.2.2.3. Power Factor: Parallel Generators with a capacity of less than 11kva shall operate at a power factor> 0.85 (lagging or leading) when output is >10% of rating. All other generating Units compromising a Parallel Generator shall be capable of and operate at some point within a range of a power factor of 0.95 (either leading or lagging). Operation outside this range is acceptable provided the reactive power of the Parallel Generator is used to meet the reactive power needs of on-site loads or that reactive power is otherwise provided under tariff by the Utility. The Parallel Generator shall notify the Utility if it is using the Parallel Generator for power factor correction.

8.2.2.4. Limits specific to single-phase generators. For single-phase generators connected to a shared single-phase secondary system, the maximum capacity shall be 20kva. Parallel Generators applied on a center-tap neutral 240-volt service must be installed such that no more than 6kva of imbalance in capacity exists between the two sides of the 240-volt service. For dedicated distribution transformer services, the limit of a single-phase Parallel Generator shall be the transformer nameplate rating.

8.2.2.5. Three-phase synchronous generators: Parallel Generator circuit breakers shall be three-phase devices with electronic or electromechanical control. The Parallel Generator shall be responsible for properly synchronizing its Parallel Generator with the Utility's Electric System by means of either a manual or automatic synchronizing function. Automatic synchronizing is required for all synchronous generators, which have a Short Circuit Contribution Ratio (SCCR) exceeding 0.05. A Parallel Generator whose SCCR exceeds 0.05 shall be equipped with protective functions suitable for detecting loss of synchronism and rapidly disconnecting the Parallel Generator from the Electric System. The Short Circuit Contribution Ratio is the ratio of the Parallel Generator's short circuit contribution to the Utility's short circuit contribution for a three-phase fault at the high voltage side of the transformer connecting the Parallel Generator to the Utility's system.

8.2.2.6. Unless otherwise agreed to between the Parallel Generator and the Utility, synchronous generators shall automatically regulate power factor, not voltage, while operating in parallel with the Electric System. Power system stabilization is specifically not required for Parallel Generators with Capacity under 10MW.

8.2.2.7. Induction Generators. Induction Generators do not require separate synchronizing equipment. Starting or rapid load functions on induction generators can adversely impact the Utility's Electric System's voltage. Corrective step-switched capacitors or other techniques may be necessary and may cause undesirable Ferro resonance. When these counter measures (e.g. additional capacitors) are installed on the Parallel Generator's side of the Point of Delivery, the Utility must review these measures. Additional equipment may be required to resolve this problem as a result of an Interconnection Study.

8.2.2.8. Inverter Systems. Utility-interactive inverters do not require separate synchronizing equipment. Non-Utility-interactive stand-alone inverters shall not be used for parallel operation with the Utility's Electric System.

8.2.2.9. Telemetering. If the nameplate rating of the Parallel Generator is 1 MW or greater, telemetering equipment may be required at the Parallel Generator's expense. If the Parallel Generator is interconnected to a Distribution System operating at a voltage below 10kV (Line-to-Line), then telemetering equipment may be required on Parallel Generators 250 kW or greater. The Utility shall only require telemetering to the extent that less intrusive and/or more cost effective options for providing the necessary data in real time are not available. The minimum information which will be remotely monitored with the telemetering equipment are listed as follows:

- Watts in/out
- Vars in/out
- Amps
- KWhr and kVARhr
- Line voltage at interconnection
- Interconnection breaker status/control
- Phase angle across the interconnection power circuit breaker
- The Utility may require any or all of the tests provided in the body and Annexes to IEEE 1547

8.2.2.10. Reclose Block. If the capacity of the connected parallel generation is greater than 1/3 of the minimum load of the distribution feeder, then recluse block for the energized distribution feeder will have to be installed on the Utility substation feeder breakers and backup feeder breakers that will be used to connect the generation to the Utility distribution and transmission system. Reclose block may not be required if an engineering study by a qualified electrical engineering consultant with extensive experience in completing Distribution Generation Interconnection Studies determines it is not necessary.

8.2.2.11. Instrument Transformers. Current transformers serving the interconnection relays shall be class C400 or better. Voltage transformer shall have an accuracy class of 1.2 and a VA rating adequate to carry the load on the circuit and stay within the accuracy class. Instrument transformers for the metering circuits will have separate requirements.

8.2.2.12. Additional requirements may apply where the Parallel Generator connects to a system on which the normal operating voltage is greater than 25kV.

8.3 Interconnecting Line Extension

8.3.1. If the Parallel Generator is connected to the Distribution System the design, procurement and construction of the interconnection line extension of the Parallel Generator shall be done in accordance with Rule 9.

8.3.2. If the Parallel Generator is connected to the Transmission System, the Utility will direct the design, procurement, and construction of any interconnection line extension.

8.3.3. All interconnecting transmission or distribution lines must be constructed in compliance with the Utility's applicable design, construction, and material standards. In addition, all rights-of-way and permits will be reviewed and accepted by the Utility. It is the responsibility of the Parallel Generator to obtain all necessary rights-of-way and permits.

8.3.4. The extension line (transmission or distribution) design will be submitted to the Utility for review to ensure that the proposed installation meets the minimum requirements as specified by the Utility. The minimum standards include, but are not limited to, the Utility's Transmission Line Standards, the Utility's Distribution Line Standards, and WECC Rules.

9. Protection Design Recommendations: Parallel Generator

The Parallel Generator is responsible for protection of its facilities from any and all sources of potential damage. The minimum design requirements in Section 8.0 are not intended to protect the Parallel Generator from every possible source of damage. It is recommended that the Parallel Generator utilize a Professional Engineer with Registration in the state where the Parallel Generator is located to appropriately specify, apply and integrate the Parallel Generator into the Electric System.

- Over/under-speed protection (IEEE 12/14)

- Phase and/or ground distance (IEEE 21)
- Reverse power protection (IEEE 32)
- Loss of excitation protection (IEEE 40)
- Loss of Phase/negative sequence protection (IEEE 46)
- Over current protection (IEEE 50/51)
- Machine ground protection (IEEE 64)
- Generator differential protection (IEEE 87G)
- Transformer difference protection (IEEE 87T)

Multifunction microprocessor relays having functions appropriate for the application can often perform a number of these functions. In critical applications relays are recommended.

Further guidance for the protection of generators can be found in publications such as IEEE/ANSI C37 series guide recommendations and IEEE publication catalog number 95TP 102.

10. Non-Net Metering Parallel Operating Energy Storage Devices

In addition to any applicable requirements in the sections above, all stand-alone Energy Storage Devices, or those paired with renewable generation that is not Net Metering, operating in parallel with the Utility Electric System shall also follow these requirements:

10.1 Initial Application

10.1.1. The initial application process shall begin in the Utility's online PowerClerk interconnection application web site.

10.1.2. Upon the Utility's review of the web application it may be decided that additional Interconnection Studies, Network Studies, or other tasks may be necessary.

10.1.3. The initial application will require at a minimum the following technical documents: a single line electrical diagram, a site plan indicating the layout and location of the to-be equipment, and technical specifications of the Energy Storage Device.

10.2 Metering Requirements

10.2.1. The Utility meter at the point of interconnection at main service entrance shall be exchanged with a bi-directional Utility meter in order to measure both possible directions of energy flow.

10.2.2. The bi-directional meter is necessary to accurately measure and support the Energy Storage Device's energy charging and discharging capabilities. Only an Energy Storage Device that is paired with a qualifying renewable generator on NV Energy's net metering program may be entitled to any renewable energy bill compensation credits, and in that respect, only any discharged energy from the Energy Storage Device that was sourced directly from the renewable generator.

10.3 Other Energy Storage Device Technical Requirements

10.3.1. The Utility's readily-accessible lockable and visible disconnecting means described by the IEEE 1547 standard is required. It must isolate all Energy Storage Devices from the Electric System. The installation of an Energy Storage Device must not cause any bypass of other pre-existing safety equipment.

10.3.2. The Utility visible disconnect must be located within 10 feet of the main service entrance.

10.3.3. The Utility visible disconnect must be identified with weather resistant, sunlight resistant, durable signage. The signage shall specifically mention that it is for disconnecting the "Energy Storage Device" or "Battery System" or similarly recognizable term.

10.3.4. There must be signage indicating the presence of an Energy Storage Device on the service entrance equipment and shall be weatherized and rated for outdoor use.

10.3.5. The breaker panel must have a label indicating which breaker is for the Energy Storage Device.

10.4 Backup Operation and Backup Equipment of an Energy Storage Device

10.4.1 Whole or partial building Backup Operation during a loss of utility power service using Energy Storage Devices is permitted.

10.4.2 The Backup Equipment used to engage the Backup Operating mode must prevent any and all exporting of power to the grid while in Backup Operating mode.

10.4.3 The Backup Equipment must use hardware that uses a physical break to interrupt the circuit. This hardware can include switches or relays. Devices that do not use a physical break to engage Backup Operation such as solid state relays or other semiconductors are not permitted.

10.4.4 For partial building backup designs, the set of backup loads must be located on a panel designated for Backup Operation that is separate from the main service panel.

10.4.5 For whole building backup designs, the main service panel may be used for Backup Operation if it will be isolated from the point of common coupling with the utility grid during outage conditions.

10.4.6 The Backup Equipment may be located either internally or externally to the Energy Storage Device.

10.4.7 The Backup Equipment does not preclude the requirement for an effective Visible Disconnect.

10.4.8 The Energy Storage Device and renewable generators must follow procedures outlined in the latest version of IEEE 1547 for reconnecting to the utility grid once power service is restored.

11. Attachments

Attachment 1: Parallel Generator Interconnection Application for Installations up to 200kW

Attachment 2: Parallel Generator Interconnection Application for Installations with a Capacity of 201kW to 10,000kW

Attachment 1
Parallel Generator Interconnection Application for Installations Up to 200kW

Facility Information	Where will the Generating Facility be Installed?		
Contact Person	Phone	Fax	Email Address
Company Name	Meter Number		
Street Address	City	State	Zip Code
Mailing Address (if different from street address)	City	State	Zip Code

Applicant Information	Who will be contractually obligated for this Generating Facility?		
Contact Person	Phone	Fax	Email Address
Company Name	Meter Number		
Street Address	City	State	Zip Code
Mailing Address (if different from street address)	City	State	Zip Code

Contractor/Installer Information	(if different from above)		
Contact Person	Phone	Fax	Email Address
Company Name	Meter Number		
Street Address	City	State	Zip Code
Mailing Address (if different from street address)	City	State	Zip Code

ATTACHMENT 1:
INSTALLATION QUESTIONS

1. How many Generators do you intend to install behind the single meter covered by this application for this Generating Facility? _________ *(Number of Generators)*

   Note: Multiple Generators connected through a single interface and controlled as one generating set count as one Generating Facility. Example: photovoltaic panels connected through a single inverter or multiple micro-turbines connected through a single interface and controlled as one generating set count as one Generating Facility. If you plan to use more than one type of Generator, please provide the information for each type and specify how many of each type you plan to use.

2. Do you plan to export to the Distribution System? ☐ Yes ☐ No

   If ***Yes***, continue to Question 2.1.

   If ***No***, Continue to Question 3.

   2.1. Is the Generating Facility a Qualifying Facility (QF)? ☐ Yes ☐ No

   2.2. What is the estimated net annual export in kWh? ____________ *(Net Export kWh)*

3. What mode of operation do you plan?

As Available	☐	Prime Power (Base Load)	☐
Demand Management	☐	Peak Shaving	☐
Combined Heat and Power	☐	Load Following	☐
Other (Describe):			

4. Do any of your generating units start by using grid power (motoring)? ☐ Yes ☐ No

   If ***Yes***, continue to Question 4.1.

   If ***No***, Continue to Question 5.

   4.1 What is your inrush current?_____________ *(Inrush Current)*

   4.2 What is the continuous ampere rating of your service entrance equipment? ___ *(Ampere Rating)*

5. Is the Gross Nameplate Rating of your Generating Facility system 10kVA or less? ☐ Yes ☐ No

   If ***Yes***, skip to Question 7

6. Short Circuit Current Capability:

   6.1. What is the short circuit current capability of the Generating Facility at the Generating Facility's terminals? ___________ *(Amps)* ____________ *(Nominal Voltage)*

   6.2. If you intend to have only one generating set behind the single meter covered by this application, skip to Question 14.3.

   6.3. During a distribution system fault, what is your short circuit contribution? ________ *(Amps)*

Note: To answer this question, you may need to gather the following from the Generator manufacturer:

1. Fault duration curve and fault current interrupt time of the interrupting device, or:

2. Synchronous machines only, the greater of:

a. Fault Current interrupt time of the interrupting device; including the:
Direct axis synchronous reactance (Xd),
Direct axis transient reactance (X'd), and
Direct axis subtransient reactance (X"d), or:

b. The inertia constant of prime mover or Generator, including the:
Direct axis synchronous reactance (Xd),
Direct axis transient reactance (X'd), and
Direct axis subtransient reactance (X"d).

7. Will you install a Dedicated Transformer in connection with the installation of your proposed Generating Facility? ☐ Yes ☐ No

   If ***Yes***, continue to Question 7.1.

   If ***No***, Continue to Question 8.

   7.1 If you are adding a transformer, please provide the following:

   ________ (Rating KVA) ________ (Primary Volts) ________ (Secondary Volts) ________ (Impedance)

8. What is your estimated date of initial operation? ____________________ *(Date)*

9. Is the unit a pre-packaged prime mover/generator/inverter/controller system? ☐ Yes ☐ No

   If ***Yes***, continue to Question 9.1.

   If ***No***, Continue to Question 11.

   9.1 Who is the manufacturer? _________________________________ *(Manufacturer Name)*

   9.2 What is the model number? _________________________________ *(Model Number)*

10. What are the Gross and Nameplate Ratings in KVA? __________ *(Gross KVA)* __________ *(Net KVA)*

11. Prime Mover Information:

What is the prime mover technology? Please check all of the appropriate boxes.

IC Engine	☐	Fuel Cell	☐	Comb. Turbine	☐
Microturbine	☐	Hydro	☐	Steam Turbine	☐
PV	☐	Wind	☐		
Other (Describe):					

11.1. Who is the prime mover manufacturer? ______________________________ *(Manufacturer Name)*

11.2. What is the prime mover model number? ________________________________ *(Model Number)*

12. Generator/Inverter Information:

Inverter	☐	Synchronous	☐	Single Phase	☐
Induction	☐			Three Phase	☐
Other (Describe):					

Who is the generator/inverter manufacturer? _______________________________ *(Manufacturer Name)*

What is the generator/inverter model number? _________________________________ *(Model Number)*

13. What is the power factor range of the generator/inverter? _____________*(Min)* _____________ *(Max)*

Is the range adjustable? ☐ Yes ☐ No

Note: When paralleled with the Utility's Distribution System, the unit is required to operate in a power factor regulation mode (not in voltage regulation mode).

14. The following attachments must accompany the application when you submit it (check if included):

- ☐ Complete and accurate protection diagrams including single-line meter relay and logic diagrams.
- ☐ A description of the proposed protection schemes and description of operations.
- ☐ Maintenance plans for the interconnection protective devices and interconnection interrupting devices.
- ☐ Any other documentation and certifications that may assist The Utility in approving your generating unit for interconnection with The Utility's distribution system.

ATTACHMENT 2

Parallel Generator Interconnection Application for Installations with a Capacity of 201kW to 10,000kW

Facility Information	**Where will the Generating Facility be Installed?**		
Contact Person	Phone	Fax	Email Address
Company Name	Meter Number		
Street Address	City	State	Zip Code
Mailing Address (if different from street address)	City	State	Zip Code

Applicant Information	**Who will be contractually obligated for this Generating Facility?**		
Contact Person	Phone	Fax	Email Address
Company Name	Meter Number		
Street Address	City	State	Zip Code
Mailing Address (if different from street address)	City	State	Zip Code

Contractor/Installer Information	**(if different from above)**		
Contact Person	Phone	Fax	Email Address
Company Name	Meter Number		
Street Address	City	State	Zip Code
Mailing Address (if different from street address)	City	State	Zip Code

Attachment 3 Standard Data Required for a Generation Interconnection Study

Note: For values given in per unit, please include bases. If there are any questions concerning these forms, please contact The Utility.

*1. **A range and township site map** of the planned facilities with the turbine/generator, step/up transformer, and substation identified (please attach).

*2. **A one-line diagram** of the planned generation facilities (lease attach). The one-line diagram should include:

A. Transmission/Distribution Line(s)
B. Generators
C. Transformers
D. Motors
E. Breakers
F. Fuses
G. Lightning arrestors
H. Disconnect switchers
I. Power factor correction equipment (i.e., capacitors/reactors)
J. Station service loads
K. Other special devices

*3. **A construction schedule** with construction power, start-up power, and full load testing dates identified. If a more detailed schedule is available, please attach.

Start Construction: ____________________ *(date)*
Construction Complete: ____________________ *(date)*
Start-up, Begin Full-load Testing: ____________________ *(date)*
Full-load Testing Complete ____________________ *(date)*

*4, **An estimated one-line date** and the total future capacity for any additional generation added at the initial site.

MW: ____________________ *(date)*
MW: ____________________ *(date)*
MW: ____________________ *(date)*

5. **Turbine/generation Data:**

Information should be provided for each generator. Generators must be synchronous if aggregate is 1MVA or greater.

	Unit 1	Unit 2	Unit 3
A. Type of generating unit (i.e., induction or synchronous)	_______	_______	_______
Manufacturer	_______	_______	_______
Excitation system type	_______	_______	_______
B. Rated MVA	_______	_______	_______
C. Maximum Gross Output (MW)	_______	_______	_______
D. Rated leading power factor	_______	_______	_______
Rated lagging power factor	_______	_______	_______
E. Nominal voltage and acceptable voltage range (volts +/-%)	_______	_______	_______
F. Estimated load factor, number of hours/year of operation, or MWH/year.	_______	_______	_______
G. Stability Data:			
1. Inertia of turbine/generator (MW-Sec)	_______	_______	_______
2. Transient direct axis reactance (PU)	_______	_______	_______
3. Excitation system data (Note 1, Attach)	_______	_______	_______
4. Governor data (Note 1, Attach)	_______	_______	_______
5. Laplace transform block diagrams of the control equipment (Note 1, Attach)	_______	_______	_______
H. Voltage/Frequency Limits			
1. Pickup settings	_______	_______	_______
2. Roll off rates	_______	_______	_______
I. Minimum/maximum Excitation Limits			
1. Underexcitation			
a. Instantaneous	_______	_______	_______
b. Time delayed	_______	_______	_______
2. Overexcitation			
a. Instantaneous	_______	_______	_______
b. Time delayed	_______	_______	_______

Note 1: This information may not be required for an Interconnection Study, but required before the actual operation of the unit.

6. **Step Up Transformer Data:**

Note: Information should be provided for each transformer. Step-up transformer(s) shall normally be grounded WYE on the high voltage winding. Other configurations on the high side winding are acceptable where the Parallel Generator's engineer can demonstrate satisfactory performance in detecting and clearing the Parallel Generator from faults on The Utility's electric system

	XFMR 1	XFMR 2	XFMR 3
A. Self-cooled and top MVA ratings (ONAN/OFAF MVA)	________	________	_______
B. Nominal voltage rating (kV) available taps for each winding (+/-%)	________	________	_______
C. Electrical configuration of each winding			
1. High side winding	________	________	_______
2. Low side winding	________	________	_______
D. Impedance of the OA Base (%)			
1. Positive sequence	________	________	_______
2. Zero sequence	________	________	_______

7. Auxiliary Load Data:

A. Maximum load and power factor (i.e., during plant shutdown and minimum facilities operating) __________________ *(kW & PF)*

B. Maximum load during start-up __________________ *(kVA)*

C. Maximum load and power factor during normal operation (KW & PF). Provide for one unit operating, two units operating, etc.

One Unit Operating __________________ *(kW & PF)*

Two Units Operating __________________ *(kW & PF)*

Etc.

D. Largest motor to be started __________________ *(HP)*

Starting method __________________ *(Starting Method))*

Inrush KVA at rated motor voltage __________________ *(kVA)*

Starts per hour __________________ *(Starts)*

8. Conductor, spacing, and length of any distribution or transmission lines planned to be constructed by the power producer:

A. Conductor size & type __________________ *(Conductor Size/Type)*

B. Spacing __________________ *(Feet)*

C. Length __________________ *(Miles)*

D. Voltage __________________ *(kV)*

1. Table of Contents

2. Purpose

The purpose of this document is to present the Utility's planning and design requirements for generators connected to and operating in parallel with the Electric System to ensure the safety of people and property and the integrity of the Electric System.

This documentation is applicable to those individual generators or group of generators located at a single electrical location with an aggregate nameplate capacity greater than 10 MW.

The requirements herein for generators located at a single electrical location with an aggregate capacity of greater than 10 MW are general in nature and specific installations may be subject to additional requirements as determined in the reasonable judgment of the Utility.

3. Definitions

3.1 The Utility: NV Energy (NVE).

3.2 System User: Any customer connected to the Transmission or Distribution System.

3.3 Electric System: The combined Distribution and Transmission System of the Utility and all connected loads and generation sources.

3.4 Distribution System: Those electric facilities owned, controlled, and operated but the Utility that are not classified as part of the transmission system by the Federal Energy Regulatory Commission and subject to the Utility's open access transmission tariff (OATT) on file with the FERC.

3.5 Transmission System: Those facilities that are owned, controlled, and operated by the Utility that are classified as part of the transmission function in the Utility's open access transmission tariff (OATT) on file with the FERC.

3.6 A Parallel Generator: A generator that is interconnected to and operates in parallel with the Electric System.

3.7 Interconnection Study: The Interconnection Study examines steady state effects caused by parallel generators on the Utility Electric System.

3.8 Network Studies: The Network Study is performed using computer programs to determine the nature of any system impacts and to identify the corrective actions necessary to minimize these affects.

3.9 Parallel Operation: The operation of a system in which generation can be connected to a bus common with the Electric System such that power transfer between the Parallel Generator's facilities and the Distribution System mat result.

3.10 Capacity: The nameplate rating or aggregate total of the nameplate ratings of all of the units at one location.

3.11 WECC: Western Electric Coordinating Council.

4. Disclaimers

The standards outlined in Section 8.0 herein are for the protection of the Utility and System Users and are not for the protection of the Parallel Generator. The Utility's recommendations for Parallel Generator protection are included in Section 9.0. Such recommendations are not intended to be a comprehensive and exhaustive list of relays or equipment required to protect the Parallel Generator. The Parallel Generator is responsible for the protection of the generator and associated equipment.

5. Interconnection and Networking Study Requirements

An Interconnection Study, which develops requirements and alternatives with supporting cost estimates for the required interconnection facilities for all Parallel Generators with a Capacity greater than 10 MW, will be required. A Network Study may be required when the Utility believes that the size and location of the proposed generation may adversely impact the Electric System by decreasing reliability or degrading power quality below the values specified in approved tariffs and the Utility's standards. The Parallel Generator shall submit all data for the initial application (Attachment 1) and additional information as spelled out on Attachment 2 if a Network Study is required. In some cases, information in addition to that specified on the standard forms may be required to perform the necessary studies. The Utility will coordinate all necessary studies.

5.1 Interconnection Study

The Interconnection Study examines steady state effects caused by the Parallel Generators on the Electric System. The study is computer based and models the Parallel Generation within the Electric System.

The study will determine the optimum interconnection alternative for the project and recommend a system that meets the Utility's reliability and quality of service standards.

5.2 Network Study

Due to potential problems which may be caused by generation being added to the transmission system, Network Studies may be required. The Network Study is performed using computer programs to determine the nature of any system impacts and to identify the corrective actions necessary to minimize their affects, thereby assuring compliance with all WECC and Utility reliability standards. Depending on the size of the Parallel Generator, the Network Studies may require internal Utility review and possibly review by a WECC Study Group. All Network Studies are required to meet this WECC and Utility Assessment Practices Document. The need for a Network Study will be determined by preliminary analysis of the Interconnection Study. The following factors influence the need for a Network Study.

- Size of the Parallel Generator
- Location of the Parallel Generator with respect to other generators or System User's loads.
- Probability of islanding the Parallel generator
- Electrical Strength of the interconnected Electric System
- Location and use of series capacitors- SSR

6. Metering Arrangements

Metering installations shall comply with the Utility's Electric Service and Metering Requirements.

7. Interconnection Agreement, Application Forms and Data Forms

The application for interconnection is provided as Attachment 1.

The Parallel Generator must execute an interconnection agreement with the Utility prior to the interconnection and operation of the Parallel Generator.

8. Design Requirements: Parallel Generator

The following requirements are intended to protect other System Users and the Utility. The Parallel Generator may wish to install additional protective equipment for the protection of his facilities. Protection of the Parallel Generator and associated equipment is the sole responsibility of the Parallel Generator.

8.1 Interconnection Facility:

If the Parallel Generator is connected to the Transmission System, and the interconnection switchyard is an integral part of the Utility's transmission system, used to carry power on the transmission grid for the Utility or other customer's, then the Utility will direct the design, procurement, and construction of the interconnection facility (point of delivery), separate from the generator facilities, that will isolate the generation from the Electric System when required.

If the Parallel Generator is connected to the Transmission System and the interconnection switchyard's sole function is to correct the parallel generator to the transmission system for the present or in the future, then the parallel generator will have sole responsibility for the design, procurement, and construction, and maintenance of the interconnection facility (point of delivery). The interconnection facility design shall be reviewed and accepted by the Utility and on any relaying installed, shall be compatible with the Utility's standard relaying practices as required. The interconnection facility and/or generation plant shall make provisions for any required Utility communications or metering equipment.

If the Parallel Generator is connected to the Distribution System, the design, procurement and construction of the interconnection facilities of the Parallel Generator shall be done in accordance with Rule 9 and Rule 15. All members of the WECC have agreed to minimum requirements for both their generating units and system operations. All Parallel Generator will comply with these same minimum requirements. These requirements are published by the WECC in "Interconnection Guidelines or IPP's," available from the Utility or the WECC.

8.1.1 Interconnection Facility Components:

The interconnection facility, as a minimum, will consist of a suitably controlled environment, the interrupting and isolating device(s), protective control devices, and data-acquisition equipment. All the above will be enclosed in a fenced yard with restricted access. The Utility's Substation Construction Standards present the minimum design specifications for substation interconnection facilities which supplement the following requirements:

8.1.2 The control building will be temperature controlled and weatherproof to enclose the AC and DC power sources, relaying equipment, telemetering, supervisory RTU, and communication equipment.

8.1.3 The interrupting device will be a power circuit breaker capable of interrupting maximum available fault circuit or industry-standard minimum levels which ever is greater. It shall be directly controlled by the Utility's supervisory control system via Remote Terminal Unit (RTU).

Air-break switches will be installed on each side of the circuit breaker to isolate the breaker for inspection and maintenance purposes. Single-breaker schemes will not include bypass provisions. Where transmission lines terminate on switches, ground blades will be required (Kirk-key interlocks are required on disconnect switches used with ground switches).

8.1.4 The following protective relays will be installed at the interconnection point (minimum requirement). Typical settings required by the Utility are defined below. The Utility will provide site-specific settings prior to interconnection testing.

- Phase and Neutral Overcurrent Relays (IEEE 50/51): The Phase and Neutral Overcurrent Relays (IEEE 50/51) shall be microprocessor based relays with fault current and voltage event reporting capability and communication ports.
- Over/Under-voltage Relays (IEEE 27/59) Over/under-voltage protection will be set to pick up at ± 10 percent deviation from nominal with a definite time to trip of 3.0 seconds. In addition, a high-speed (0.15 seconds) trip will be initiated if the voltage at the interconnection exceeds 120 percent of nominal.
- Over/under-Frequency Relays (IEEE81): Under-frequency protection will typically be set per WECC and manufacturer's Guidelines. The turbine generator supplied by the Parallel Generator should be designed to operate at 58.0Hz for 15 seconds without any loss of life. Over-frequency protection will also be set per WECC Guideline.
- Synch-Check Relay (IEEE 25): This synch-check relay has to be designed for synchronizing a generator onto the Electric System. It will prevent the circuit breaker from closing under excessive phase-angle differences. This relay will also be designed to prevent the generator from energizing a dead Utility circuit.

These functions may be provided by redundant multifunction relays.

8.1.5 Instrument Transformers. Current transformers serving interconnection relays shall be class C400 or better if contained in a single switchgear with the interconnection relays. C800 current transformers shall be used if the current transformer circuits run between separate sets of switchgear or outdoor circuit breakers and a switchgear cabinet or control house. Voltage transformers shall have an accuracy class of 1.2 and a VA rating adequate to carry the load on the circuit and stay within the accuracy class. Instrument transformers for the metering circuits will have separate requirements.

8.1.6 A Supervisory Remote Terminal Unit will be installed at the interconnection facility with the necessary interface to connect it to the Utility's communications system. This system will provide telemetering and control.

The minimum information which will be remotely monitored with the telemetering equipment is listed as follows:

- Watts in/out
- Vars in/out
- Amps
- KWhr and kVARhr
- Line voltage at interconnection
- Interconnection breaker status/control
- Phase angle across the interconnection power circuit breaker.

8.2 Electric System Modifications required to Support Parallel Generator

In addition to the above requirements, new and/or upgraded distribution or transmission lines, replacement and upgrades of existing protective device(s) at other locations on the Electric System may be necessary as a result of the addition of the generation. This may include but not be limited to, distribution and/or transmission lines, breakers, relays, controls, and other protective devices.

Additional Electric System protection may be required if the Parallel Generator can be isolated with a portion of the Electric System so that the minimum load is less than or equal to the total output of all Parallel Generators on that portion of the Electric System. Additional relaying, a scheme utilizing transfer tripping, or some other method to minimize potential adverse effects caused by the Parallel Generator may be needed. Interconnection and Network Study results will determine any additional protection requirements.

8.2.1 Reclose Block: Reclose Block for Hot Line will be required on the circuit breaker(s) in the Utility substation(s) connecting the Parallel Generator to the Utility grid.

8.3 Interconnecting Line Extension

8.3.1 If the Parallel Generator is connected to the Distribution System the design, procurement and construction of the interconnection line extension of the Parallel Generator shall be done in accordance with Rule 9.

8.3.2 If the Parallel Generator is connected to the Transmission System, the Utility will direct the design, procurement, and construction of any interconnection line extension.

8.3.3 All interconnecting transmission or distribution lines must be constructed in compliance with the Utility's applicable design, construction, and material standards. In addition, all rights-of-way and permits will be reviewed and accepted by the Utility. It is the responsibility of the Parallel Generator to obtain all necessary rights-of-way and permits.

8.3.4 The extension line (Transmission or Distribution) design will be submitted to the Utility for review to ensure that the proposed installation meets the minimum requirements as specified by the Utility. The minimum standards include, but are not limited to, the Utility's Transmission Line Standards, the Utility's Distribution Line Standards, and WECC Rules.

8.4 Parallel Generator Facility Design Requirements

This section provides the minimum requirements that the Parallel Generator must meet for major equipment, design review, and design responsibility.

It is the Parallel Generator's responsibility to provide to the Utility, copies of operating manuals and procedures for Parallel Generator equipment.

Applicable codes- Installation of the Parallel Generator must meet all applicable national, state, and local building and safety codes such as but not limited to the National Electric Code, National Electric Safety Code (ANSI C2), ANSI and IEEE Standards, NEMA standards for electrical materials and equipment, and the Utility standards, as are in effect at the time of initial Parallel Operation and thereafter as may be required. The Parallel Generator is responsible for obtaining project approval, as necessary, from local authorities.

8.5 Major Equipment Requirements

8.5.1 Synchronous Generation- Units or groups of smaller units in one location with individual or total aggregate capacity of 10,000KVA or larger must use synchronous generators with speed-droop governors and high-speed excitation systems. The Utility may require direct or indirect voltage or power factor control of these units to maintain acceptable system operation. Multiple generator unit installations will require control voltage systems that provide for coordinated group operation. The Parallel Generator shall furnish reactive power as may be reasonably required by the Utility. The Utility will specify that generators with power factor control capability, including synchronous generators, be capable of operating continuously at any power factor between 95 percent leading (absorbing vars) and 90 percent lagging (producing vars) at any voltage level within ± 5.0 percent of rated voltage. For other types of generators with no inherent power factor control capability, the Utility reserves the right to specify the installation of capacitors by the Parallel Generator to correct generation output to near 95 percent leading power factor. The Utility may also require the installation of switched capacitors on its system to produce the amount of reactive support equivalent to that provided by operating a synchronous generator of the same size.

8.5.2 Exception: Units or groups of units connected directly to the Distribution System at a voltage of 25 kV or below must be reviewed for safety, security, and transient response associated with islanding conditions. Induction rather than synchronous generation may be required depending on the conclusions of this review. The Utility will specify induction or synchronous generation in those cases subsequent to the interconnection/transient studies.

8.5.3 Power Transformer- All step-up power transformers connected to the Electric System must have a grounded wye high-voltage winding. It is recommended that the low-voltage winding (generator side) of the step-up transformer be a delta connection (however, this connection may cause unacceptably high line to ground fault currents on the Utility distribution system and may need to be avoided for that reason). The nominal voltage ratings (high-side and BIL) must be compatible with the system voltages on the line to which it is attached. Nameplate drawing and certified test results detailing the losses and positive and zero sequence diagrams with impedance values of the transformer must be provided to the Utility.

8.5.4 Generator Controls. All generation facilities control equipment (continuous voltage regulators, limiters, controllers, etc.) will be functionally tested prior to final commissioning of the plant. Copies of all control equipment Laplace transform block diagrams will be forwarded to the Utility.

8.5.5 Speed-Droop Governors. Individual or groups of generators with a capacity greater than 10MW are required to have speed-droop governors with a permanent droop setting of 5% while synchronized to the Electric System. Separate generation controllers will have to be reviewed and accepted before the unit will be allowed to go into service.

8.5.6 High Speed Excitation/Initial Response Systems. Individual or group of generators with a capacity greater than 10 MW shall have high speed excitation/high initial response systems with operational, continuously acting (IEEE 421.1-latest revision), automatic voltage regulators. The excitation system nominal response (IEEE421.1-latest revision) of said systems are required to be 0.5 or greater. The Parallel Generator must supply the Utility with test results documenting the response ratio performance. In addition, the maximum ceiling voltage and time to reach 95% of ceiling voltage upon sudden application of circuit conditions which would obtain exciter ceiling voltage shall also be supplied.

8.5.7 Power Factor Controller/Voltage Controller. Individual or groups of generators with a capacity greater than 10MW may be required to have a power factor controller(s) or alternatively to have voltage controller(s) to regulate system voltage via the generator voltage regulator. Voltage and Power factor controller(s) shall be designed to be fully compatible with high-speed excitation system requirements described in Section 8.5.6 Determination of this requirement will be dependent on the results of the Interconnection Study performed by the Utility. All controllers will be continuous in operation.

8.5.7.1 Plants having more than one generator shall be designed with parallel power factor or voltage controls such that all units making up individual plants will operate as one unit.

8.5.7.2 The Parallel Generator shall provide the following information to the Utility.

8.5.7.3 Type of parallel compensation to be used on their generators while paralleled to the Electric System.

8.5.7.4 All proposed settings.

8.5.7.5 Drawings of the voltage control equipment and settings.

8.5.8 Voltage/Frequency Limiting. Each individual generator shall have voltage/frequency limiting within its excitation system. The settings and the roll off rates are to be forwarded to the Utility.

8.5.9 Excitation Limiting: Each individual generator shall have a minimum/maximum excitation limiting within its excitation system. All instantaneous and time delayed thresholds and time settings for under-over-excitation are to be forwarded to the Utility.

8.5.10 Power System Stabilizers (PSS): Pursuant to the WECC policy statement on Power System Stabilizers, each individual generator in an installation with Capacity greater than 10 MW is required to have a PSS installed with its excitation system. The calibration, testing, and operation of PSS equipment must be conducted in accordance with WECC standard procedures. The test reports of the calibrated PSS must be submitted to the Utility for review and acceptance. The PSS shall be tested along with the overall facility. The facility will not be considered operational until calibration of the PSS has been performed to meet the Utility's standards. A copy of the WECC Power System Stabilizer Test Procedures may be obtained from the Utility.

8.5.11 Testing: Testing of the Parallel Generators and all control equipment will be performed prior to final commissioning of the plant. An individual qualified in testing protective equipment (professional engineer, factory-certified technician, or licensed electrician with experience in testing protective equipment) must perform all required testing in accordance with the applicable accepted test procedure to prove the settings and compliance with the requirements of this document. At the option of the Utility, a Utility representative may be present to witness the testing. The tests described are intended to provide assurance that the Parallel Generator will not adversely affect the Utility's Electric System and that it will cease providing power to the grid under abnormal conditions and to validate generating performance and modeling values. The test were developed assuming a low level of Generating Facility penetration. At high levels of Generating Facility penetration, other requirements and corresponding test procedures may need to be defined.

8.5.12 Upon initial Parallel Operation of a generating system, or any time interface hardware or software is changed that may affect the functions listed below, a Commissioning Test must be performed. The Utility has the right to witness Commissioning Tests as described below or to require written certification by the installer describing which tests were performed and their results. Functions to be tested during commissioning, may include any or all of the following:

- Over-and Under-voltage
- Over and Under-frequency
- Anti-Islanding function (if applicable)
- Non-Exporting function (if applicable)
- Inability to energize dead line
- Time delay restart after the Utility source is stable
- The Utility system fault detection (if used)
- Synchronizing controls (if applicable)
- Other interconnection protections that may be required as part of the Interconnection Agreement

8.5.12.1 Other checks and tests that may need to be performed include:

- Verifying final protective settings
- Trip test
- In-service test

8.5.12.2 The following tests are also to be performed prior to commissioning:

- Synchronous Unit Reactive Limits (WECC guidelines).
- Dynamic Testing/Model Validation (WECC guidelines).

8.6 Other Design Requirements

It is the responsibility of the Parallel Generator to incorporate the following into the design of their generation facility. The Parallel Generator's design should not be limited to only these items.

8.6.1 Full Load Rejection – The Parallel Generator must be designed with the capacity or protection to withstand loss of Electric System interconnection or load. The Utility is not responsible for damage to the Parallel Generator caused by a service interruption during abnormal Electric System conditions or the Utility Electric System reclosing.

8.6.2 Primary Voltage Changes – The generator exciter system and voltage regulation equipment on synchronous generators must be capable of operating subject to normal primary voltage changes on the Electric System ranging from 7.5% above or below nominal primary voltage to ±10% during emergency conditions. During a disturbance, the voltage may fluctuate beyond the ± 10% range. Therefore, it is the Parallel Generator's responsibility to protect all equipment from voltage excursions.

8.6.3 Harmonics – The Parallel Generator shall not cause unacceptable distortion of the sinusoidal voltage or current wave-form. The maximum allowable total harmonic voltage (all harmonics) and current distortion can not exceed the values published in the latest revision of IEEE Standard 519.

8.6.4 Voltage Sag – Motor starting and switching operations are limited so that the momentary voltage sag (flicker) during motor starting or switching does not exceed the Utility's standards for nominal system voltage for any other System User. Analysis of these requirements will be included in the Utility's Interconnection Study.

8.6.5 Protective Functions shall be equipped with automatic means to prevent reconnection of the Generating Facility with the Distribution System unless the Electric System service voltage and frequency is of specified settings and has been stable for a minimum of one minute.

8.6.6 Protective Relaying

8.6.6.1 The protective relays listed below are the responsibility of the Parallel Generator. The proposed relay settings are to be approved, stamped, and signed by a Professional Electrical Engineer with registration in the state where the Parallel Generator is located. The Parallel Generator one-line and three-line diagrams shall be submitted to the Utility for acceptance prior to interconnection.

8.6.6.2 In addition to the protective relaying required by the Utility at the interconnection point, the Parallel Generator must, as a minimum, install at the Parallel Generator site the protective relays described below. These relays: 1) provide short circuit protection for the Electric System and 2) provide backup for the voltage and frequency relaying located at the interconnection facility.

8.6.6.3 As part of the design review, the submitted one-line diagrams must indicate the following:

- Generator protective devices and their functions
- Current and potential transformer ratios and ratings
- Wiring demarcation points (when required)
- Other protective device types, styles, and setting

Acceptance of the proposed settings is intended for the protection of the Electric System and shall not constitute the acceptance of the adequacy of relay settings or liability for any inadequacy that may affect protection of the equipment used by the Parallel Generator.

The protective relays listed below shall meet all applicable sections of ANSI/IEEE Standard C37.90 for relay and relay systems, and ANSI/IEEE Standard C37.90.1 for surge withstand capability.

All relays specified below shall be applied to each generating unit at the facility unless noted otherwise.

8.6.6.3.1 Over/under Voltage Protection (IEEE 27/59): Shall be set no higher than +10% of nominal each with 3.0 seconds of delay.

8.6.6.3.2 Over-frequency Protection (IEEE81): Shall be set per the WECC Off Nominal Frequency Policy, generator manufacturer's recommendations, and the Utility guidelines. Only solid state or digital relays (including multifunction) are acceptable for over/under-frequency protection.

8.6.6.3.3 Under-frequency Protection (IEEE 81): Shall be set per the WECC Off Nominal Frequency Policy, generator manufacturer's recommendations, and the Utility guidelines. Only solid state or digital relays (including multifunction) are acceptable for over/under-frequency protection.

8.6.6.3.4 Voltage Controlled or Restrained Phase Overcurrent Protection (IEEE 50V/51V). These relays provide primary protection for multi-phase faults on the Electric System. Their settings will have to be determined on a site specified basis in a cooperative effort between the Utility and the Parallel Generator. These relays must have voltage control or voltage restraint, as they may be set below the full output level of the generating unit. The relays shall respond to all multi-phase faults on the inter-connection line up to the interconnection breaker (or beyond this point, depending upon the terminal configuration of the interconnection facility), and shall trip with typical delays of 0.5-2.0 seconds.

8.6.6.3.5 Transformer High Side Neutral Overcurrent Protection (IEEE 50/51). A single overcurrent relay with a Utility industry standard “very inverse” characteristic shall receive operating current from a multi-ratio transformer in the high voltage neutral of the step-up power transformer. The settings of this relay will also be determined through cooperation between the Utility and the Parallel Generator.

8.6.6.3.6 Breaker Failure Relaying (IEEE 50BF). Breaker Failure delaying shall be installed where feasible. It shall be designed to trip the individual generator breaker(s) or the Utility interconnection breaker after a breaker failure time interval if the Parallel Generator main breaker should fail to trip when required to do so. The breaker failure relay scheme shall be initiated by all protective relays that trip the main breaker and shall include current supervision. The breaker failure scheme shall trip the backup breakers through a manual reset lockout relay.

8.6.7 Synchronizing Equipment

8.6.7.1 Synchronizing equipment is required for synchronous generators at the interconnection, generator, and other breakers where synchronization may occur. The generator must be brought on-line parallel to the Electric System by one of the following methods:

8.6.7.2 Automatic synchronizing – A synchronizer, capable of issuing a close command in advance of synchronism such that breaker will close with zero voltage across the open breaker contacts, together with a synch-check relay, designed for synchronizing generators onto the Electric System, is required to automatically synchronize a generator onto the Electric System.

8.6.7.3 Manual synchronizing– A synch-check relay, designed for synchronizing generators onto the Electric System, together with a synch-scope is required to supervise manual closing of the generator circuit breaker.

8.6.8 Telephone Requirements

The Parallel Generator may be required to install a telephone for the Electric System Control Center (ESCC) at the Utility. The telephone communication between the Parallel Generator and ESCC shall be delay free.

8.6.9 Maintaining Efficiency and Safety

Following initial interconnection when existing equipment and measures are demonstrably insufficient to prevent damage to property or persons on the Electric System or unreasonably degrades the ability of the Utility to operate the Electric System efficiently or safely additional protective equipment, operational equipment, and safety measures may be required.

9. Protection Design Recommendations: Parallel Generator

The Parallel Generator is responsible for protection of its facilities from any and all sources of potential damage. This section identifies protection that the Parallel Generator should consider for its own protection. The protection identified is not all-inclusive and additional relays or other protective equipment may be appropriate for some installations. The minimum design requirements in Section 7.0 are not intended to protect the Parallel Generator from every possible source of damage. It is recommended that the Parallel Generator utilize a Professional Electrical Engineer with Registration in the state where the Parallel Generator is located to appropriately specify, apply and integrate the Parallel Generator into the Electric System.

- Over/under-speed protection (IEEE 12/14).
- Phase and/or ground distance (IEEE 21)
- Reverse power protection (IEEE 32)
- Loss of excitation protection (IEEE 40)
- Loss of phase/negative sequence protection (IEEE 46)
- Overcurrent protection (IEEE 50/51)
- Machine ground protection (IEEE 64)
- Generator differential protection (IEEE 87G)
- Transformer differential protection (IEEE 87T)

Multifunction microprocessor relays having functions appropriate for the application can often perform a number of these functions. In critical applications redundant relays are recommended. Further guidance for the protection of generators can be found in publications such as IEEE/ANSI C37 series guide recommendations and IEEE publication catalog number 95TP 102.

10. Attachments

Attachment 1: Application for the Interconnection of a Generator with a Capacitor Greater than 10 MW for Parallel Operation with the Utility System

Attachment 2: Data Required for a Generation Interconnection Network Study

Attachment 1

Application for the Interconnection of a Generator with a Capacitor Greater than 10 MW for Parallel Operation with the Utility System

Facility Information	Where will the Generating Facility be Installed?		
Contact Person	Phone	Fax	Email Address
Company Name	Meter Number		
Street Address	City	State	Zip Code
Mailing Address (if different from street address)	City	State	Zip Code

Applicant Information	Who will be contractually obligated for this Generating Facility?		
Contact Person	Phone	Fax	Email Address
Company Name	Meter Number		
Street Address	City	State	Zip Code
Mailing Address (if different from street address)	City	State	Zip Code

Contractor/Installer Information	(if different from above)		
Contact Person	Phone	Fax	Email Address
Company Name	Meter Number		
Street Address	City	State	Zip Code
Mailing Address (if different from street address)	City	State	Zip Code

Attachment 1: Standard Data Required for a Generation Interconnection Study.

Note: For values given in per unit, please include bases. If there are any questions concerning these forms, please contact The Utility.

1. **A range and township site map** of the planned facilities with the turbine/generator, step/up transformer, and substation identified (please attach).

2. **A one-line diagram** of the planned generation facilities (lease attach). The one-line diagram should include:

    A. Transmission/Distribution Line(s)
    B. Generators
    C. Transformers
    D. Motors
    E. Breakers
    F. Fuses
    G. Lightning arrestors
    H. Disconnect switchers
    I. Power factor correction equipment (i.e., capacitors/reactors)
    J. Station service loads
    K. Excitation system
    L. Other special devices

3. **A construction schedule** with construction power, start-up power, and full load testing dates identified. If a more detailed schedule is available, please attach.

    Start Construction: ____________________ *(date)*

    Construction Complete: ____________________ *(date)*

    Start-up, Begin Full-load Testing: ____________________ *(date)*

    Full-load Testing Complete ____________________ *(date)*

4. **An estimated one-line date** and the total future capacity for any additional generation added at the initial site.

    MW: ____________________ *(date)*

    MW: ____________________ *(date)*

    MW: ____________________ *(date)*

    Etc.

5. **Turbine/generation Data:**

Information should be provided for each generator. Generators must be synchronous if aggregate is 1MVA or greater.

	Unit 1	Unit 2	Unit 3
A. Type of generating unit (i.e., induction or synchronous)	________	________	______
Manufacturer	________	________	______
Excitation system type	________	________	______
B. Rated MVA	________	________	______
C. Maximum Gross Output (MW)	________	________	______
D. Rated leading power factor	________	________	______
Rated lagging power factor	________	________	______
E. Nominal voltage and acceptable voltage range (volts +/-%)	________	________	______
F. Estimated load factor, number of hours/year of operation, or MWH/year.	________	________	______
G. Stability Data:			
1. Inertia of turbine/generator (MW-Sec)	________	________	______
2. Transient direct axis reactance (PU)	________	________	______
3. Excitation system data (Note 1, Attach)	________	________	______
4. Governor data (Note 1, Attach)	________	________	______
5. Laplace transform block diagrams of the control equipment (Note 1, Attach)	________	________	______
H. Voltage/Frequency Limits			
1. Pickup settings	________	________	______
2. Roll off rates	________	________	______
I. Minimum/maximum Excitation Limits			
1. Underexcitation			
a. Instantaneous	________	________	______
b. Time delayed	________	________	______
2. Overexcitation			
a. Instantaneous	________	________	______
b. Time delayed	________	________	______

Note 1: This information may not be required for an Interconnection Study, but required before the actual operation of the unit.

6. **Step Up Transformer Data:**

Note: Information should be provided for each transformer. Step-up transformer(s) shall normally be grounded WYE on the high voltage winding.

	XFMR 1	XFMR 2	XFMR 3
A. Self-cooled and top MVA ratings (OA/FOA MVA)	________	________	______
B. Nominal voltage rating (kV) available taps for each winding (+/-%)	________	________	______
C. Electrical configuration of each winding (Delta or Wye)			
1. High side winding	________	________	______
2. Low side winding	________	________	______
D. Impedance of the OA Base (%)			
1. Positive sequence	________	________	______
2. Zero sequence	________	________	______

7. **Auxiliary Load Data:**

   A. Maximum load and power factor (i.e., during plant shutdown and minimum facilities operating) __________________ *(kW & PF)*

   B. Maximum load during start-up __________________ *(kVA)*

   C. Maximum load and power factor during normal operation (KW & PF). Provide for one unit operating, two units operating, etc.

   One Unit Operating __________________ *(kW & PF)*

   Two Units Operating __________________ *(kW & PF)*

   Etc.

   D. Largest motor to be started __________________ *(HP)*
   Starting method __________________ *(Starting Method))*
   Inrush KVA at rated motor voltage __________________ *(kVA)*
   Starts per hour __________________ *(Starts)*

8. **Conductor, spacing, and length of any distribution or transmission lines** planned to be constructed by the power producer:

   A. Conductor size & type __________________ *(Conductor Size/Type)*

   B. Spacing __________________ *(Feet)*

   C. Length __________________ *(Miles)*

   D. Voltage __________________ *(kV)*

9. **Power system stabilizer:**

   Calibration and test reports.

Attachment 2: Data Required for a Generation Interconnection Network Study

Note:All items are considered mandatory. Ignore any items for which the data has previously been supplied. For values given in per unit, please include bases. If more than 3, please attach additional data sheets.

1. **Transmission/distribution line data:**

A. Voltage, Line-to-Line ________________ *(kV)*

B. Line Length(s) ________________ *(Miles)*

C. Conductor Size/Type ________________ *(Conductor Size/Type)*

D. Neutral Size/Type (if applicable) ________________

E. Neutral Grounding Configuration ________________

F. Line Structure Type(s) (configuration of conductors and neutral with height above ground and spacing's denoted) ________________

2. **Transformer Data:**

	XFMR 1	XFMR 2	XFMR 3
A. Primary/Secondary/Tertiary MVA Ratings	_______	_______	_______
B. Primary/Secondary/Tertiary kV Ratings	_______	_______	_______
C. Primary/Secondary/Tertiary Tap(s) (Note intended operational taps)	_______	_______	_______
D. Winding Connection Diagrams (Please attach)			
E. BIL Ratings (kV)	_______	_______	_______
F. Impedance on the OA Base			
Positive	_______	_______	_______
Zero Sequence	_______	_______	_______

3. **Capacitor/Reactor Data:**

A. Type ________________

B. Rated KVA ________________ *(kVA)*

C. Rated kV ________________ *(kV)*

D. Impedance (ohms) ________________ *(ohms)*

4. **Station Service Load Data:**

   A. Types of Loads and KVA ____________________

   B. Total Operational Load KVA and Power Factor

      1. Normal __________ *(kVA & PF)*
      2. Maximum __________ *(kVA & PF)*
      3. Minimum __________ *(kVA & PF)*

5. **Lightning Arrestor Data** (Provide information for all Arrestors; i.e., Line and Transformers):

   A. Manufacturer __________

   B. Type __________

   C. Voltage Ratings ____________________ *(V)*

6. **Induction Generator Data:**

	UNIT 1	UNIT 2	UNIT 3
A. Full Load Current	______	______	______
B. Power Factor	______	______	______
C. Slip or Speed at Full Load	______	______	______
D. Locked rotor current at 100% voltage	______	______	______
E. Locked Rotor Power Factor	______	______	______
F. Electrical Torque and Current Versus Speed Curve from 1% to 100% Speed	______	______	______
G. Moment of Inertia (WR2) of the Generator and Turbine (gearcase also if used)	______	______	______
H. Governor System Model with Parameters	______	______	______
I. Primer Mover System Model with Parameters	______	______	______

7. **The Utility/WSCC Full Representation Synchronous Generator Data:**

A. Generator Data:

	UNIT 1	UNIT 2	UNIT 3
1. Full Load Current	________	________	_______
2. Maximum kW	________	________	_______
3. Minimum kW	________	________	_______
4. Terminal Voltage (kV)	________	________	_______
5. Rated Power Factor	________	________	_______
6. Direct-Axis Subtransient Reactance, X"D (PU)	________	________	_______
7. Quadrature-Axis Subtransient Reactance, X"Q (PU)	________	________	_______
8. Direct-Axis Subtransient Open Circuit Time Constant, T"DO (SEC)	________	________	_______
9. Quadrature-Axis Subtransient Open Circuit Time Constant, T'QO (SEC)	________	________	_______
10. Kinetic Energy, EMWS	________	________	_______
11. Armature Resistance, RA (PU)	________	________	_______
12. Direct-Axis Transient Reactance, X'D (PU)	________	________	_______
13. Quadrature-Axis Transient Reactance, X'Q (PU)	________	________	_______
14. Direct-Axis Non-Saturated Synchronous Reactance, XD (PU)	________	________	_______
15. Quadrature-Axis Non-Saturated Synchronous Reactance, X'Q (PU)	________	________	_______
16. Direct-Axis Transient Open Circuit Time Constant, T'DO (Sec)	________	________	_______
17. Quadrature-Axis Transient Open Circuit Time Constant T'QO (Sec)	________	________	_______

18. Stator Leakage Reactance, XL (PU)	_______	_______	______
19. Saturation at 1.0 P.U. Terminal Voltage, SG1.0	_______	_______	______
20. Saturation at 1.2 P.U. Terminal Voltage, SG1.2	_______	_______	______

B. Exciter Data:

	UNIT 1	UNIT 2	UNIT 3
1. Voltage Regulator Gain, kA	_______	_______	______
2. Voltage Regulator Lag Time Constant, TA (sec)	_______	_______	______
3. Maximum Voltage Regulator Output, VRMAX (PU)	_______	_______	______
4. Minimum Voltage Regulator Output, VRMIN (PU)	_______	_______	______
5. Exciter Constant Related to Self-Exciter Field, KE (PU)	_______	_______	______
6. Exciter Time Constant, TE (sec)	_______	_______	______
7. Exciter Saturation at Maximum Field Voltage, SE1 (PU)	_______	_______	______
8. Exciter Saturation at 75% Maximum Field Voltage, SE2 (PU)	_______	_______	______
9. Minimum Exciter Output Voltage, EFDMIN (PU)	_______	_______	______
10. Maximum Field Voltage, EFDMAX (PU)	_______	_______	______
11. Analytical Functions and Associated Constants:			
a. Exciter Gain Constants	_______	_______	______
b. Exciter Time Constants (sec)	_______	_______	______

C. Governor/Turbine Data:

1. Power Output of Turbine (MW) _______ _______ _______
2. Steady-State Droop _______ _______ _______
3. Maximum Valve Opening Velocity (/sec) _______ _______ _______
4. Maximum Valve Closing Velocity (/sec) _______ _______ _______
5. Analytical Block Diagram with Transfer Function and Associated Constants:
   a. Governor Time Constants (sec) _______ _______ _______
   b. Turbine Time Constants (sec) _______ _______ _______
   c. Turbine Gain Constants _______ _______ _______
   d. Voltage/HZ Limited Data:
      1. Pick-Up _______ _______ _______
      2. Roll Off Rate _______ _______ _______
   e. Minimum/Maximum Excitation Limiter Data:
      1. Minimum Capability Curve _______ _______ _______
      2. Instantaneous Field Current Threshold _______ _______ _______
      3. Delayed Field Current Threshold _______ _______ _______
      4. Delayed Field Current Time Delay _______ _______ _______
         A. Inverse Timer Setting _______ _______ _______
         B. Fixed Timer Setting _______ _______ _______

1. Table of Contents

2. Safety

If it is required to penetrate the ground's surface to install equipment at the customer premise (i.e. equipment required for the customer's net metering system such as ground rods or other), the installer should contact 811 and request that all utilities are clearly marked and located before the installation begins to avoid damage or safety incidents from occurring.

3. Purpose

The purpose of this document is to present the Utility's design requirements for Net Metering systems to operate in parallel with the Utility's electric system to ensure the safety of people and property and the integrity of the electrical system. Energy Storage Devices (ESD) that are paired with a Net Metering system are also covered by this standard. For Energy Storage Devices not paired with a Net Metering System, please refer to the generation interconnection standards RE-1 and RE-2 for Southern Nevada, or ENG01U and ENG02U for Northern Nevada.

4. General

3.1 As defined in NRS 704.771: "Net metering system" means facility or energy system for the generation of electricity that:

- 3.1.1 Uses renewable energy as its primary source of energy to generate electricity;
- 3.1.2 Has a generating capacity of not more than 1,000 kilowatts
- 3.1.3 Is isolated on the Customer-Generator's premises;
- 3.1.4 Operates in parallel with the Utility's transmission and/or distribution facilities; and
- 3.1.5 Is intended primarily to offset part or all of the Customer-Generator's requirements for electricity.

3.2 As defined in NRS 704.7811, "Renewable energy" means:

- 3.2.1 Biomass
- 3.2.2 Geothermal energy
- 3.2.3 Solar energy

3.2.4 Waterpower
4.1.5 Wind

5. Applicable Standards

Customer Generator Net Metering systems and Energy Storage Devices must meet all applicable safety and power quality standards established by the most recent versions of the following at the time of the interconnection:

4.1 All articles of the National Electric Code that apply, including but not limited to Articles 480, 685, 690, 694, 702, 705, and 706.
4.2 All applicable State and Local codes.
4.3 Underwriters Laboratories Inc.
4.4 Institute of Electrical and Electronic Engineers, (IEEE) Standards 929 and 1547. The readily accessible visible break and lockable disconnect switch of IEEE 1547 is required. A pull-out disconnect is NOT acceptable.
4.5 NV Energy's parallel operating interconnection requirements in its Rule 15 tariff.
4.6 All other applicable NV Energy standards.

6. Definitions

5.1 Backup Equipment: The hardware and control system that interrupts a Net Metering System's and Energy Storage Device's Parallel Operating functions, disconnects a power source from the Utility grid, and changes over to a Backup Operation mode.
5.2 Backup Operation: The disconnection from the Utility grid and continuing operation of a power source in the event of the loss of Utility power service. Also called a "Microgrid". All devices must be effectively isolated from the Utility grid while in a Backup Operation mode.
5.3 Customer-Generator: A user of a Net Metering system or Energy Storage Device.
5.4 Energy Storage Device: A device that captures energy produced at one time, stores that energy for a period of time, and delivers that energy as electricity for use at a future time.
5.5 Net Metering: Measuring and billing only the difference between electricity supplied by the Utility and the electricity generated by the Customer-Generator that is fed back to the Utility over the applicable billing period.
5.6 Renewable Energy Credit (REC) Meter: A Utility meter that is installed at the output terminals of a renewable generator's inverter. It measures the total production as soon as it is produced by the generator that the Utility claims towards its renewable energy portfolio goals in Nevada.
5.7 The Utility: NV Energy (NVE).

7. Studies

6.1 Technical review of the impact of the Net Metering system's or Energy Storage Device's interconnection on NV Energy's electric distribution system will be conducted per the requirements set forth in NV Energy's Rule 15. Normally, an Interconnection Study will not be required, but may be if deemed necessary by NV Energy to determine any necessary changes to Utility infrastructure which may be required as a result of the interconnection.

8. Net Metering System Metering Arrangement

This section provides the requirements for metering Net Metering systems:

7.1 The Revenue Net Metering will be arranged so that Utility measures the net electricity delivered or received during the billing period.

7.2 A second (REC/Generation/Production) meter measures the electricity generated by the Customer-Generator. NV Energy will provide this meter only if the Customer-Generator participates in the Renewable Generations Program.

7.3 Connections to the supply side of the main disconnecting means installed in accordance with NEC Articles 230.82(6) and 705.12, are allowed. The connection shall be on the load side of the metering points. Connections on the load side of the main disconnecting means installed in accordance with NEC Articles 705.12 and 240.21, are allowed.

7.3.1 Modifications to the electrical equipment may compromise the equipment listing. All modifications shall be approved in writing by the Authority Having Jurisdiction, the manufacturer, or a Nationally Recognized Testing Laboratory. Forward the documentation to Meter Operations.

7.3.2 The visible break, readily accessible and lockable disconnect switch and REC meter shall be located per Sections 8, 9, and 11 of this standard.

7.4 “Solar Ready Service Panels” may be used if they meet NV Energy requirements. Submit the service panel’s specification sheets and part numbers used as part of the net metering application for engineering review.

9. Energy Storage Device Metering Arrangement

This section provides the requirements for metering Energy Storage Devices when they are paired with a Net Metering System.

9.1 Installation of Energy Storage Devices requires a revenue quality, bi-directional, Utility interval meter to be installed at the main service panel.

9.2 AC-Coupled Energy Storage Devices installed in parallel with renewable generation require an additional meter socket to be installed by the Customer-Generator per the diagrams in Attachment 4 of this standard. The meter installed at this socket is used to monitor power flowing to and from the Energy Storage Device, Utility power or customer renewable generation.

9.3 DC-Coupled Energy Storage Devices installed on a shared renewable generation inverter will need a bi-directional meter socket installed by the Customer-Generator per Attachment 5 or Attachment 6 of this standard. If the renewable generation is incentivized, the REC meter may be exchanged with a bi-directional meter to meet this requirement.

9.4 The load-side (bottom) clips of the ESD meter socket shall connect to the ESD inverter. The line-side (top) clips of the socket shall connect to the main service.

9.5 Connections to the supply side of the main disconnecting means installed in accordance with NEC Articles 230.82(6) and 705.12, are allowed. The connection shall be on the load side of the metering points. Connections on the load side of the main disconnecting means installed in accordance with NEC Articles 705.12 and 240.21, are allowed.

9.5.1 Modifications to the electrical equipment may compromise the equipment listing. All modifications shall be approved in writing by the Authority Having Jurisdiction, the manufacturer, or a Nationally Recognized Testing Laboratory. Forward the documentation to Meter Operations.

9.6 The visible break, readily accessible and lockable disconnect switch shall be located per Attachments 4, 5, or 6 of this standard. It must be within 10 feet of the service entrance equipment.

9.7 The Energy Storage Device meter must be located within 10 feet of the service entrance equipment.

9.8 Regular metering installation procedures found in other relevant standards apply as needed based on the specific nature of the project, including but not limited to: RPM-G, RPI-G, RPI-2, etc.

10. Customer-Generator Engineering Requirements

This section provides the engineering requirements that the Customer-Generator must comply with to install a Net Metering system or Energy Storage Device paired with a Net Metering system:

9.1 The required location of the REC and ESD meter socket is within 10' of the service entrance equipment. (See Attachment 1).

9.1.1 Electric Meter Operations will consider the REC (generation) and ESD meter to be farther than 10' from the existing service entrance equipment if there are extenuating circumstances with the project design. Evaluation of the REC and ESD meter location will include, but is not limited to, a review of safety issues and accessibility to the REC and ESD meter. Relocation of the REC and ESD meter for aesthetic reasons is not sufficient.

9.1.2 For Customer-Generators served by a dedicated transformer with the net (revenue) meter located on or near the transformer (remote from the service entrance equipment), installation of the REC or ESD meter socket must be within 10' of the service entrance equipment disconnect rather than the net meter.

9.2 Locate the visible disconnect switch within 10' of the net meter. (See Attachment 2.)

9.2.1 Distribution equipment including but not limited to subpanels and transformers are allowed to be installed between the Visible Disconnect switch and the REC and ESD meter.

9.2.2 The installation of the above distribution equipment must NOT electrically bypass the Visible Disconnect switch. The intent of the Visible Disconnect switch is to isolate applicant owned generation from NV Energy equipment.

9.2.3 For Customer-Generators served by a dedicated transformer with the net (revenue) meter located on or near the transformer (remote from the service entrance equipment), install the source disconnect within 10' of the service entrance equipment disconnect rather than the net meter.

9.2.4 Under all circumstances the source disconnect must be within 10' of the service entrance disconnect with a direct line of sight and no obstructions (fence, etc.) between the two.

9.2.5 AC disconnect must be wired in accordance to Jurisdictional code.

9.2.6 All sources of generation, including but not limited to renewable generation and Energy Storage Devices, must be protected by a Visible Disconnect that isolates the source from the grid. Retrofitting equipment into an existing net metering system shall not bypass any existing protections.

9.3 During the design phase, it is recommended that design professionals thoroughly investigate the proposed installation for NEC and Utility compliance issues as part of the due diligence process. Any compliance issues are to be addressed prior to finalization and stamping of the designs.

9.4 Customer-Generators who have primary voltage service and who own all of the service equipment on the load side of NVE owned primary metering equipment (a privately owned and maintained system) may use an NVE primary metering switch having a visible air break and under the control and operation of NVE as the means of disconnect. Note that if the Customer-Generator's generation remains connected to their system, the potential may exist in such a situation for the renewable generation to feed into the customer owned system upon the loss of NVE source.

9.5 There must be at least 6 inches of clearance below the Utility sealed section of a service panel. All Customer-Generator owned equipment including conduit must provide this clearance.

11. Customer-Generator Operating Requirements

This section provides the operating requirements that the Customer-Generator must follow and the responsibilities that they must assume for operating a Net Metering System generator or Energy Storage Device in parallel to the Utility system:

10.1 Quality of service – The operation of the Customer Generator's generation facility must not reduce the quality of service to the Utility's electric system or other Utility customers. No abnormal voltages, currents, frequencies, or interruptions are permitted.

10.2 De-energized Utility Circuit – The generator or Energy Storage Device will at no time energize a de-energized Utility circuit.

10.3 Inhibited Parallel Operation – If while operating in parallel with Utility's system, any of the protective devices operate inhibiting parallel operation, the Customer-Generator will perform the following procedures prior to attempting any further parallel operation with Utility:

10.3.1 Determine whether Utility's circuit is energized or de-energized.

10.3.2 If Utility's circuit has been continuously energized, then the Customer-Generator will not attempt to reconnect their system in parallel with the Utility until the cause of a protective device disoperation has been corrected by a certified person and the Utility has inspected and has satisfied itself that the Customer-Generator's system is operating properly.

10.3.3 If it is determined that the Utility circuit is de-energized, the Customer-Generator must not attempt to re-connect their system until it is confirmed by Utility that power has been restored and Utility's circuit is energized.

10.4 The Customer-Generator is responsible for damage caused to other customers and to the Utility as a result of improper operation or malfunction of their generation facilities.

10.5 The Utility is not responsible for damage caused to other customers and to the Utility as a result of improper operation or malfunction of the customer's generation facilities.

10.6 It is recommended that on the loss of power from the Utility that the Customer-Generator not isolate itself from the Utility while continuing to generate (unless operating in Backup Operation mode). The Customer-Generator shall coordinate reconnection of their generation to the Utility per Section 10.3 after the Utility voltage and frequency are restored to normal. Utility is not responsible for damage caused to the Customer-Generator's facility as a result of the utilities automatic or manual reclosing of its feeder.

12. Energy Storage Device Requirements

This section provides the engineering requirements specifically for an Energy Storage Device that is paired with a Net Metering System.

11.1 Energy Storage Devices by themselves do not qualify for Net Metering unless paired with renewable generation and charged solely from renewable generation, and must follow the interconnection process described in Rule 15. For stand-alone Energy Storage Devices or those paired with renewable generation that is not Net Metering, refer to the generation interconnection standards RE-1 and RE-2 for Southern Nevada, or ENG01U and ENG02U for Northern Nevada.

11.2 The operation of the Energy Storage Device must be certified for all applicable anti-islanding, energy storage, and Utility interactive equipment standards from IEEE, Underwriter's Laboratories, NEC, and State and local building codes, particularly the latest versions of IEEE 1547 or UL 1741, UL 9540, NEC 706, and others.

11.3 Electrical line drawings and manufacturer specification sheets for Energy Storage Devices must be submitted during the interconnection application for engineering review.

11.4 There must be signage indicating the presence of an Energy Storage Device on the property. The signage shall be outdoors on the service entrance equipment and shall be weatherized and rated for outdoor use.

11.4.1 The breaker panel must have a label indicating which breaker is for the Energy Storage Device.

11.5 The Energy Storage Device must have a readily accessible, visible-break, and lockable Visible Disconnect that effectively isolates it from the grid.

11.5.1 The retrofitting of an Energy Storage Device into an existing Net Metering System must not bypass any existing Visible Disconnects.

11.5.2 Each power source (renewable generator, Energy Storage Device, etc.) must have its own Utility Source Disconnect in order to provide a safe means to service solar REC meters and other meters that may be on those circuits.

11.5.3 The Visible Disconnect must be located within 10 feet and within line of sight from the service entrance equipment.

11.6 Backup Operation and Backup Equipment of an Energy Storage Device

11.6.1 Whole or partial building Backup Operation during a loss of Utility power service using Energy Storage Devices is permitted.

11.6.2 The Backup Equipment used to engage the Backup Operating mode must prevent any and all exporting of power to the grid while in Backup Operating mode.

11.6.3 The Backup Equipment must use hardware that uses a physical break to interrupt the circuit. This hardware can include switches or relays. Devices that do not use a physical break to engage Backup Operation such as solid state relays or other semiconductors are not permitted.

11.6.4 For partial building backup designs, the set of backup loads must be located on a panel designated for Backup Operation that is separate from the main service panel.

11.6.5 For whole building backup designs, the main service panel may be used for Backup Operation if it will be isolated from the point of common coupling with the Utility grid during outage conditions.

11.6.6 The Backup Equipment may be located either internally or externally to the Energy Storage Device.

11.6.7 The Backup Equipment does not preclude the requirement for an effective Visible Disconnect.

11.6.8 The Energy Storage Device and renewable generators must follow procedures outlined in the latest version of IEEE 1547 for reconnecting to the Utility grid once power service is restored.

13. Attachments

Attachment 1: Incentive Net Metering One-Line Diagram

Attachment 2: Metering Arrangement

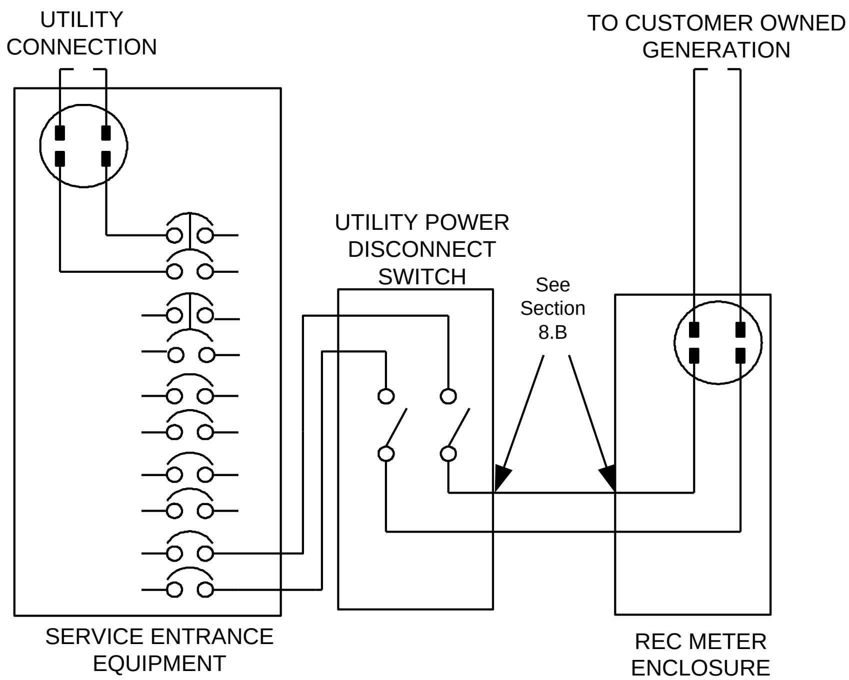
Attachment 3: Required Tagging

Attachment 4: AC-Coupled ESD System Electrical Drawing

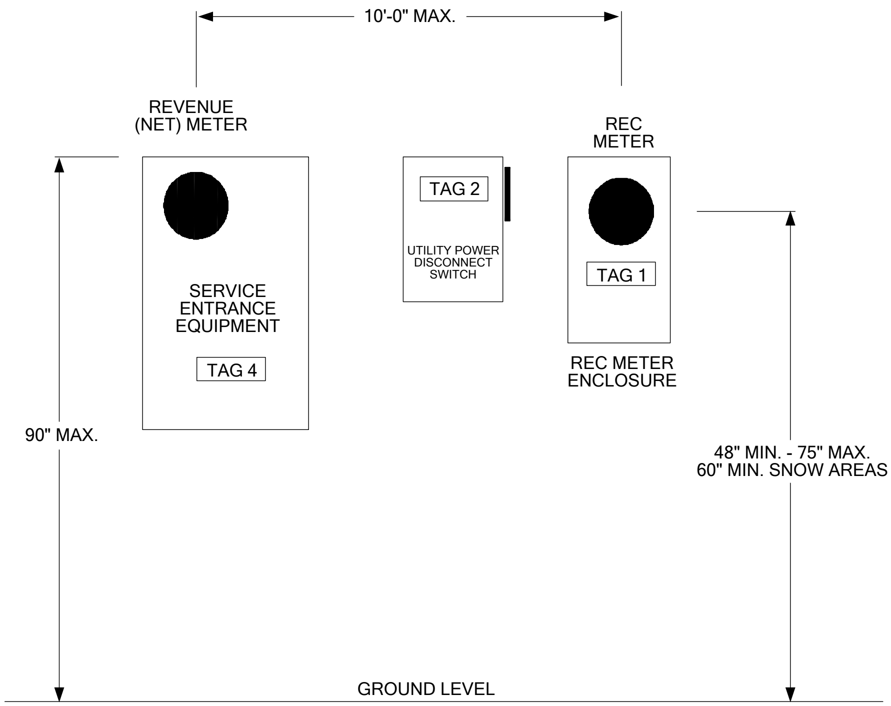
Attachment 5: DC-Coupled ESD System Electrical Drawing

Attachment 6: DC-Coupled ESD System with Inverter-Tied Backup Loads Electrical Drawing

ATTACHMENT 1:
INCENTIVE NET METERING SYSTEM ONE LINE DIAGRAM

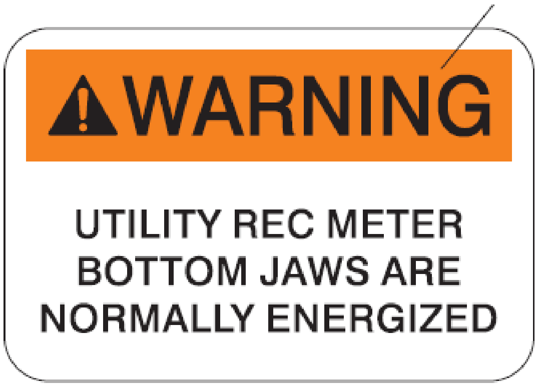
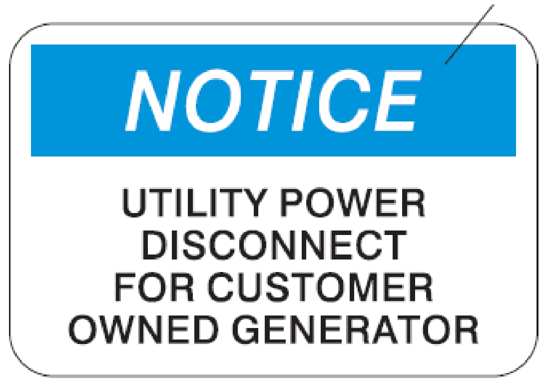
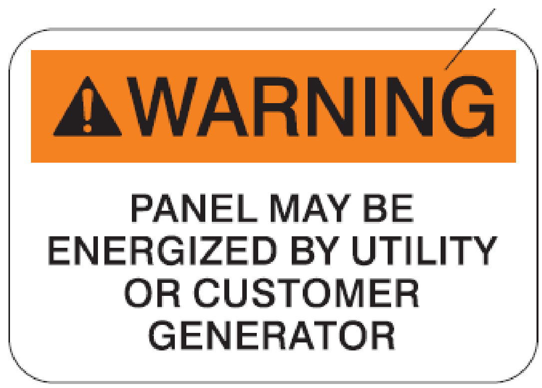


ATTACHMENT 2:
METERING ARRANGEMENT

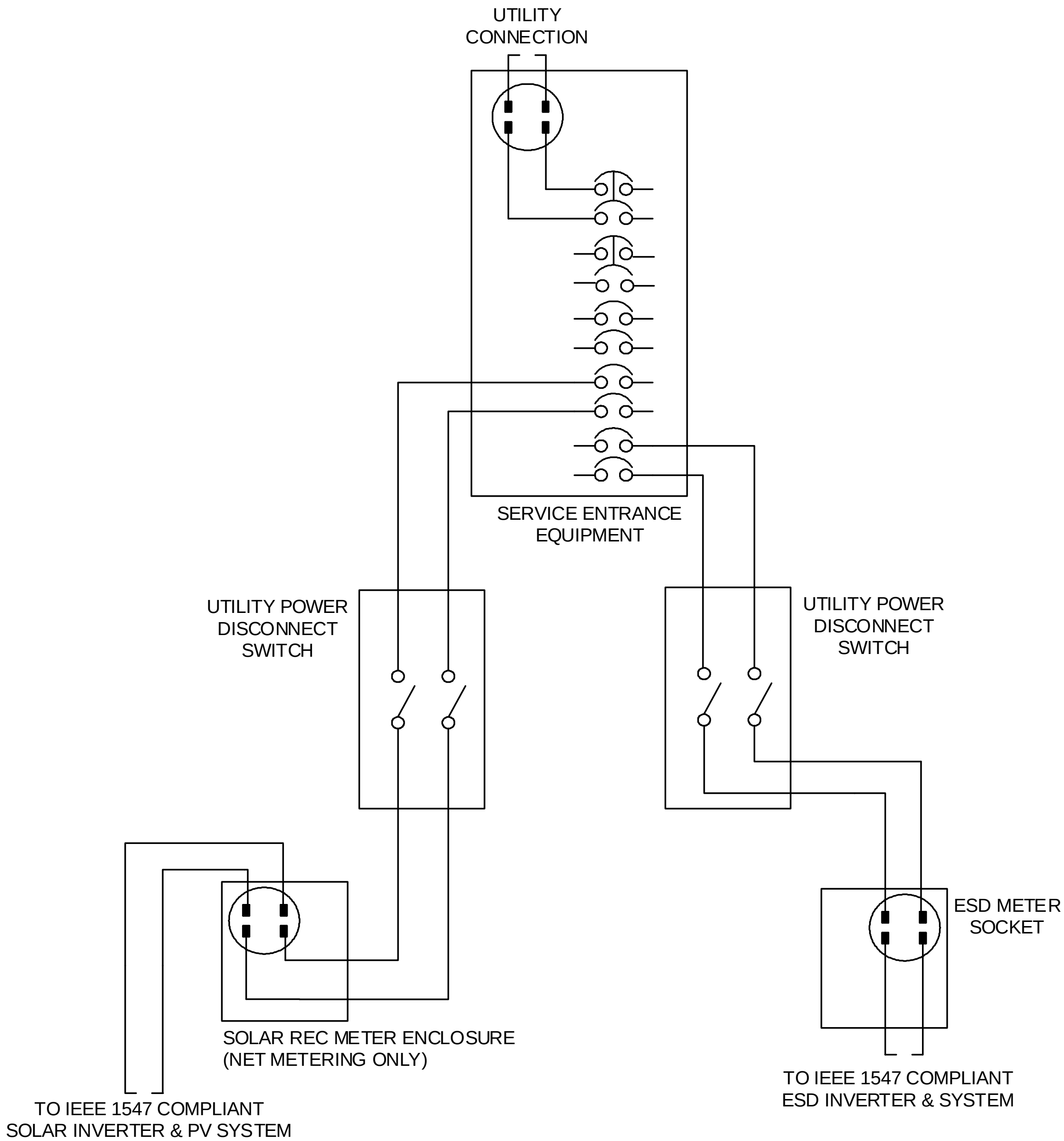


ATTACHMENT 3: REQUIRED TAGGING

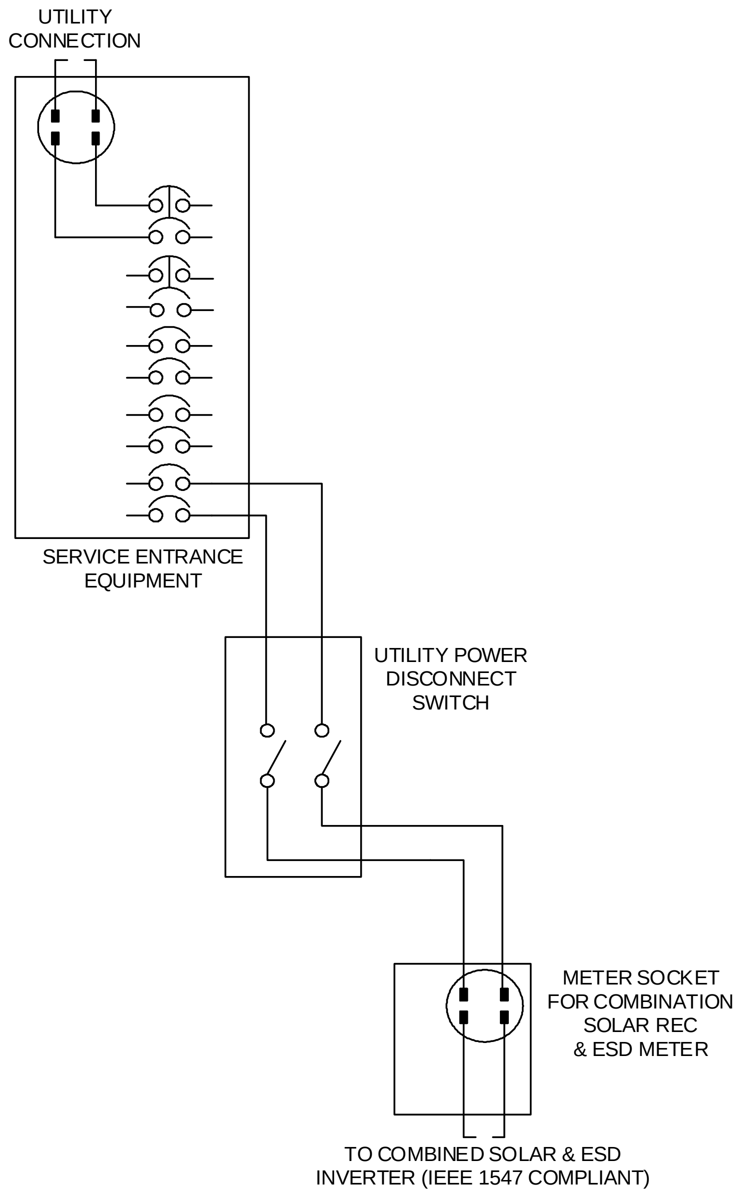
NV ENERGY WILL ATTACH THE TAGS BELOW TO ALL NET METERING SYSTEMS

Tag 1. Install on REC Meter Box (956205)	**Tag 2. Install on Disconnect Switch Box (956200)**
	
Tag 3. Install on Transformer, J-Bar, or Service Conductor (951022)	**Tag 4. Install on Net Meter Box (956210)**
	

ATTACHMENT 4:
AC-COUPLED ESD SYSTEM ELECTRICAL DRAWING



ATTACHMENT 5:
DC-COUPLED SYSTEM ELECTRICAL DRAWING



ATTACHMENT 6:
DC-COUPLED ELECTRICAL SYSTEM WITH INVERTER-TIED BACKUP LOAD ELECTRICAL DRAWING

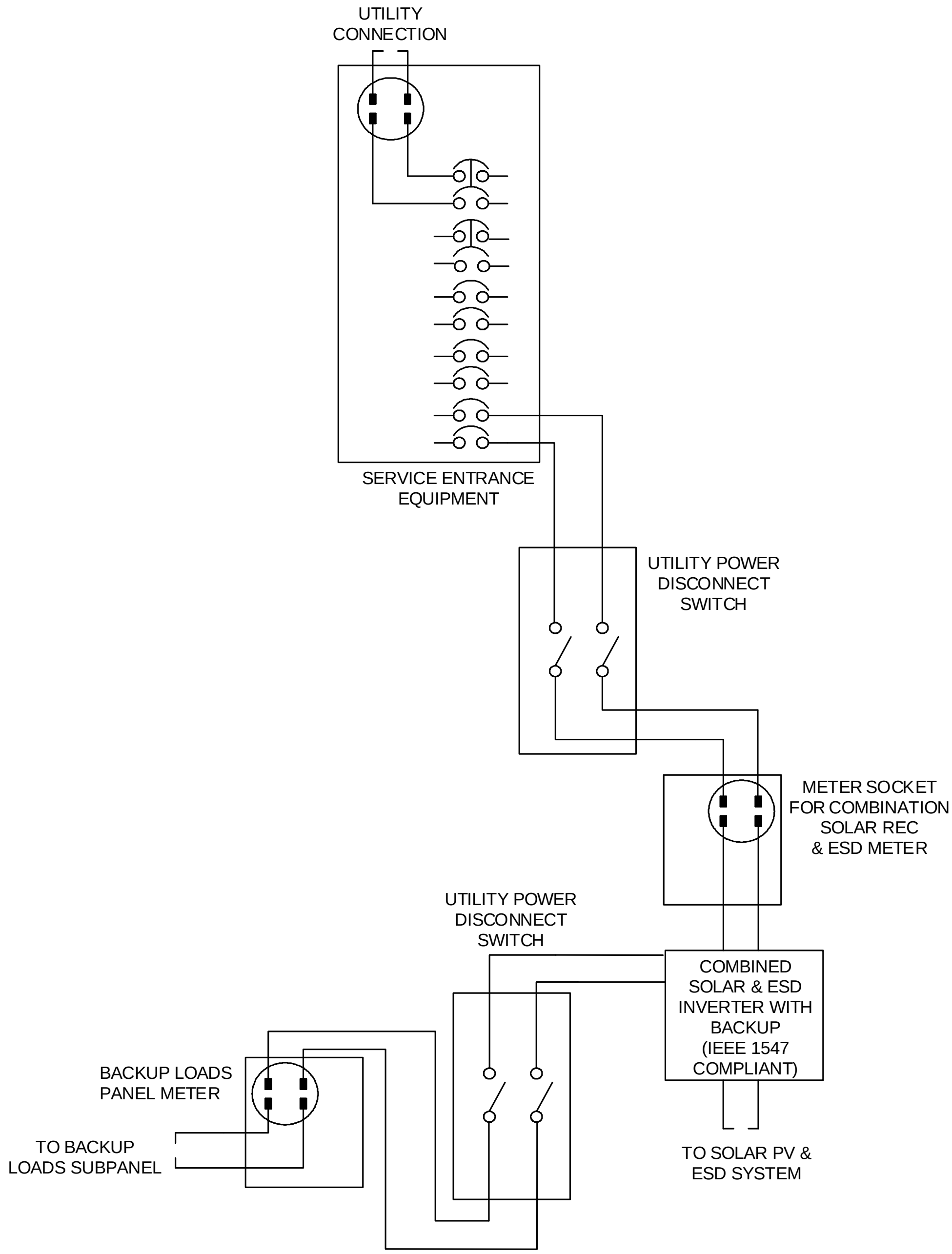


TABLE OF CONTENTS

1. Purpose

1.1 This specification defines the minimum requirements for a customer-owned equipment room containing facilities and equipment owned, operated, and maintained by NV Energy (NVE).

1.2 These design requirements are intended to provide for satisfactory infrastructure to install and maintain NV Energy electrical service equipment. These are the minimum requirements to meet the operational and safety needs of NV Energy.

1.3 This specification is not a complete design or construction specification. Compliance with this specification is a requirement for service.

2. References, Codes and Standards

2.1 Terms in this document are defined in IEEE 100 as well as by the references cited below.

2.2 The equipment room shall be designed and constructed in compliance with the National Electric Code (NEC), Article 450 "Transformers and Transformer Vaults". Attention is particularly directed to Part "III", 450-41 through 450-48 or latest revision.

2.3 This specification does not relieve the Customer from complying with all applicable codes, ordinances, or other industry standards.

2.4 Where there is a conflict between this specification and any codes, ordinances, or industry standards, this specification shall supersede when the requirements of this document exceed those of applicable codes. When there is a question regarding a conflict, the Customer shall notify NVE in writing for resolution.

2.5 Exemptions from this specification must be obtained in writing from NVE.

2.6 The requirements in this standard may be in addition to and exceed the requirements in the National Electric Code (NEC) and other local codes. The requirements in this standard shall take precedence when they exceed the requirements of any applicable codes.

2.7 Applicable codes (may not be all inclusive):

- National Electric Code (NEC), Article 450, “Transformers and Transformer Vaults”
- Must meet all applicable OSHA standards as outlined in 29 CFR 1910
- ASTM A123, Standard Specification for Zinc-Coated Coating on Iron and Steel Products
- ASTM A153, Standard Specifications for Zinc Coating on Iron and Steel Hardware
- ASTM F512, Standard Specifications for Smooth-Wall Poly Conduit and Fittings for Underground Installation
- Metal Framing Standards Publication No. MFMA-1
- NEMA TC6, PVC and ABS Plastic Utilities Duct for Underground Installation
- NEMA GR-1, Ground Rods and Ground Rod Couplings
- Uniform Fire Codes and National Fire Protection Association Standards & Codes
- City of Las Vegas, City of North Las Vegas, City of Laughlin, City of Henderson, and/or Clark County of Nevada Construction Codes Requirements of Fire Extinguishing Systems
- IEEE 100, Standard Dictionary of Electrical and Electronic Terms

3. General Requirements

3.1 The construction and design of the equipment room shall meet the requirements of NEC Article 450, “Transformers and Transformer Vaults”.

3.2 NV Energy must approve the equipment room design before construction begins in accordance with Section 4 Customer Submittals. This will include a review of the fire protection and suppression components by an NV Energy Safety & Health Specialist or designee, and a general design review by our Engineer(s).

3.3 NV Energy will provide, install, and maintain the following:

- Primary switchgear and fusing
- Primary cables and terminations
- Primary junction boxes
- Transformers
- Service cable connections to the transformer

3.4 The Customer shall furnish all materials, labor, and incidentals, except as otherwise noted in this specification, necessary to complete construction of the equipment room including, but not limited to, the following:

- Ventilation
- Fire Suppression
- Ground Bus
- Oil Containment
- Duct and Cable Racking
- Lighting and Outlets
- Service Conductors

3.5 Only equipment, pipes, ducts, wires and other fixtures that are a necessary part of the electrical installation shall be allowed in an equipment room.

3.6 Foreign fixtures such as pipes, ducts, vents, or other objects which are not required for electric service shall not enter or pass through the equipment room.

3.7 NV Energy will provide and install transformer(s), switches, primary conductors, and connectors as required.

3.8 All metering equipment and customer equipment, other than service conductors or bus, shall be located outside of the equipment room.

3.9 Equipment rooms shall not be used as temporary or permanent storage spaces.

3.10 The design of the equipment room shall accommodate and the Customer shall ensure that NVE personnel have full, unimpeded 24 hour immediate access to the equipment room.

3.11 After NVE acceptance of the equipment room, the Customer and/or his representative or contractor(s) shall not enter the equipment room except in the presence of an authorized NVE employee. Access to the equipment room after equipment is energized will be restricted and entry into the equipment room by the Customer for maintenance of facilities is to be coordinated with NVE. A sign will be posted identifying the NVE contact for entry into the equipment room. At least seven days advance notice is required to schedule maintenance of NVE equipment room facilities. A qualified NVE employee must be present during Customer/contractor access into an energized equipment room. The Customer will be charged for this stand-by time.

4. Design Considerations

4.1 NV Energy's preferred design is to use standard pad mounted outdoor equipment. The customer is responsible for the equipment premium, installation, operation, and maintenance costs beyond those of NV Energy's outdoor pad mounted design standards.

4.2 Equipment shall not be installed in an equipment room which, in the event of equipment failure, is likely to cause other customers outside the facility to experience an extended interruption of service until repairs can be made to the failed equipment.

4.3 The minimum floor space required for an equipment room shall be determined by the number of transformers and switches required to serve the facility.

4.4 Dry type transformers will be required in equipment rooms at or above grade when transformers are necessary for service.

4.5 Oil filled transformers will be required in equipment rooms below grade when transformers are necessary for service.

4.6 NVE will make the determination as to whether an equipment room is above, at, or below grade, and what type of transformer(s) will be required based in part on information submitted by the customer.

4.7 The equipment shall have the ability to be de-energized from outside the equipment room. The intent of this is to be able to de-energize the equipment room in case of failure, a fire or other hazardous circumstance.

4.8 After receipt of the detailed design and construction submittals, NVE will work with the Customer to determine the best layout and size of the equipment room.

5. Customer Submittals

5.1 The customer shall submit to NVE a design of the equipment room and a construction schedule for approval. The schedule shall provide adequate time for NVE to review the design.

5.2 **A minimum of 10 business days** is typically required for review (and approval if acceptable) by NVE. Any revisions or changes of the schedule must be submitted to NVE for approval, and approval must be granted in writing prior to the start of construction.

5.3 The design and construction schedule shall include:

- The date on which construction of the equipment room is to begin.
- The date on which construction of the equipment room will essentially be complete, no significant Customer work remains, and NVE may have access to the equipment room for installation of NV Energy's electric service equipment.
- A timeline indicating when all items of this specification will be completed in order for NVE to plan for energizing the equipment.
- The date on which the Customer desires electrical service.

5.4 The customer shall submit three (3) complete sets of detailed design plans, drawings, and other documentation which demonstrates compliance with this specification to NV Energy for approval.

5.5 Design and construction drawings should be approved by NVE prior to application for permit with the city or county of jurisdiction. The purpose of this requirement is to allow the Customer to provide the city or county of jurisdiction with NVE approved documentation. Required NVE changes made to the design after city or county approval may require re-submittal to the city or county of jurisdiction.

5.6 The submittal shall include the following:

- One Line Diagram showing primary type, size, and number of required conductors (as developed with the NVE designer); service conductor type, size, and number of conductors; and main panel(s) sizes and quantity.
- The Customers bus duct locations and/or electrical service conduit entrance(s) into the equipment room.
- For equipment rooms located outside of the building floor plan - a site plan showing the location of the equipment room and adjacent streets, personnel and vehicular access, ventilation, wall penetrations, and fire protection equipment along with any other necessary details as required.
- For equipment rooms located within a building floor plan - a drawing showing adjacent rooms, ventilation, fire protection, personnel and vehicular access, equipment access, penetration details, and exterior and interior access routes along with any other necessary details as required.
- Where electrical service equipment rooms are part of a building or structure - the location of the building's inlet air ducts, vents, doors and windows. No building inlet air ducts, vents, windows or doors shall be located immediately above or adjacent to an equipment room or the equipment room's ventilation.
- The equipment room HVAC balance diagram showing inlet air flow (CFM), inlet air maximum temperature, any significant heat loads, and the duct vent sizes.
- Electrical conduit ducts from the electrical source to the equipment room (reference Section 5.6.15)
- Construction drawings, specifications, vendor information, etc. showing compliance with this specification.
- Fire protection drawings, system design calculations and technical specification sheets on fire protection system components for the equipment room including fire/smoke dampers and actuators, sealants, doors, etc.

5.7 NVE will review the submittals and return one complete set of documentation to the Customer with NVE comments. **A minimum of 10 business days** shall be required for NVE engineering review of submittals.

5.8 Delays in submission of or failure to submit the required design and schedule information will result in delays in obtaining or failure to obtain electrical service.

5.9 Submittals returned "NOT APPROVED" shall be revised by the Customer as appropriate and resubmitted to NVE.

5.10 NV Energy approval is limited to those areas occupied by NV Energy equipment. Approval is for the purpose of assuring the safe and efficient operation and maintenance of NVE equipment. NVE assumes no responsibility for the correct application or safety of Customer installed/owned equipment or designs.

6. Equipment Room Location

6.1 The location of the equipment room shall comply with NVE Standard RPI-015 “Commercial Meter and Service Equipment Location”.

6.2 An “Access to Equipment Agreement” is required for equipment room installations.

6.3 The equipment room shall be located on the Customer’s property. It is recommended that transformers be placed in separate rooms to prevent an equipment failure from damaging or preventing access to other equipment.

6.4 The preferred location for an equipment room is at grade level adjacent to the exterior wall that is closest to NVE’s existing distribution system.

6.5 In all cases, the location shall be accessible by a door or removable wall to an outside location where a movable lift can reach the transformers, switchgear and related equipment for installation, maintenance and replacement.

6.6 Location of the equipment room may dictate what type of equipment is required for service. (See Sections 4.4 and 4.5)

6.7 The customer shall provide NVE crews with immediate, unimpeded 24-hour access to the equipment room. Future expansion plans by the customer must not affect accessibility.

6.8 The equipment room shall be located where it can be ventilated to the outside air.

7. Permits and Licenses

7.1 The Customer, at their expense, shall secure all permits and licenses necessary for the execution of the work.

7.2 The Customer shall give all notices, necessary and incidental, for the due and lawful execution of the work.

7.3 Design and construction drawings per Section 4 should be approved by NVE prior to application for permit with the city or county of jurisdiction. The purpose of this requirement is to allow the Customer to provide the city or county of jurisdiction with NVE approved documentation. Required NVE changes made to the design after city or county approval may require re-submittal to the city or county of jurisdiction.

8. Personnel Access

8.1 The equipment room shall have **at least** two personnel access ways. These access ways shall be located at opposite ends of the equipment room. A personnel access way can be either:

- 2'-8" W x 6'-8" H doorways at curb level in the equipment room wall. The installation shall be such that the outside knob is fixed with entry by key only, while the inside of the door shall be equipped with a panic bar or pressure plate device that shall always remain unlocked and open under simple pressure as per Section 8.4.
- A doorway equipment access may also serve as one of the personnel accesses.

8.2 Both egresses must allow 24 hour exit from the equipment room and building.

8.3 Personnel doors shall swing out and be equipped with panic bars, pressure plates, or other devices that are normally latched but open under simple pressure.

8.4 All doors shall meet the following requirements:

- All doors shall have auto closers.

- All doors shall have warning placards/signs, such as “Danger High Voltage”
- Locksets shall be Best Heavy Duty Cylinder Lockset, Cat. #85K7D4AS3-626. Locksets shall be such that the outside knob is fixed with entry by key only, and the inside knob is always unlocked. NVE will provide and install lock cylinders.
- Doors shall swing out and be equipped with locks and hinges/latches that permit opening by easy pressure or torque on the operating components.
- Doors shall be 3-hour fire rated and smoke sealed.
- Door hardware, hinges, and latches shall be designed to withstand the pressures associated with fire protection discharges.
- Doors and openings shall be air tight so as to encapsulate the gaseous fire suppression agent.

8.5 A minimum 7’-6” clearance must be maintained in front of all switchgear bays.

9. Equipment Access

9.1 The equipment room design shall provide for and the Customer shall maintain a clear access route for delivery and installation of NV Energy equipment. NVE will work with the customer to plan for the most efficient maintenance and emergency restoration procedures.

9.1 An “Access to Equipment Agreement” is required for all equipment room or equipment area installations.

9.2 The preferred method of installing and removing equipment is by use of a movable lift (mobile crane). Therefore, the equipment room shall have a minimum of one of the following access features:

- A 10 ft. wide access aisle-way running the length of the equipment room. The access aisle-way shall provide a minimum 10'-0” wide x 14'-0” high clear path running the length of the equipment room for installation and/or removal of NVE equipment. Road access to equipment rooms is to be considered as part of the access aisle-way.
- One doorway at curb level opening into a 10 ft. wide clear access aisle-way running the length of the equipment room. Equipment access doors shall be double doors (hinged or roll-up), each door shall be a minimum of 8'-0" wide x 12'-0" high. The doors shall open out of the equipment room with auto-closers, and shall be set to curb level. The doors shall also be 3-hour fire rated, smoke sealed, and equipped with flush bolts. Locksets shall per Section 8.
- The installation shall be such that the outside knob is fixed with entry by key only, while the inside doors shall always remain unlocked. One such equipment door may double as a personnel access provided Section 8.4 is adhered to such that doors will open under simple pressure.

9.4 Equipment access openings shall not be located directly under or adjacent to building fresh air intakes or open windows due to hazards associated with fire, smoke, or fumes.

9.5 Customer shall provide an NVE approved movable lift capable of lifting 12,000 lb. equipment to a vertical height of 4’ in order to clear the conductors and which is capable of being rolled through the adjacent doors to the outside where NVE’s lifting equipment is located.

10. Ceiling, Walls, and Floors

10.1 The ceiling height above the equipment shall not be less than 14 feet from the floor to the bottom of the lowest overhead obstruction unless otherwise approved in writing by NVE. A minimum of 4 feet clearance above the equipment to the lowest obstruction or ceiling shall be provided. Overhead cable racks should have a minimum 2 foot clearance from the ceiling. In addition to a 4 foot clearance above the equipment, a minimum 2 foot horizontal clearance must be maintained above all switchgear bays.

10.2 If the floor of the equipment room is below ground level, the portion of the walls and ceiling of the equipment room below ground level shall be painted with not fewer than two coats of white vinyl acrylic concrete paint.

10.3 Requirements for fire protection applications shall be considered when designing ceilings, walls, and floors. These considerations shall include structural requirements due to pressure during discharge of the fire suppression gases, and porosity for containment of suppression gases.

10.4 For equipment rooms containing oil-filled equipment, a six (6) inch (minimum) high curb shall be constructed and sealed along the wall and doorway openings for oil containment. See Section 22 Equipment Data for transformer oil volume.

10.5 The equipment room shall be designed to stop the intrusion of water through all walls, floors, ceilings, and joints.

10.6 Sumps (For Equipment Rooms With Floors Below Grade)

10.6.1 The Customer shall provide a minimum of two drainage sumps in the floor of the equipment room.

10.6.2 The sumps shall have minimum dimensions of 12" x 12" x 12", or 12" in diameter by 12" deep. The sumps shall have removable grates installed flush with the floor.

10.6.3 The sumps discharge piping shall be connected together with one and one half (1-1/2) inch PVC Class 120 water pipe.

10.6.4 The floor shall be sloped (pitched) toward each sump. The slope shall provide a maximum one (1) inch drop from the highest point of the floor to the sump.

10.6.5 The sumps shall be located in the corners of the equipment room next to a door and six (6) inches from the walls.

10.6.6 The Customer shall provide a means for discharging any accumulated water from the equipment room. Typically this requires a sump pump of sufficient head and capacity to discharge the water to or near a gutter or Drop Inlet. The pump shall be manually controlled, with the switch located such that entrance into standing water in the equipment room is not necessary to operate the pump.

10.6.7 In the case where the equipment room is divided into separate rooms (for fire suppression reasons), these sump requirements apply individually to each room.

10.7 There shall be no floor drains in the equipment room due to the potential of oil discharge from the transformers.

10.8 The Customer shall provide a minimum of eight (8) pulling irons for the primary conduit entrance. These pulling irons shall be located with two (2) in each corner of the room, one of which is near the ceiling and one near the floor. The pulling irons shall be located such that they are at least 18" away from the floor, ceiling, or adjacent wall. Pulling Irons shall be Joslyn #J1142 or NVE approved equivalent. Each pulling iron shall have a minimum installed working strength of 10,000 pounds.

11. Fire Protection and Detection

11.1 The building and/or fire agencies having jurisdiction may require fire protection and detection to be installed. NVE assumes no responsibility for the permitting or operation of the system.

11.2 When a fire protection system is required in the equipment room, the design of the fire suppression and detection system is the responsibility of the Customer. Automatic gaseous suppression systems may be required on equipment rooms built inside a building or within the foundation structure.

11.3 Automatic water sprinkler systems or water suppression systems shall not be utilized.

11.4 Note: Automatic water suppression systems are not allowed within the equipment room due to the hazards associated with the operation of such systems while working on electrical equipment in the area. The clean-up effort after the operation of a water suppression system in an electrical equipment room is significantly more hazardous, costly, and time consuming than with gaseous protection systems. In addition, accidental discharges and leaks of water suppression systems may cause electrical equipment failures thereby reducing the reliability of electrical service and causing additional hazards.

11.5 Automatic fire suppression cylinders, containers, agent, and control panels when required shall be installed outside of the equipment room.

11.6 The owner shall be responsible for the monitoring, servicing, maintenance, and repair of the fire systems.

11.7 Pre-alarm audible devices, and supervised maintenance/isolation switches shall be permitted to be inside the equipment room.

11.8 Smoke detectors shall not be used inside electrical equipment rooms due to the potential for inadvertent operation with electrical equipment. Heat detectors are required. Automatic suppression systems when installed shall be cross-zoned with heat detection. Detectors shall have a minimum temperature rating of 205 degrees F.

11.9 All fire suppression piping, nozzles and equipment shall be located so as not to interfere with electrical cables, transformers or other electrical equipment. A minimum clearance of 4' (four feet) shall be maintained from all electrical equipment so as not to interfere with overhead cabling, raceways, open buses and other electrical equipment.

11.10 Doorways and corridors shall remain clear and unobstructed. A minimum clearance of 13 feet shall be maintained from the finished floor to the bottom of fire suppression equipment in addition to the 4' vertical clearance requirement and 2 foot horizontal clearance requirement for electrical equipment in Section 10.1.

11.11 When carbon dioxide gas is used as the extinguishing agent, the owner shall take precautions so that the discharged gaseous agent will not settle into occupied areas where it may cause asphyxiation. It is recommended the odorant wintergreen be added to the carbon dioxide.

11.12 Forced air ventilation systems shall be equipped with a damper system that shuts down all fans and closes all openings in the event of a fire.

11.13 Dampers and fans shall be shut down upon activation of two fire detectors or upon activation of a pressure/flow switch resulting from the fire suppression agent being discharged.

11.14 Dampers and other openings shall be equipped with fusible links. Dampers shall be self-closing upon loss of power, fusible link, or activation of fire suppression or detection systems. Damper assemblies equipped with actuators employing a "stall" motor design are not allowed.

11.15 Dampers shall be combination fire/smoke with a 3-hour fire rating.

11.16 When automatic fire suppression systems are installed, a supervised isolation switch which deactivates the system shall be provided for NVE personnel so that maintenance or other activities in the equipment room may be performed. The switch shall be clearly marked, located inside the equipment room, adjacent to the entrance and easily accessible.

11.17 Fire Protection submittals shall be sent to the proper jurisdiction authority:

Las Vegas Fire and Rescue, 500 N. Casino Center Blvd. Las Vegas, NV

Clark County Fire, 575 E. Flamingo Rd. Las Vegas, NV

NLV Fire Administration, 2626 E Carey Ave, NLV, NV 89030

Henderson Fire Administration, 240 Water Street, Henderson, NV 89015

12. Fire Ratings

12.1 All walls, the floor, and the ceiling shall have a minimum three (3) hour fire rating. All doors shall have a three (3) hour fire & smoke rating. All penetrations (floor/wall/ceiling) including the doors shall be sealed per UFC & NFPA codes. Sealing designs shall consider pressures expected during fire protection suppression discharges.

12.2 Sealant used inside the equipment room shall be UL or FM approved and have the appropriate fire rating for the enclosure. All sealant materials and methods are subject to NVE approval through the submittal process.

12.3 Dampers shall be combination fire/smoke with a 3-hour fire rating.

13. Ventilation

13.1 General

13.1.1 Ventilation is required and can be by either natural circulation of air, forced ventilation, or a combination of both. The ventilation design shall be approved by NVE.

13.1.2 The equipment room shall be ventilated directly to an outdoor area. The equipment room ventilation shall not be mixed with the building ventilation/cooling system.

13.1.3 Ventilation openings shall be covered with durable gratings, screens, or louvers.

13.1.4 When gaseous fire suppression systems are used, ventilation requirements shall comply with the code requirements, including the ability to vent and maintain design limit pressures of the equipment room during fire suppression discharge and to minimize exposure of suppression gases to adjacent areas. Reference NFPA 12 Section 2.6.

13.1.5 Note: For fire suppression systems utilizing CO_2, it is recommended that the ventilation exhaust duct be located at a high elevation point near or on the ceiling to allow lighter gases to discharge while heavy CO_2 is being released. The fire/smoke damper for this ventilation duct should remain open during CO_2 discharge and automatically close after CO_2 release is complete.

13.1.6 All openings in the equipment room shall have fire/smoke combination louver/dampers in accordance with Section 5.6.9c and 5.6.8m.

13.2 Natural Circulation

13.2.1 The net area of ventilation opening, after reduction for the area occupied by screens, grates, and/or louvers, shall not be less than three square inches per installed transformer kVA. (Reference NEC 450). Example: With a quantity of four 1000kVA transformers installed, the ventilation area is calculated as 4 x 1000 kVA x 3 square inches/kVA = 12,000 square inches.

13.3 Forced Ventilation

13.3.1 The forced air ventilation capacity shall be designed and installed to maintain a 50 degree C (122 degrees F) maximum equipment room air temperature with an assumed outside air temperature of 40 degrees C (104 degrees F) with the assumed heat load per the table below:

Transformer Size	Heat Load per Transformer
2500 kVA (OIL)	18.4 kW
1500 kVA and below (OIL)	14.4 kW
2500 kVA (DRY)	30.0 kW
1500 kVA and below (DRY)	20.0 kW

13.3.2 The ventilation design capacity shall take into consideration all other heat loads including lighting, etc. In no case shall the ventilation capacity be less than 1300 CFM per transformer.

13.3.3 The maximum air velocity shall not exceed 900 feet per minute.

13.3.4 The combined net area of all ventilation openings, after deducting the area occupied by screens, gratings, and louvers shall not be less than fifteen hundred (1500) square inches per transformer position.

13.3.5 The fans shall be controlled by a thermostat. The fans shall operate at 90 degrees F equipment room temperature and shut off at 70 degrees F equipment room temperature.

13.3.6 The Customer shall provide and maintain electric service to all ventilation fans.

13.3.7 A means of disconnecting the power to the fans shall be provided in the equipment room.

13.3.8 Fans shall be interlocked to be shutdown during automatic fire protection system actuation. Reference UFC and NFPA.

13.3.9 Fire dampers on vents used to minimize pressure of the room during discharge of carbon dioxide fire suppression systems should close after discharge of the carbon dioxide. These vents should be located near or at the top of the room.

13.3.10 The ventilation system balance diagram showing the designed inlet capacity (CFM), maximum inlet temperatures and duct sizes shall be supplied as part of the submittals defined in Section 4.5.

14. Grounding

14.1 Grounding for the equipment room must meet NFPA 70 - NEC Article 250 requirements.

14.2 The customer is responsible for installing a continuous ground bus along the inside walls of the room a minimum of 12” and a maximum of 36” above the floor. The ground bus must not cross or obstruct any access doors.

14.3 The ground bus shall be a copper bar or wire and must have minimum cross-sectional area equal to 4/0 AWG conductor.

14.4 The ground bus shall be tied to a minimum number of ground points as specified in 14.6 to create an equal potential zone in the room. The ground bus shall be tied once to each piece of equipment in the room.

14.5 Connections of the ground points to the grounding electrode conductors that tie to the ground bus shall be made with an NEC approved and listed connector. Connections of the grounding electrode conductors to the ground bus shall be made using Cadweld or equivalent exothermic welding process. Connections of equipment grounding conductors between the ground bus and equipment shall be made with an NEC approved and listed connector. A Cadweld or equivalent exothermic welding process is acceptable for connecting the equipment grounding conductors to the ground bus.

14.6 One ground rod shall be installed in each of the corners of the equipment room as grounding points. Additional ground rods shall be installed as required and determined by NVE, up to twelve (12) in each room. In any event, grounding will conform to or exceed the requirements of NEC Article 250.

14.7 Each ground point shall consist of a ground rod or NVE approved alternative.

14.8 All ground rods shall be driven vertically such that the top end shall be ten (10) inches above the floor. The Customer shall exercise reasonable care to avoid damaging the threads on the ground rods. **Ground rods shall only be driven in the presence of an NVE inspector**.

15. Cable and Cable Racking

15.1 Customer is responsible for furnishing all conduit and racking inside the building required to bring the primary and service conductors to the switchgear and/or transformer.

15.2 Customer is responsible for furnishing, installing, and maintaining service cables, unless otherwise agreed. NVE will terminate the customer’s service cables on the transformer.

15.3 NV Energy will furnish, install, and maintain the primary voltage cables.

15.4 The equipment room shall provide adequate space for entry/exit and training of primary and secondary cables to equipment.

15.5 Switches

15.5.1 Underground primary feeder cables entering the equipment room shall run through precast concrete structures installed underneath switchgear bays as needed.

15.5.2 Primary cables exiting switchgear shall run through precast concrete structures installed underneath fuse bays as needed.

15.6 Transformers

15.6.1 Underground primary cables shall run through precast concrete structures installed underneath the floor.

16. Ducts for Primary Cable and Control

16.1 The Customer shall furnish and install a conduit duct for NVE's primary cable from the equipment room to a NVE designated location on Customer's property line.

16.2 The design shall call for an RS-82 (NVE Standard) precast box (30” x 84” x 48”) placed a maximum of 150’ outside the equipment room to facilitate the installation of feeder cable to the entrance switch bay.

16.3 The Customer must contact the NVE Designer to confirm type, size, location, and number of conduits for each equipment room.

16.4 All ducts shall be concrete encased. A minimum of 1 1/2" of concrete shall separate each duct. A minimum of 3" of concrete shall encase the complete duct bank.

16.5 The sum of the angles of all bends in the duct from the property line to the equipment room shall not exceed 135 degrees.

16.6 The typical number and size of conduits required in the duct for NVE's primary cable, control and communication is specified below – Customer must contact NV Energy for specific requirements:

15kv & 25kv: All Equipment Rooms	2 - 6" conduits per entrance/exit switch bay 1 - 2" conduit for communication
As required by commitment	1 - 6” conduit per switch for control 1 - 6” conduit spare

16.7 The minimum radius for conduit bends in the interior of a building shall be:

Duct Elbow Size	Radius (Minimum)
2”	18”
6”	48”

16.8 All underground primary ducts shall be 12 foot sweeps. Elbows shall not be used.

16.9 All primary ducts shall be installed in accordance with NEMA TCB2.

16.10 Any rigid steel conduit that is buried shall be wrapped with 30 mil plastic tape or factory coated.

16.11 A duct layout plan showing the specific route and duct material used shall be submitted for NVE approval as part of the submittals per Section 4.

17. Ducts for Secondary Cable

17.1 The Customer shall furnish and install a conduit duct for the Customer’s secondary cable from the equipment room to Customer's panel location when cable is used.

17.2 NV Energy will terminate the customer’s service cables on the transformer.

17.3 A duct layout plan showing the specific route and duct material used shall be submitted for NVE approval with the submittals per Section 4.

17.4 All secondary ducts shall be sealed by the Customer. Sealing shall be for the purposes of stopping water, smoke, and fire. The Customer shall take extra care in the design of bus duct systems so that this can be accomplished. All sealing material and methods shall be subject to the approval of NVE. Sealing materials shall be approved through the submittal process.

17.5 The service conductor conduit locations shall be approved by NVE. The size of the conductor and number of conductors shall also be approved by NVE. These plans shall be submitted to NVE in the submittals per Section 5.

17.6 The length of each Customer's furnished service entrance conductor after it enters the equipment room shall be as approved by NVE.

17.7 The Customer shall furnish the service conductors, or bus conductors from the Customer's switchgear to the equipment room. The Customer shall furnish 2-hole NEMA pad connectors for the termination of their cable to the transformers.

17.8 Customer supplied service conductors shall be 250 kcmil, 500 kcmil, or 750 kcmil. The conductors may be either copper or aluminum.

17.9 When Bus Conductors are utilized, the following conditions are required:

17.9.1 Bus conductor location and configuration in the equipment room shall be approved by NVE. These plans shall be submitted to NVE in the submittals per Section 4. The Customer shall provide and install the bus duct termination enclosures. Termination enclosures shall be located as close as practical to the transformers.

17.9.2 The termination enclosure shall be designed to terminate NVE's NEMA pad connectors. The spacing between phases shall provide sufficient room to terminate NVE's conductors.

17.9.3 NVE will furnish and install all cable and connectors required to connect the transformers to the Customer's bus conductor termination enclosure in the equipment room.

18. Conduit System Materials

18.1 All polyvinylchloride (PVC) conduits shall be Schedule 40 (minimum), gray color in accordance with the latest revision of ASTM F512 and NEMA TC6. Conduit may be supplied by any manufacturer meeting specifications.

18.2 All conduit fittings shall conform to ASTM F512 and NEMA TC9.

18.3 Elbows shall be schedule 40 polyvinylchloride (PVC), one piece gray in color with an integral bell end.

Size	2”	6”
Carlon No.	UA9CJB	UA9FRB
Condux No.	52781-20	52785-60

18.4 End bells shall be solid one-piece type, polyvinylchloride (PVC), Schedule 40, gray in color.

Size	2”	6”
Carlon No.	E997J	E997R
Condux No.	61019-20	61019-60

18.5 Conduit plugs shall be plastic tapered for appropriate conduit size.

Size	2”	6”
Carlon No.	P258JT	P258RT
Condux No.	80474-00	80478-00

18.6 Prefabricated multiple conduit terminators are acceptable. Please submit for approval.

18.7 A flat tape pull rope shall be left in each duct to facilitate conductor installation. The pull tape shall be tied to the removable conduit plug (MC-38).

18.8 Pull tape shall be made of polyester, be lubricated, and printed with footage markings and have a minimum strength of 2500 lbs. (MT-15).

19. Lighting and Receptacles

19.1 The Customer shall provide, install, and maintain lighting equipment and electrical outlets inside the equipment room. Lighting and outlets shall be designed and installed to meet all applicable codes.

19.2 NVE requires a minimum of two 120 VAC wall outlets consisting of duplex receptacles, minimum 20A rating, located such that no point on a wall is more than ten feet away from an outlet.

19.3 The height of the lights shall provide proper work clearance for electrical equipment installed in the equipment room.

20. Materials

20.1 Certain materials to be incorporated in the work may be designated in this specification under a trade name or the name of the manufacturer. Where materials are specified by a particular designation, or equal, the Customer may use an alternative material, which is of equal quality and of the required characteristics for the purpose intended, but only with prior NVE approval. These materials must be approved with the submittals, and no substitutions are allowed without specific approval from NVE.

20.2 The Customer shall request approval of a proposed substitution in writing accompanied by complete data as to the quality of the material proposed. Such request shall be made in ample time to permit due consideration for approval without delaying the work. At least ten (10) working days are required to review a material submittal. The burden of proof as to the equality or suitability of alternatives shall be upon the Customer. Samples may be required to determine equality. NVE shall be the sole judge as to the equality and suitability of alternative materials. The use of materials prior to written approval of their use by NVE shall be at the Customer's risk and may be rejected.

20.3 Certain required materials may not be stocked locally. The Customer should locate required material as early in the project schedule as possible. This will reduce the likelihood of delays or costly rebuilding of the equipment room to comply with these specifications.

21. Inspections

21.1 NVE will provide an Inspector who will be in the line of communication between the Customer and NVE during construction. The hours of work for the Inspector are from 7:30 A.M. to 3:00 P.M., Monday through Friday. All work requiring the presence of the Inspector shall be scheduled during these hours

21.2 The Customer shall, unless otherwise specified, give 48 hours advance notice, by telephone, to the NVE Inspector prior to placing concrete, installing ground rods, backfilling trench, or mandrelling conduit.

21.3 Ducts constructed for NVE installed cable shall be thoroughly cleaned and tested. The test shall involve drawing a mandrel through each duct. The customer will furnish the proper size mandrels. The mandrel test shall be pulled only in the presence of the Inspector.

21.4 Ducts which do not pass the mandrel test shall be repaired and re- tested. A steel brush shall not be used in any non-metallic duct.

21.5 NVE will not energize its equipment until all requirements of this specification are complete and the inspector has accepted the equipment room.

21.6 It shall be the Customer's responsibility to coordinate with the Inspector to ensure proper inspection is performed throughout the construction period. The name of the Inspector will be provided to the

Customer after the equipment room design and drawings are approved. Fire protection and suppression systems shall be inspected by NVE's Safety and Health Specialist or designee.

21.7 The Customer shall arrange for inspection at the number listed on the NVE design drawing.

21.8 NVE's inspectors shall inspect the equipment room during construction for compliance with the approved design. All material and work shall be subject to inspection, examination, and testing by NVE, at any time during manufacture, installation, or construction. The Customer shall provide and maintain proper facilities and safe access for such inspections or testing. The Customer will pay the costs of all tests required under this inspection.

21.9 NVE shall have the right to reject defective material and work. Rejected work shall be corrected and rejected material shall be replaced with proper material. The Customer shall promptly segregate and remove rejected material from the job site.

21.10 Failure of the Customer to adhere to the above provisions may result in the Customer being required, at his expense, to remove, uncover, or otherwise enable inspection of such work by the Inspector.

21.11 Rejected work will result in delaying electric service until the inadequacies are corrected. The costs of correcting rejected work shall be paid by the Customer.

21.12 The Customer shall submit letters from the applicable building and fire agencies detailing their inspection of the equipment room and stating their acceptance and approval. NVE will not provide electrical service or energize NVE equipment prior to acceptance of the equipment room by the required agencies.

21.13 The fire protection and detection system shall meet the requirements of NVE and of the local governing body (i.e., city, county Fire Department). Only after complete approval of all aspects of the inspection will NVE's equipment be energized.

22. Equipment Data

22.1 The dimensions below are approximate for the standard Arc-Resistant Stand-Up Switchgear that NVE requires for equipment rooms and should be used only as a general guide in determining the required size of an equipment room. The size of the equipment room shall be determined in coordination with NVE. Additionally, front, side, and overhead clearances must be added to the equipment dimensions below to determine minimum space required for the equipment room.

Equipment	Width (in)	Depth (in)	Height (in)	Weight (lbs)
Termination bay	44	44	129	2500
Fuse bay	44	44	129	2500
Capacitor bay	64	44	129	3300
Transition bay	44	44	129	2500
Tie switch bay	44	44	129	2500

22.2 12,470 Transformer Data

Size (kVA)	Width (in)	Depth (in)	Height (in)	Weight (lbs)	Oil Volume (gal)
500	68	65	65	5900	350
750	68	71	77	8200	400
1000	73	75	77	10,400	475
1500	73	77	77	12,200	600
2500	86	86	77	17,200	800
Dry-type (all sizes)	72	120	108	15,000	--

Table of Contents

1. General Guidelines

1.1 In order to minimize the pulling tension, the cable should be pulled from the manhole or pole riser nearest

1.2 This standard is intended as a guideline for the installation of NVE conduits in or on bridges and overpasses. The final conduit support system design will be the responsibility of the Project Engineer (Engineer).

2. Process

2.1 It is imperative the NVE coordinate with the regulating body of the bridge or overpass throughout the project to secure occupancy rights on the structure, to assure that proper load limits are designed for, and to meet the project construction time table.

2.2 NVE Distribution Planning shall specify system requirements, e.g. number of conduits.

2.3 Design should conform to NVE ESR RT-5 “Criteria for Emergency Spare Conduit Installations”.

2.4 Design should have no sharp bends or “snaking” of conduits. Design should minimize cable pulling tension.

2.5 Final design shall be stamped by a professional engineer registered in the State of Nevada.

2.6 NVE Design Acceptance should include review by but not limited to the following: District Underground Inspector, District Design Facilitator, District Designer, District Engineer, District Coordinator, and District Supervisor.

3. Galvanized Rigid Steel (GRS) Conduit Specification

3.1 Conduit material shall be steel on the bridge and continuing through bridge abutments.

3.2 The specified size shall be nominal trade size 6”.

3.3 All surfaces, including threads, except field cut threads shall be zinc coated by a hot dip galvanizing process.

3.4 Field cut threads shall be painted with galvanized repair paint acceptable to the Engineer.

3.5 Each conduit stick, factory elbow and couplings shall bear the Underwriters Laboratories, Inc. label.

4. Expansion/Deflection Fitting

4.1 Expansion/deflection fittings shall be installed in/at all structural expansion joints or at 200’ maximum spacing, whichever is the lesser distance, and on the bridge side of the abutments. The expansion setting and deflection setting shall be determined by the Engineer. Fittings shall be O.Z./Gedney Type EXDX-600, Eaton Crouse-Hinds Series XD014, or approved equivalent.

4.2 Expansion/deflection fittings shall only be installed on straight portions of conduit runs.

5. Hanger Supports

5.1 Where applicable, “all supports, bolts, straps, screws and so forth shall be of corrosion-resistant materials or protected against corrosion by corrosion-resistant materials” per NEC 2005 344.10 (D), including bridge inserts. Stainless Steel or hot dip galvanizing after fabrication is acceptable.

5.2 Conduit hanger support shall be at 6’-8’ maximum spacing.

5.3 Squares that enclose conduit in supports should be approximately ½” larger than the OD of the conduit.

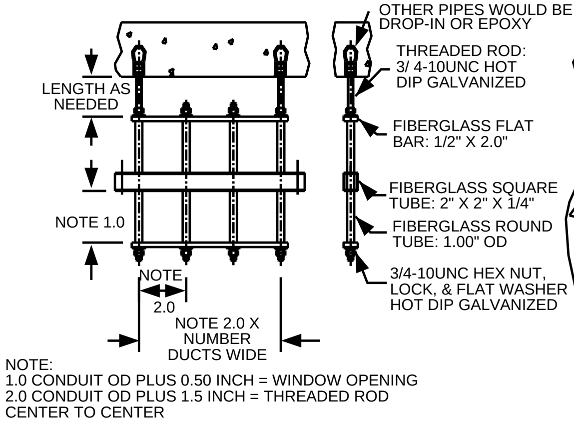
5.4 Support shall permit conduit to expand and contract with temperature and bridge.

5.5 Peen, center punch or spot weld all bolts at thread line to lock nuts in place.

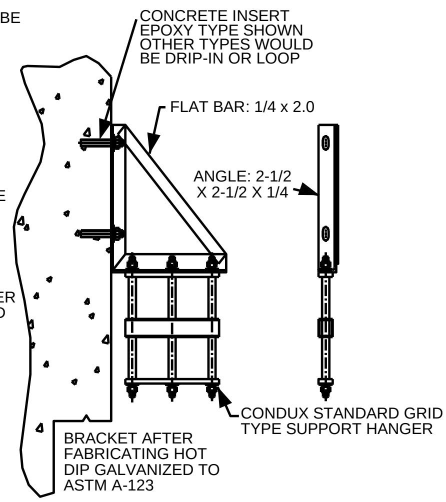
5.6 Mounting surface for hardware shall be cleaned by sandblasting or other equivalent methods.

5.7 Steel support hangers must be restrained for maximum cable pulling tension.

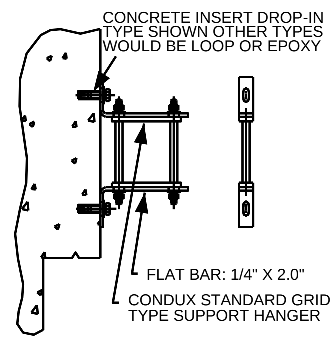
5.8 Hanger supports mounted on the exterior of the bridge shall be located on the downstream side of the bridge if over water, and no lower than the bridge structure.



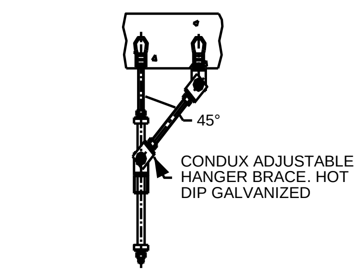
CONDUX STANDARD GRID TYPE CONDUIT SUPPORT HANGER



CONDUX STANDARD GRID TYPE CONDUIT SUPPORT HANGER WITH ANGLE IRON SIDE MOUNT



CONDUX STANDARD GRID TYPE CONDUIT SUPPORT HANGER WITH FLAT BAR “L” MOUNT BRACKET



CONDUIT STOP RING BRACED HANGER DETAIL

NOTE:
ALL MEASUREMENTS ARE IN INCHES UNLESS NOTED OTHERWISE

NOTE:
PVC CONDUIT PLACE DETAIL 100 FOOT MAX
FIBERGLASS CONDUIT PLACE DETAIL 200 FOOT MAX
GRC CONDUIT THIS DETAIL IS NOT NEEDED

6. Conduit Sleeves/Windows

6.1 Windows, sleeves and casings should be designed to permit the conduit to pass through, for example, an abutment in the same alignment as the conduit on the hanger support. Such design will make rolling or bending the conduit unnecessary. The conduit pass through method will be determined by the Engineer.

Figure 3 Typical Window (Intentionally Blank)

7. Conduit Bonding to Bridge

7.1 A #2 AWG stranded copper conductor shall bond bridge steel or rebar to the NVE conduits near the bridge abutments.

7.2 The conduit bonding should be visible from the inspection doors or from the outside.

7.3 The bonding method to the bridge shall be by either exothermic welding or compression connector, as determined by the Engineer.

7.4 The bonding method to the conduit shall be by a mechanical bronze ground clamp, looped to each conduit.

7.5 For GRS conduit systems that are continuous between NVE manholes, grounding bushings shall be installed in pullboxes and manholes; then #2 AWG stranded copper conductor attached to the ground bus in the manhole, looping through the insulated grounding bushing on each galvanized rigid steel conduit. The insulated grounding bushing shall be O.Z. Gedney HBLG-6122 or SBLG-6122 or equivalent.

7.6 For GRS conduit system that are not continuous between NVE manholes, #2 AWG stranded copper conductor shall be installed from the conduit bonding point(s) to the ground bus in the manhole(s). Where subject to physical damage, a 1” PVC Schedule 80 or galvanized rigid steel conduit shall be installed for protection.

Figure 5 Typical Bonding for Non Continuous GRS Conduit Systems (Intentionally Blank)

8. Inspection Door(s)

8.1 If necessary, install a 30” x 30” door that is located such that the expansion/deflection fittings and conduit bonding to the bridge at the abutment may be inspected by NVE.

Figure 6 Typical Inspection Door (Intentionally Blank)

TABLE OF CONTENTS

1. PURPOSE

1.1 This standard describes the requirements for the design and operation of separate standby or emergency transfer systems which supply electric power to customer's circuits that are normally served by NV Energy's distribution system.

2. GENERAL

2.1 In general, any portable electric generator which is capable of being temporarily connected to a customer's electrical system, (residential and commercial) which is normally supplied by NV Energy shall be connected only after opening the customer's main service switch so as to isolate the customer's electrical system. Also, the generator must be disconnected before reclosing the main service switch to restore normal electric service. Any electrical generator, other than one authorized by NV Energy to run in parallel with NV Energy, or standby power source capable of being permanently or temporarily connected to a customer's electrical system shall be connected only by means of a visibly open double throw-switch, to isolate the customer's electrical system from NV Energy's system. Failure to isolate the customer's electrical system from NV Energy's system can cause electrical feedback and endanger both life and property. Any person who possesses and intends to use any such auxiliary generator or standby power source on an electrical system normally supplied by NV Energy must notify the local NV Energy office of the units' installation location. All auxiliary and standby power sources must be installed in compliance with all National Electric Codes (NEC) and local/state/federal ordinances.

2.2 The customer's system addressed in this standard is separate generation and is excluded from parallel generation such as might be found with small power producers, co-generation, or net metering. (RE-1, RE-2, RE-3).

2.3 Refer to RE-3 for all requirements for generation sources that qualify as Net Metering or are paired with Net Metering System.

3. REFERENCES

3.1 National Electrical Code (NEC) Article 445: Generators.

3.2 National Electrical Code (NEC) Article 517: Health Care Facilities.

3.3 National Electrical Code (NEC) Article 695: Fire Pumps.

3.4 National Electrical Code (NEC) Article 700: Emergency Systems.

3.5 National Electrical Code (NEC) Article 701: Legally Required Standby Systems.

3.6 National Electrical Code (NEC) Article 702: Optional Standby Systems.

3.7 National Electrical Code (NEC) Article 705: Interconnected Electrical Sources.

3.8 National Electrical Safety Code (NESC), Articles 120 and 121C or latest edition/revision.

3.9 Nevada Power Company Electric Rule 19: Standby and Auxiliary Service.

4. CUSTOMER DESIGN REQUIREMENTS

4.1 Separate Operation

4.1.1 General

The electrical characteristics of transfer switches shall be suitable for the operation of all functions and equipment which they are intended to supply. The capacity of the transfer switches shall be adequate for switching all classes of loads to be served and withstand the effects of available fault currents without contact welding. Where an alternate source is used to supply the same load supplied by NV Energy as a normal source, transfer equipment for shifting from one source to the other shall open all ungrounded conductors of one source before connection to the other.

Transfer switches must meet all ANSI, NEMA and utility specifications.

4.1.2 Automatic Transfer Switch

Automatic transfer switches shall be electrically operated and mechanically held. The transfer switch shall transfer and may retransfer the load automatically. A reliable mechanical interlocking, or an approved alternate method, shall be inherent in the design of transfer switches to prevent the interconnection of the normal and alternate sources of power, or any two separate sources of power. Two lights, properly identified, shall be provided to indicate the transfer switch position.

A means for the safe manual operation of the automatic transfer switch shall be provided.

4.1.3 Non-automatic/Manual Transfer Switches

Manual switching devices shall be mechanically held. Operation shall be by direct manual or electrical remote manual control. Electrically operated switches shall derive their control power from the source to which the load is being transferred. A means for safe manual operation shall be provided.

A reliable mechanical interlocking or an approved alternate method, (double throw safety switch), shall be inherent in the design to prevent the interconnection of the normal and alternate sources of power, or any two separate sources of power. Lights or other indicators properly identified shall be provided to indicate the switch position.

4.2 Momentary Parallel Operation (Exception)

The momentary paralleling of the customer's generation equipment and NV Energy's system is only allowed on an exception basis. The Standards Engineer and the System Protection Engineer must review and approve all parallel systems. <u>This scheme is very expensive and demands careful design consideration to ensure equipment and personnel safety</u>. Parallel switch operations require a detailed system design containing many monitoring devices and relays, i.e., reverse power, directional current, timing, over/under voltage, synchronizing and protective. Synchronizing is the most critical operation in the system since substantial damage to the customer's generator can result.

4.3 Approval

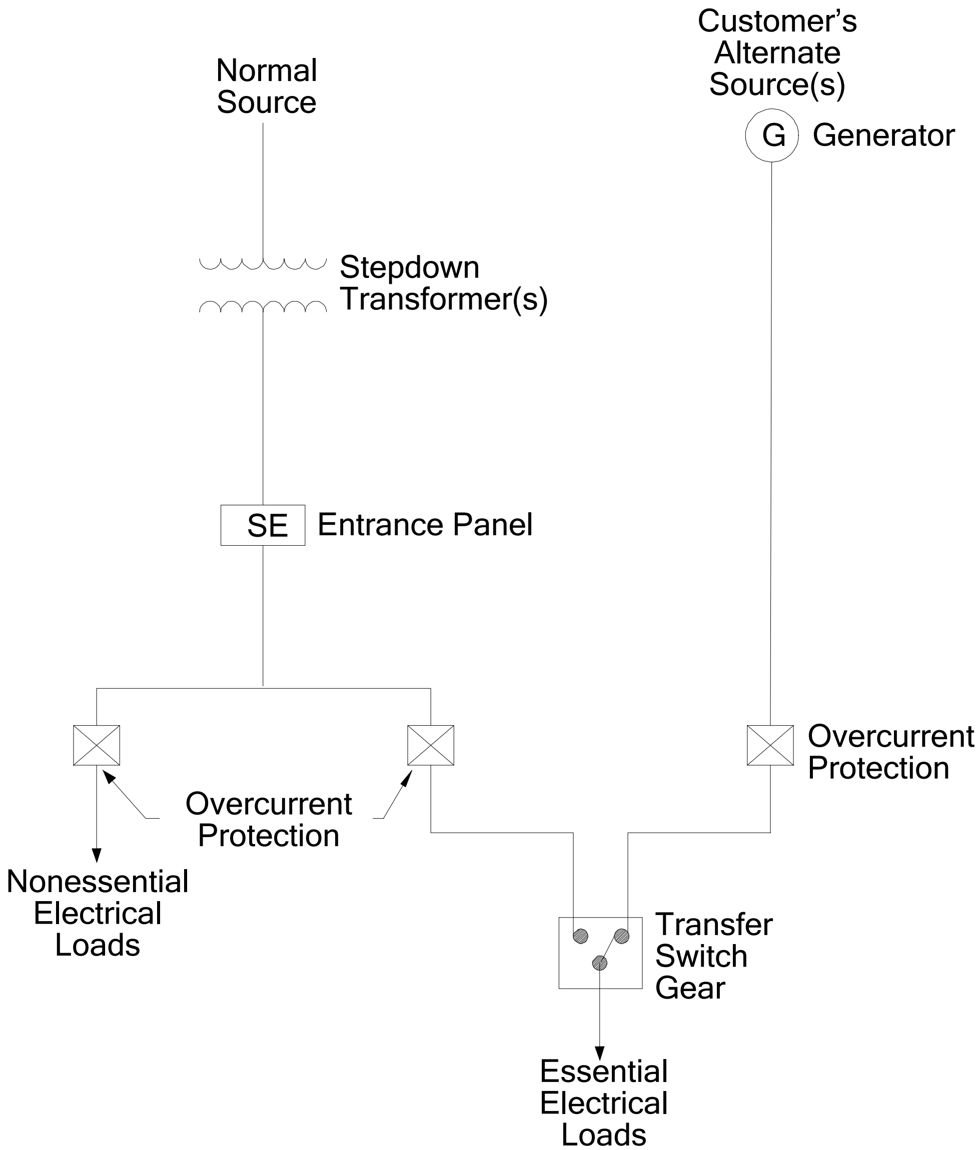
In order to be approved by NV Energy the transfer switch and equipment selected by the customer must meet the requirements of all applicable federal, (NEC, NESC), state, and local codes, as well as NV Energy standards.

The customer will supply to NV Energy two copies of its proposed electrical plans, such as single-line meter and relay diagrams, along with a full description of function, features and operation of the proposed parallel/transfer switch and their interlocking devices, preferably in the form of the manufacturer's full specification with illustrations and references to existing installations.

As a precondition for approval, all automatic parallel/transfer switches shall meet the appropriate UL standards. Automatic and manual transfer switches will be a true double throw, inherently interlocked switch.

The utility will be most critical with regard to the degree in which the interlocking features on transfer switches can be defeated.

5. SWITCHING DIAGRAM (EXAMPLE)



THIS PAGE INTENTIONALLY LEFT BLANK

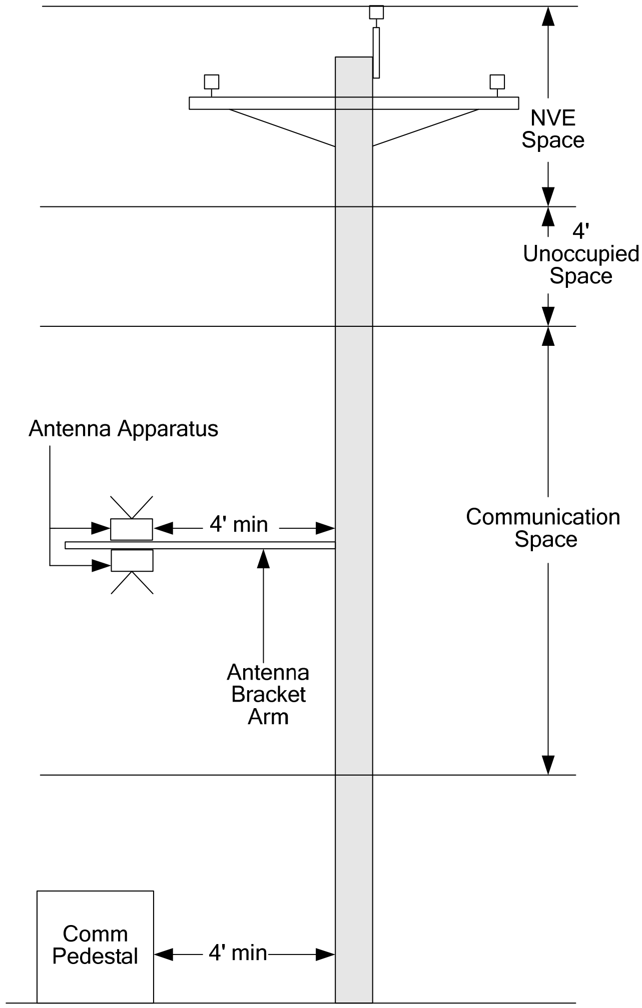
1. Table of Contents

2. Purpose

The following list covers the basic requirements for a communications antenna site installation on a wood distribution power pole; it does not include all requirements for installation.

3. General Installation Requirements

1. Installation is on a “clean” pole. The pole is not encumbered by an air break switch, transformers, capacitor banks, regulators, dead-end guys, or a three-phase dip. A guy-stub pole may be used with prior approval.
2. Zoning, clearance and building permit(s), where required, are obtained by customer.
3. Estimated electrical load information of the installation shall be provided to NVE.
4. A structural analysis report stamped by a Nevada Civil P.E. shall be provided to NVE. Contact the NVE Joint Use Department for a complete list of the structural analysis requirements.
5. All work shall be done by qualified linemen except within the communications space. Only NVE or NVE qualified workers may enter or work in the NVE supply space.
6. Only the antenna and mounting bracket or cross arm used to stand the antenna off from the pole and the riser conduit for the antenna cables shall be allowed on the pole. All other ancillary equipment shall be located within a separate pedestal.
7. Communications equipment pedestals must not block access to the pole. The preferred location is nearby on adjacent private property. Conduits shall be run underground between the pole and the cabinet. **The absolute minimum distance from the communications pedestal to the pole is 4 feet.**
8. The telecommunications equipment owner shall incur the cost of removing the equipment from a pole in the event that the equipment is abandoned.
9. The telecommunications company must notify NVE at least 45 days in advance when an outage will be required to service an installed antenna.
10. A disconnect switch with a visible air break on the electrical service to the antenna site shall be provided to allow the antenna, pedestal, and ALL other customer owned associated telecommunications equipment at the site to be de-energized. This switch shall be installed by the customer and will be used to de-energize all customer owned equipment at the site in the event NVE deems it necessary to do so in order to operate the electric system or work on nearby facilities. NVE Metering Department **must** be consulted well in advance for approval of the location of the switch. The installation shall be required to meet all other applicable NVE Standards.



Notes:

1. **ALL** installations must be approved by NVE, including **but not limited to** the antenna, the mounting arm and bracket, and the pedestal.
2. Customer to provide and install all materials.
3. Antenna shall be installed within the communications space on wood distribution poles.
4. Under no circumstances shall anyone other than NVE qualified workers enter the NVE supply space.
5. Only one antenna assembly shall be mounted on the antenna bracket or mounting arm. The assembly may contain multiple antennas, but the distance from the pole to the closest point of the antenna assembly shall be no less than 4 feet
6. Metal bracket arms shall be self-supporting and bonded to pole ground with a #6 S.D. bare copper conductor. If no pole ground is present, bracket shall be grounded with #6 soft-drawn solid copper to a minimum 6’ x ½” copper-clad ground rod driven into ground at base of the pole; the first 8’ of ground wire from base of pole to be covered with Wood, PVC or HDPE wire molding. All antenna support arms must be attached such that they do not encroach into the climbing space. NVE must approve all bracket/arm designs and all designs must accommodate 100% No-Fall climbing practices adopted by NVE.
7. Communication line clearances shall conform to the requirements of the latest edition of the NESC.

1. General

1.1 This specification covers the requirements for cellular antenna installations on wood distribution poles.

1.2 All costs shall be the sole responsibility of the communications company, unless stated otherwise in this standard.

1.3 This standard is applicable only to distribution lines less than or equal to 34.5kv.

1.4 By submitting a license application, you represent and warrant that you have met the contractual obligations of your Pole Top Antenna Agreement and are thereby affirming you performed a complete structural analysis of the effects of the proposed attachment(s) to NV Energy infrastructure.

2. Pole Selection Criteria

2.1 Installations are limited to distribution poles only.

2.2 Must be an existing wood service pole or NV Energy owned streetlight pole.

2.3 Must be a “clean” pole, meaning, the pole cannot be encumbered by an air break switch, transformer, capacitor bank, regulator, dead-end guys, or a three-phase dip.

2.4 The use of pole top extensions is prohibited.

2.5 Distribution facilities must be nearby for providing electrical service.

2.6 Communications equipment cabinets must not block access to the pole. Conduits shall be run underground between the pole and the cabinet.

2.7 For locations where a proposed pole top antenna is to be installed, the existing pole shall be replaced with a pole 5 feet greater in height to allow required clearances to be met.

3. Application

3.1 All requests must contain the following at a minimum. Contact the Joint Use Department for additional requirements:

a) Installation contractor

b) Address of the pole

c) All information located on the pole tag

d) Photographs of the upper portion of the pole and area around it

e) Drawings of the antenna facilities proposed to be attached (See section 4)

f) A proposed installation schedule

g) Proof of any government required permits (See section 5)

3.2 Only one antenna shall be installed per pole.

3.3 NV Energy reserves all right to make any changes to allow the installation at the communications company’s expense, or decline the proposed location.

3.4 All modifications to the pole or associated electrical system to accommodate the installation shall be paid for by the communications company.

3.5 Any requests to install an antenna must be sent to the Joint Use Department:

Installations in the North:
Joint Use Contracts Analyst
6100 Neil Road
M/S R77CSE
Reno, NV 89511

Installations in the South:
Joint Use Contracts Analyst
7155 Lindell Road
M/S B54RN
Las Vegas, NV 89118

4. Drawings

4.1 The drawings will not be conceptual, but location specific and complete for the proposed installation.

4.2 Drawings shall include:

a) Clearances to current carrying conductors

b) Down guys where required

c) Equipment cabinet sizes and mounting locations

d) Metering and electric service facilities and their proposed locations

e) Antenna array size

f) Wind loading information. If the wind loading is greater than 1.5 square feet, pole loading calculations will be required. Contact the Joint Use Department for details concerning structural analysis and loading calculation requirements.

g) Estimated electrical load for all equipment

5. Zoning

5.1 The customer is wholly responsible for obtaining all government required permits and approvals

5.2 NV Energy reserves the right to remove any and all equipment if requested by the local authority

5.3 The communications company shall perform a TOWAIR (or Landing Slope Facility Calculator) study. The study shall be sent to NV Energy to be filed with the Federal Aviation Administration. If the FAA requires the structure to be registered, an Antenna Structure Registration number must be obtained from the FCC. Any and all requirements from the FAA will be the responsibility of the communications company.

5.4 The communications company shall reimburse NV Energy for any and all engineering studies

6. Equipment Requirements

6.1 Equipment details shall be provided and approved prior to installation.

6.2 All equipment associated with the pole top antenna must be housed in a pad-mounted communications cabinet a minimum distance of 4 feet from the pole.

6.3 A visible service disconnect switch box for the antenna must be provided

a) The service disconnect shall be housed in a lockbox located a minimum of 4 feet away, adjacent or attached to the communications cabinet.

b) The lock must be a “horseshoe” type lock.

6.4 Switch box shall be designed with two enclosures, one for the cutoff switch, the other storing three RF monitoring devices

6.5 RF monitoring devices shall be worn by all NV Energy personnel while servicing the pole. Until the RF device confirms that the power to the RF devices is off, no NV Energy personnel may be within 30 feet of an energized antenna system. NV Energy shall inspect and maintain these devices according to the recommendation by the manufacturer, including maintaining the batteries.

6.7 The meter and associated equipment shall be on a separate meter pedestal or attached to the pad-mounted enclosure.

6.8 A service disconnect is required to comply with NEC. Additionally, a manual transfer switch (double pole double throw, break before make) will be required when connected to an auxiliary generator.

6.9 The telecommunications equipment owner shall incur the cost of removing the equipment from a pole in the event that the equipment is abandoned.

7. Conduit

7.1 All communications conduit which enters the utility space must be non-conductive as per NESC 239H or latest edition/revision. All metallic conduit outside of the utility space must be bonded to the pole ground.

7.2 Conduit less than two inches in diameter may be banded to the pole. Anything larger than two inches, or if there are more than two conduits, must be mounted on standoffs.

7.3 Conduit standoffs must be mounted jointly with NV Energy conduit when a single-phase primary dip is already fixed to the pole.

7.4 Conduit shall not interfere with a lineman’s ability to climb the pole.

8. Grounding

8.1 When a ground is not available on the pole, the communications company must request NV Energy to install a ground.

8.2 NV Energy grounds are not guaranteed to comply with the NEC requirements for grounding.

8.3 The communications company must bond their NEC ground to NV Energy’s ground with not less than a #4 solid copper conductor.

8.4 The antenna owner shall provide lightning and over/under voltage protection adequate to protect their equipment from damage.

9. Installation Requirements

9.1 Required power outages for equipment installation must be coordinated with NV Energy.

9.2 All work is to be performed by qualified electric linemen, except within the communications space. Work within the communications space must be performed by a qualified communications worker.

9.3 The communications company must notify NV Energy at least 45 days in advance when an outage will be required to service an installed antenna. Outages may not be possible at certain times of the year or under certain power routing conditions.

9.4 Customer shall affix a sign to the pole nearest to the shutoff box reading “High Energy Field – RF Monitors Must Be Worn.”

9.5 There shall be a 5 foot minimum clearance from the closest energized conductor to the antenna bracket and/or mounting baseplate.

9.6 The electric service conduit shall be installed on standoff brackets which provide 5 inches of clear space between the conduit and pole face.

9.7 The weatherhead shall be installed such that service conductors shall be more than 40 inches above the highest communications cable or metallic attachment bracket. The communications company shall coordinate with NV Energy to determine the proper location for the weatherhead.

9.8 All installations must be in compliance with the FCC Office of Engineering and Technology (OET) Bulletin 65, Edition 97-01 “Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields” or the latest revision thereof.

1. Table of Contents

2. Purpose

This standard outlines the minimum requirements for installation of a temporary overhead service pole by a customer, having a 100A to 200A, single phase service entrance. In some cases three phase service might be available, consult the local NVE office for details. A service pole is considered temporary when the installation is expected **to remain in service for less than 18 months**. Building construction sites and temporary sales lots are examples. Inspection / approval by local authorities are required before service can be connected.

3. Location

1. Temporary poles shall be placed in such a location that the service drop will not cross portions of adjacent property or any structures on customers' premises. Service drop must be a minimum of 18' above the ground. Areas subject to truck traffic; dump trucks, cement trucks, etc., will require 24' ground clearance.
2. Temporary poles shall be a minimum of 10 feet and a maximum of 100 feet from NVE's pole. When spans of #2 str triplex exceed 75 feet (or larger conductor), or when over an area where vehicles will travel including but not limited to crossing roads, temporary poles must be push-braced or back-guyed.

4. Pole

Poles may be rectangular or circular in cross section and shall be solid (not laminated). Rectangular poles are acceptable when truck access is provided per section 6 of RPI-15 and shall be a minimum cross section of 6" x 6" nominal. Circular poles are required when truck access is unavailable and shall be minimum top circumference of 26" (8" diameter). The minimum acceptable length shall be 20 ft. and must be set a minimum of 4 ft. in the ground. A taller pole may be required to obtain the required clearances. Untreated redwood, butt-treated cedar and commercially full-treated douglas fir poles are acceptable.

NOTE: Because this temporary pole must be safely climbed by NV Energy linemen, a quality installation is critical.

5. Service Entrance Equipment

Service entrance conductors and grounding must meet applicable Local, State, and National Electrical (NEC) Codes. Meter socket must meet NVE requirements.

6. Identification

Customer to provide an identification sign or tag securely attached to pole/panel with street address that matches the structure or building address.

7. Riser Conduit

Conduit required to be non-conductive material with waterproof service head. Conduit size and type must meet National Electric Code (min. IMT or RGS electrical conduit).

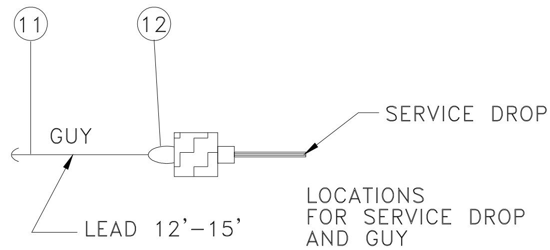
8. Installation Requirements

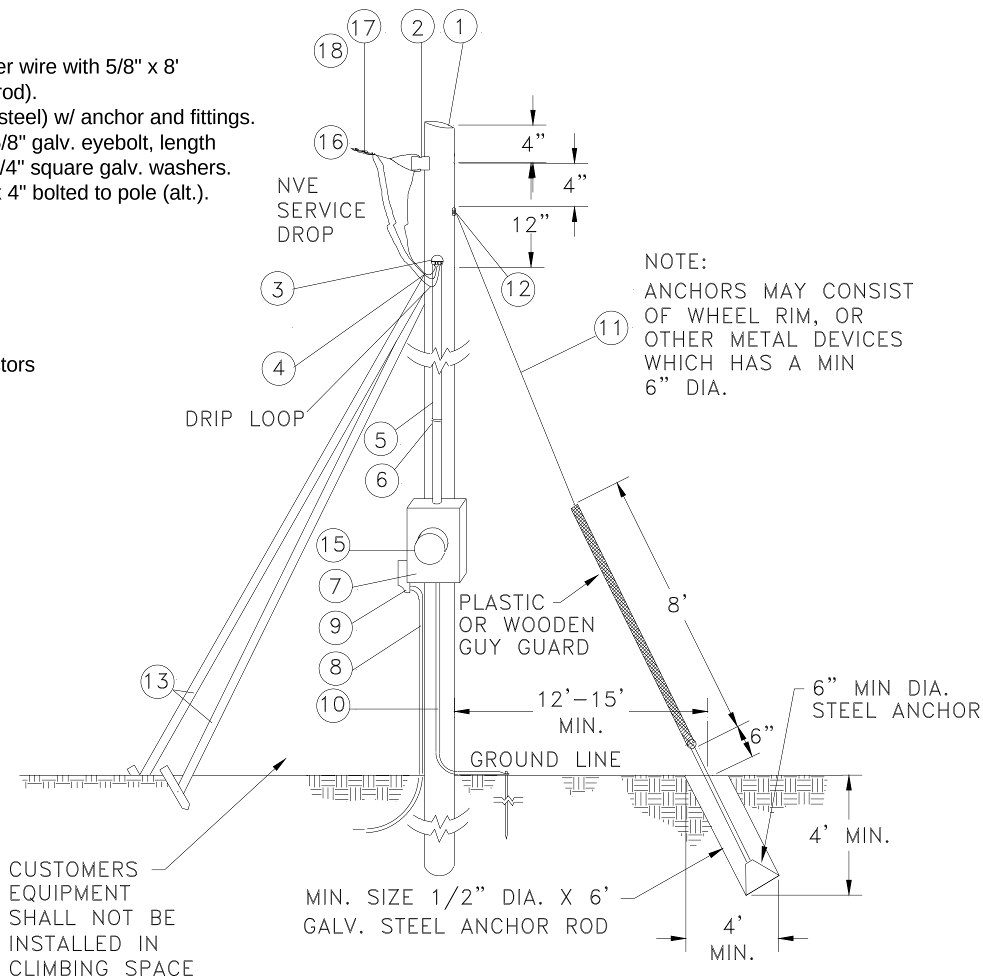
Material Furnished By Customer

1. Pole or timber-min. 20', must meet requirements of Section 3.
2. Service insulator/bracket 4" from top of pole.
3. Service (weather) head.
4. Wire - insulated.
5. Conduit shall be min. IMT or RGS electrical conduit & waterproof service head.
6. Conduit straps @ 30" spacings.
7. Meter socket, main service switch.
8. Conduit, load side.
9. Waterproof outlets.
10. Grounding (#4 copper wire with 5/8" x 8' copper clad ground rod).
11. Guy wire (1/4" galv. steel) w/ anchor and fittings.
12. Down guy requires 5/8" galv. eyebolt, length as required, with 2-1/4" square galv. washers.
13. Push brace min. 2" x 4" bolted to pole (alt.).

Items Furnished By NVE

15. Meter
16. Service drop wire
17. Wedge clamp
18. Service drop connectors





FAULT CURRENT FOR 3∅ TRANSFORMERS (12,470 DELTA-WYE),
CALCULATED FOR THE EMERGENCY SPARE TRANSFORMER

Xfmr (3Ø, kVA)	Volt L-L	Volt L-G	Current (Amp.)	System Imp. (%)	Xfmr Imp. (%)	3Ø Fault (Amps)	L-G Fault (Amps)
75	208	120	208	.026	0.90	27,890	28,223
112.5	208	120	312	.040	1.08	36,752	37,333
150	208	120	416	.053	1.08	53,871	55,129
225	208	120	625	.079	1.08	70,227	72,379
300	208	120	833	.106	1.08	90,933	94,573 (Note 2)
500	208	120	1388	.176	1.35	90,933	94,473
750	208	120	2083	.264	5.32	54,399	55,681
1000/1120	208	120	2778	.353	5.32	54,399	55,681 (Note 2)
75	480	277	90	.026	.90	12,086	12,230
112.5	480	277	135	.040	1.08	15,926	16,178
150	480	277	180	.053	1.08	23,344	23,889
225	480	277	271	.079	1.08	30,432	31,364
300	480	277	361	.106	1.08	39,404	40,982
500	480	277	601	.176	1.35	39,404	40,982 (Note 2)
750	480	277	902	.264	5.32	21,204	21,653
1000	480	277	1203	.353	5.32	30,848	31,806
1500	480	277	1804	.529	5.32	39,927	41,548
2000	480	277	2406	.705	5.32	53,399	56,338
2500/2800	480	277	3368	.987	5.32	53,399	56,338 (Note 2)
500	4160	2400	69	.176	1.35	4,547	4,729
750	4160	2400	104	.264	5.32	2,447	2,498
1000	4160	2400	139	.353	5.32	3,559	3,670
1500	4160	2400	208	.529	5.32	4,607	4,794
2000	4160	2400	278	.705	5.32	6,161	6,501
2500/2800	4160	2400	389	.987	5.32	6,161	6,501 (Note 2)

FAULT CURRENT FOR 1∅ TRANSFORMERS CALCULATED FOR THE EMERGENCY SPARE TRANSFORMER

Xfmr (1Ø, kVA)	Volt L-L	Volt L-G	Current (Amp.)	System Imp. (%)	Xfmr Imp. (%)	L-L Fault (Amps)	L-G Fault (Amps)
25	240	120	104	.009	1.32	11,729	17,649
37.5	240	120	156	.013	1.32	13,401	20,829
50	240	120	208	.018	1.54	20,394	31,993
75	240	120	313	0.26	1.54	22,270	35,073
100	240	120	417	.135	1.84	35,100	55,766
167	240	120	696	.159	1.92	35,100	55,766 (Note 2)

NOTES:

1. The above tables are based on 2 substation transformers (33 MVA) in parallel and being fed at 138kV.
2. Fault currents shown are for the worst case between the existing transformer and the next larger (emergency spare) size, where applicable.
3. The system impedance values shown above use the transformer kVA as the base.
4. The transformer impedance values shown above are based on the <u>lowest</u> values supplied in the past for each kVA size.

1. Scope

This standard provides information on determining when and how service and supply conduits need to be internally sealed. Under specific circumstances, conduits shall be internally sealed to prevent gas from entering the company's or the customer's equipment.

2. Sealing of Conduit Systems

2.1 Per the latest revision of the IEEE NESC Part 3 Section 322, all conduits that enter through an exterior wall, floor, or roof shall have seals inside at that end of the conduit. Additionally, any gaps between the conduit and the wall, floor, or roof that it protrudes from shall be sealed.

2.2 In subdivisions with gas and power joint trench, all conduits shall be sealed.

3. Conduit Sealing Methods

3.1 When conduit is installed and has been mandrelled, it shall be sealed with conduit sealing caps or expandable plugs. The stock numbers for these are:

Type	Conduit Size	Stock #
Cap	3"	240442
	4"	240444
Plug		240711
	6"	240712

Table 1 - Conduit Plugs & Caps

3.2 If CIC is installed and requires sealing, it shall be sealed with cold shrink covers under 255050.

3.3 When cable is terminated, NV Energy crews shall remove existing plugs, caps, or covers, and install an approved permanent NOFIRNO seal as follows:

3.3.1 Cable inserts placed around each cable type per the Table 2

Cable Type	Cable Size	Stock #
Primary	1/0	241272
	750	241274
	1000	241274
Secondary/ Service	2/0	241270
	4/0	241270
	350	241271
	500	241271
	750	241273

Table 2 - Cable Sleeves

3.3.2 Use filler sleeves, 241276, to pack the remainder of the conduit leaving a 3/4" gap between the fillers and the end of the conduit.

3.3.3 NOFIRNO sealant, 241120, used to install a 3/4" seal and pat with a damp cloth.

3.3.4 NOFIRNO seals can be cut with a hole saw to install additional cable as necessary. A new seal would have to be reapplied around the tampered area.