



Specifications for Electrical Underground Distribution Systems from Pad Mounted Transformation, Secondary Service Accounts

Specification DDS-4 UG
Revision 13, November 2023

**ONCOR ELECTRIC DELIVERY COMPANY
SPECIFICATIONS FOR ELECTRICAL UNDERGROUND DISTRIBUTION SYSTEMS
FROM PADMOUNTED TRANSFORMATION, SECONDARY SERVICE ACCOUNTS
SPECIFICATION NUMBER DDS-4 UG**

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**ONCOR ELECTRIC DELIVERY COMPANY
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FROM PADMOUNTED TRANSFORMATION, SECONDARY SERVICE ACCOUNTS
SPECIFICATION NUMBER DDS-4 UG**

1. SCOPE

This document represents the minimum requirements and specifications for the installation of the electrical underground distribution systems fed from padmounted transformation, serving Secondary Service Accounts, to be transferred to Oncor Electric Delivery Company ownership.

2. REFERENCES

This specification shall be used in conjunction with the latest edition of the following publications.

2.1 The Electric Service Guidelines, Oncor Electric Delivery Company.

3. DEFINITIONS

- 3.1 Company: Oncor Electric Delivery Company and its designated representatives.
- 3.2 Contractor: Individual or firm installing electric underground service to Secondary Service Accounts.
- 3.3 Authority Having Jurisdiction: Generally an incorporated City or Town, but may be an agency of the County, State or Federal Government.
- 3.4 Point of Delivery: The point where Company's conductors are connected to premise's conductors, typically at the padmounted transformer secondary terminals or the padmounted connection enclosure.

4. GENERAL

- 4.1 The latest edition of all applicable building and safety codes shall be followed in the installation of the electrical underground distribution system. Included, but not limited to, are the:

4. GENERAL (continued)

- 4.1.1 Local City Building and Fire Codes or any other applicable Codes for a particular project location
- 4.1.2 National Electrical Safety Code (NESC)
- 4.1.3 U.S. Occupational Safety and Health Act of 1970 (OSHA)
- 4.1.4 The American Concrete Institute (ACI)
- 4.1.5 The American Society for Testing and Materials (ASTM)
- 4.2 Upon receipt of all necessary information from the Contractor, a project sketch showing the route of the conduit line and other pertinent information will be furnished by the Company.
- 4.3 Prior to construction a meeting shall be held to discuss and coordinate construction and inspection.
- 4.4 The Company will require a signed easement at no cost or a filed plat incorporating Company easement requirements prior to the Company installing any electrical facilities.
- 4.5 Joint use ditch will be determined by the Company on an individual basis.
- 4.6 No electrical facilities shall be connected by the Company until after the final inspection is made and approval by the Authority Having Jurisdiction, as required by code, has been received.

5. COMPANY RESPONSIBILITY- The following shall be performed by, and the responsibility of, the Company:

- 5.1 The Company inspector is to inspect all conduit installations prior to the placing of backfill.
- 5.2 The Company inspector is responsible for all field changes and coordinates changes with the local Engineering office.
- 5.3 The Company inspector is to inspect all equipment pad installations prior to the laying of concrete.

5. COMPANY RESPONSIBILITY (continued)

- 5.4 After approval of the installed conduit system by the Company inspector, and after the Contractor has signed all appropriate contracts, agreements, easements and has paid any required CIAC (contribution in aid of construction), the Company shall install service lateral cables up to the line side of the point of delivery.
- 5.5 Upon notification of final electrical inspection from the Authority Having Jurisdiction, the Company is to make final electrical connections at the point of delivery.

6. CONTRACTOR RESPONSIBILITY- The following shall be performed by, and the responsibility of, the Contractor:

- 6.1 The Contractor is to provide the Company a Site Plan, a Dimension Control Plan, an Elevation Plan, a Grading Plan and loading information.
- 6.2 The Contractor is to coordinate with the Company inspector for inspection of work prior to backfilling.
- 6.3 The Contractor is to provide personnel and vehicular access to the facility at all times.
- 6.4 The Contractor is to be held responsible for the full direction and supervision of all work being performed by his employees, agents or contractors. The Contractor shall also be responsible for the area at all times prior to acceptance, particularly in the prevention of damage to the electrical distribution system by the activities of other trades and utilities.
- 6.5 All testing of concrete and backfill which is deemed necessary by the Company is to be performed by an independent testing laboratory at the Contractor's expense.
- 6.6 The Contractor is to replace at his expense any damaged equipment or work not in compliance with the requirements in these specifications, the project sketch, the DDS-4 UG Detail Sheets or as specified by the Company.
- 6.7 The Contractor is to furnish equipment and labor to lay out ditch, set grade, dig ditches, place conduit in ditch, set equipment pads and place electrical connection boxes. The line shall run in as straight alignment as practicable. All conduit and bends shall be Schedule 40 PVC or Schedule 80 PVC and shall be electrical grade. All PVC conduit and bends shall be gray in color.
- 6.8 The Contractor may be required to furnish a spare conduit in the same ditch with service conduit(s) and cap both ends at bends.

6. CONTRACTOR RESPONSIBILITY (continued)

- 6.9 The Contractor is to complete rough site grading, establish final grade at padmounted equipment locations and clear these locations of all obstructions. Any change in final grade which requires the lowering or raising of electrical conductors or associated equipment is at the expense of the Contractor.
- 6.10 Minimum vertical crossing clearance of electrical conduits from other utilities' conduits is twelve (12) inches.
- 6.11 A lateral separation of five (5) feet from electrical conduits to other utilities' conduits is required on private property.
- 6.12 No foreign pipes are permitted under the equipment pad area except gas, telephone and cable T.V. that are installed at the same time as the electrical facilities. Gas is allowed only if sleeved in polyethylene or Schedule 40 PVC. Telephone and cable T.V. are allowed only if installed in conduit.
- 6.13 Backfilling of conduit trenches under paved areas, around conduit bends and under transformer pad areas is to be compacted to 95% of the density of surrounding undisturbed soil as per ASTM D 698. Stabilization must be uniform to bottom of ditch. Alternative stabilization methods for backfilling around under transformer pad consist of two (2) sacks of cement mixed with earth backfill or the pouring of concrete backfill with transformer pad. An alternative method for backfilling around conduit bends consists of concrete backfill with bend. The method and location where used will be at the discretion of the Company.
- 6.14 Equipment pads are to be installed a minimum of three (3) inches above finished grade. No equipment pad shall be installed in a pit below the finished grade of the surrounding area.
- 6.15 Equipment pads are to have a clear area surrounding the pad installation for safety, operation and maintenance purposes. Refer to DDS-4 UG Detail Sheets 49, 50, 51 and 52 for layout and dimensions.
- 6.16 Piers and/or beams are required on all equipment pads unless waived by the Company inspector. If required, stabilization method(s) will be determined by the Company inspector. The depth shall extend to rock or a change in soil conditions sufficient to bear the load of pad and transformer to prevent settlement due to undercutting for conduit bend installation or washing due to drainage.
- 6.17 The Contractor has the option of installing manufactured transformer pads or poured in place pads. However, where terrain will not permit the installation of a manufactured equipment pad as determined by the Company, the Contractor is to install a poured in place equipment pad. For details, refer to the DDS-4 UG Detail Sheets.

6. CONTRACTOR RESPONSIBILITY (continued)

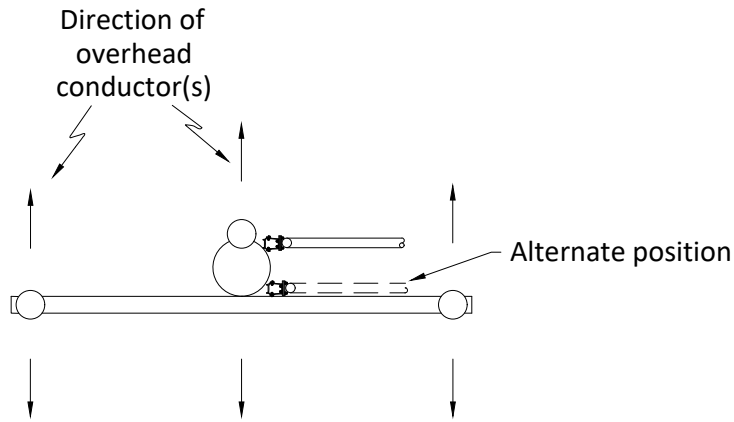
- 6.18 Concrete forms are to be tight and aligned so when forms are removed the finished surface shall require little, if any, corrective measures. Concrete work is to have an acceptable finish free of honeycombs, sharp or irregular surfaces.
- 6.19 Contractor is to pull a mandrel through each conduit to check and clear blockage and leave an approved pull tape in each conduit. Pull tape shall be furnished by the party providing conduit and shall be installed by Contractor. Mandrel shall be furnished by Contractor. Conduit shall be plugged at both ends. Reference DDS-4 UG Detail Sheet 7 for approved pull tapes.
- 6.20 Approved self-contained meter sockets or approved meter packs are to be provided and installed by the Contractor. Transocket meter bases and service enclosures (when required) are to be provided by the Company and installed by the Contractor. Reference the Electric Service Guidelines for approved self-contained meter sockets. **Contact Company for approval of meter packs prior to letting bids and installing equipment.**
- 6.21 For single occupant, C. T. metered Secondary Service accounts fed from padmounted transformation, the Contractor is to provide, install and maintain the underground raceway(s) and conductors to the secondary terminals of the transformer. The Contractor shall provide compression type connectors and the Company shall install these connectors on the Contractor's conductors and connect to the secondary terminals of the transformer. The meter will be located at or on the transformer secondary terminal enclosure. Reference the Electric Service Guidelines for approved compression type connectors.
- 6.22 In cases where the number of service conductors to a padmounted transformer is in excess of the physical connection capabilities of the secondary terminals, a padmounted connection enclosure separate from the transformer shall be used. The Contractor is to (1) provide, install and maintain the underground raceways and conductors to the load side of the connection enclosure, and (2) provide and install the underground raceways between the connection enclosure and the transformer pad. The service lateral conductors between the transformer secondary terminals and the source side of the connection enclosure shall be supplied, installed, connected and maintained by the Company. The Contractor shall provide compression type connectors and the Company shall install these connectors on the Contractor's conductors and connect to the load side of the connection enclosure. Reference the Electric Service Guidelines for approved compression type connectors.

6. CONTRACTOR RESPONSIBILITY (continued)

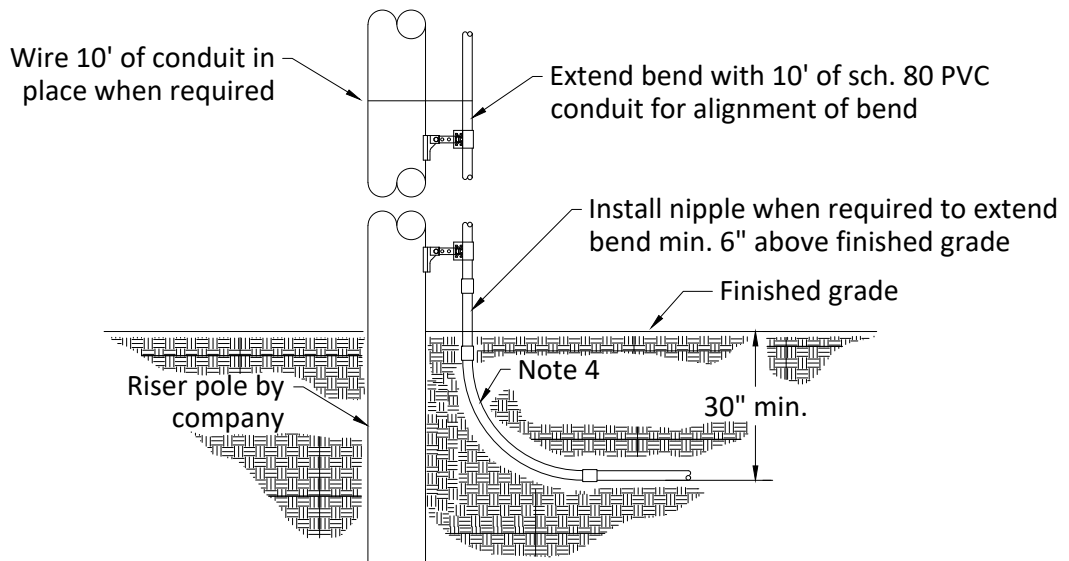
- 6.23 If socket type metering fed from padmounted transformation is utilized, the Contractor is to mount the meter socket on the building(s) with the location approved by the Company and provide, install and maintain the underground raceway(s) and conductors to the transformer secondary terminals. The Contractor shall provide compression type connectors and the Company shall install these connectors on the Contractor's conductors and connect to the secondary terminals of the transformer. Reference the Electric Service Guidelines for approved compression type connectors.
- 6.24 For multiple occupancy Secondary Service accounts fed from padmounted transformation, the Contractor is to provide, install and maintain (1) the conductors and associated raceways from the service enclosure to the padmounted transformer and (2) the conductors and associated raceways from the service enclosure to the line side of the meters. The Contractor shall provide compression type connectors and the Company shall connect the Contractor's conductors to the secondary terminals of the transformer. Reference the Electric Service Guidelines for approved compression type connectors.
- 6.25 For multiple occupancy Secondary Service accounts utilizing meter packs fed from padmounted transformation, the Contractor is to provide, install and maintain the conductors and associated raceways from the meter pack enclosure to the padmounted transformer. The Contractor shall provide compression type connectors and the Company shall connect the Contractor's conductors to the secondary terminals of the transformer. Reference the Electric Service Guidelines for approved compression type connectors.
- 6.26 The Contractor is to secure inspection and approval of premise's facilities by the Authority Having Jurisdiction prior to the connection of electrical facilities.
- 6.27 Meter sockets to multi-metered locations shall be clearly and permanently marked by Contractor on the exterior and interior of the meter socket to indicate each location served. Engraved or stamped metal, weather resistant placards shall be used on the exterior of the meter socket and be permanently affixed. Permanent marker or other acceptable method shall be used to mark the location on the inside of the meter socket (at a location other than the cover) where it can be easily read.

7. ACCEPTANCE

- 7.1 The Company inspector shall meet with the Contractor and review the project prior to acceptance. Electrical facilities will be installed as approved by the Company inspector only after acceptance of the project.



Top View



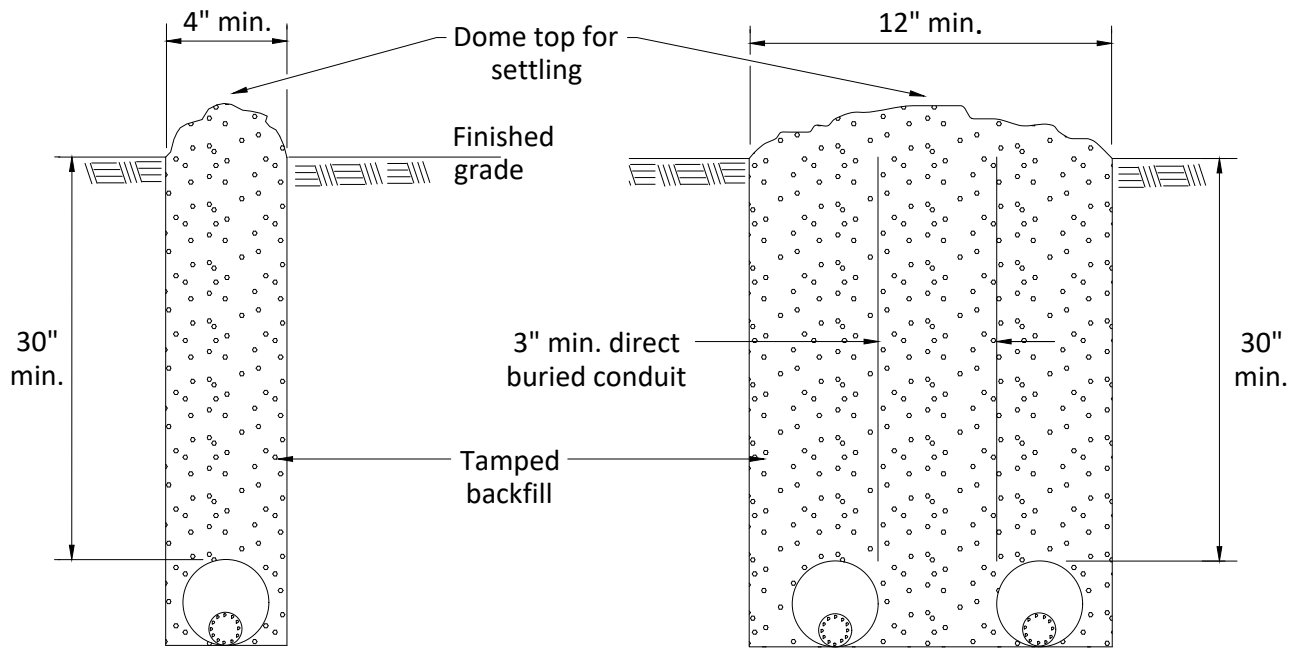
Plan View

Notes:

1. Contact company representative for (1) routing of conduit line, (2) size of conduit, and (3) installations requiring more than one riser on pole.
2. Limit raceway to three 90° bends. If more than three 90° bends are required, contact company representative.
3. Distance between 90° bends shall be 5' minimum.
4. Reference detail sheet 9 for bend radius for all horizontal and vertical conduit bends.

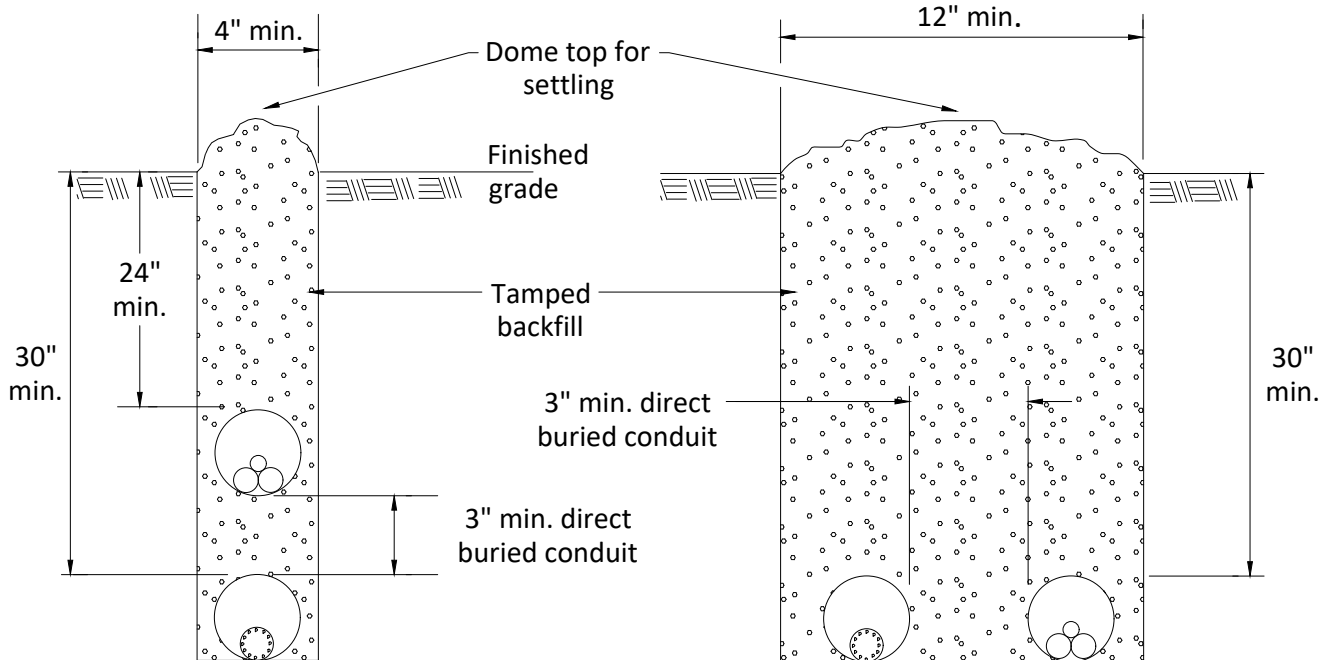


**TERMINATION OF
PRIMARY CONDUIT
AT RISER POLE**



1 Primary Conduit

2 Primary Conduits



1 Primary Conduit and
1 Secondary Conduit
Vertically Arranged

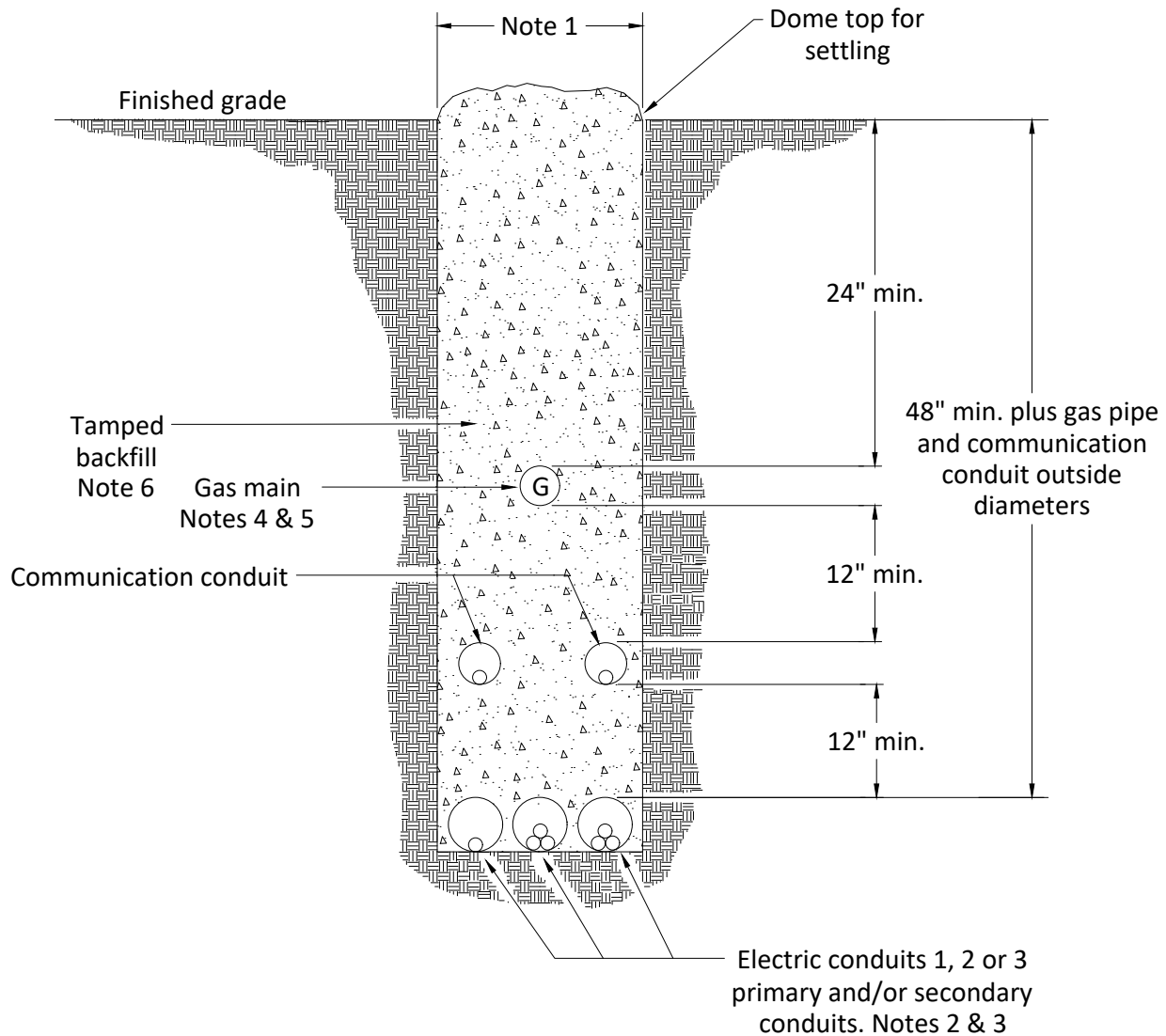
1 Primary Conduit and
1 Secondary Conduit
Horizontally Arranged

Notes:

1. Consult company representative for conduit size.
2. See detail sheets 7 and 8 for notes and instructions.
3. Separation dimensions apply to company conduits or cables only. Maintain 12" separation between company conduits or cables and foreign conduits or cables.



TRENCH REQUIREMENTS



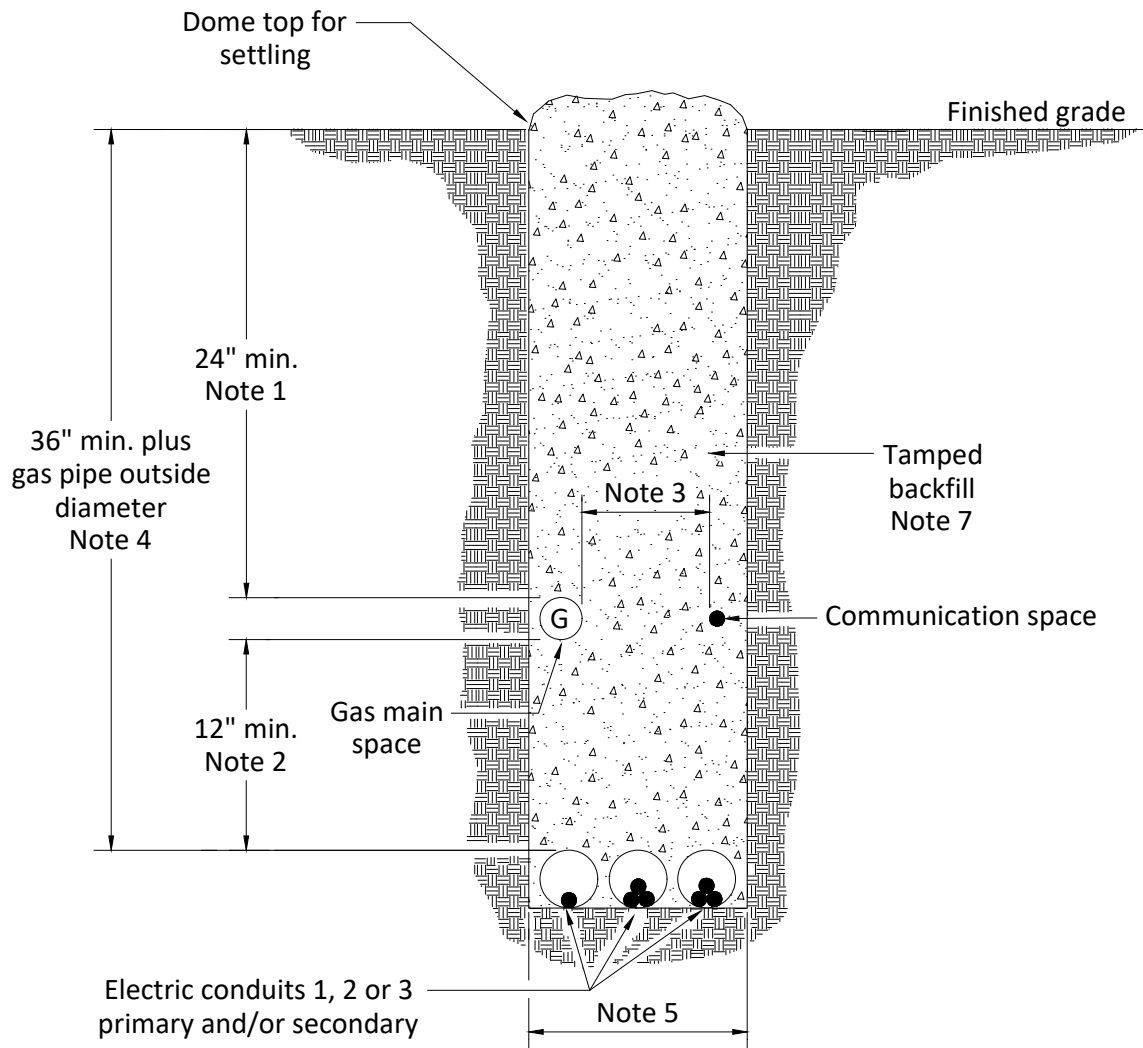
Notes:

1. 12" min. with more than one electrical supply conduit.
4" min. with one electrical supply conduit (in solid rock pipe diameter determines min. width).
2. Ampacities are reduced for multiple circuits in a trench.
3. See detail sheets 7 and 8 for notes and instructions.
4. The gas line in a joint trench shall be polyethylene.
5. When a gas line crosses under an enclosure such as a pedestal, pad mount transformer or splice/pull box, it will be sleeved in a section of polyethylene or schedule 40 PVC. The sleeve will extend a minimum of 3' beyond the edge of the enclosure on each side. Maintain a 12" separation between gas line and electrical supply conduit(s).
6. Backfill material and compaction shall meet or exceed each utility's specifications.



**TRENCH REQUIREMENTS
JOINT USE ELECTRIC, GAS
AND COMMUNICATION**

DDS-4 UG DETAIL SHEET 3 OF 58



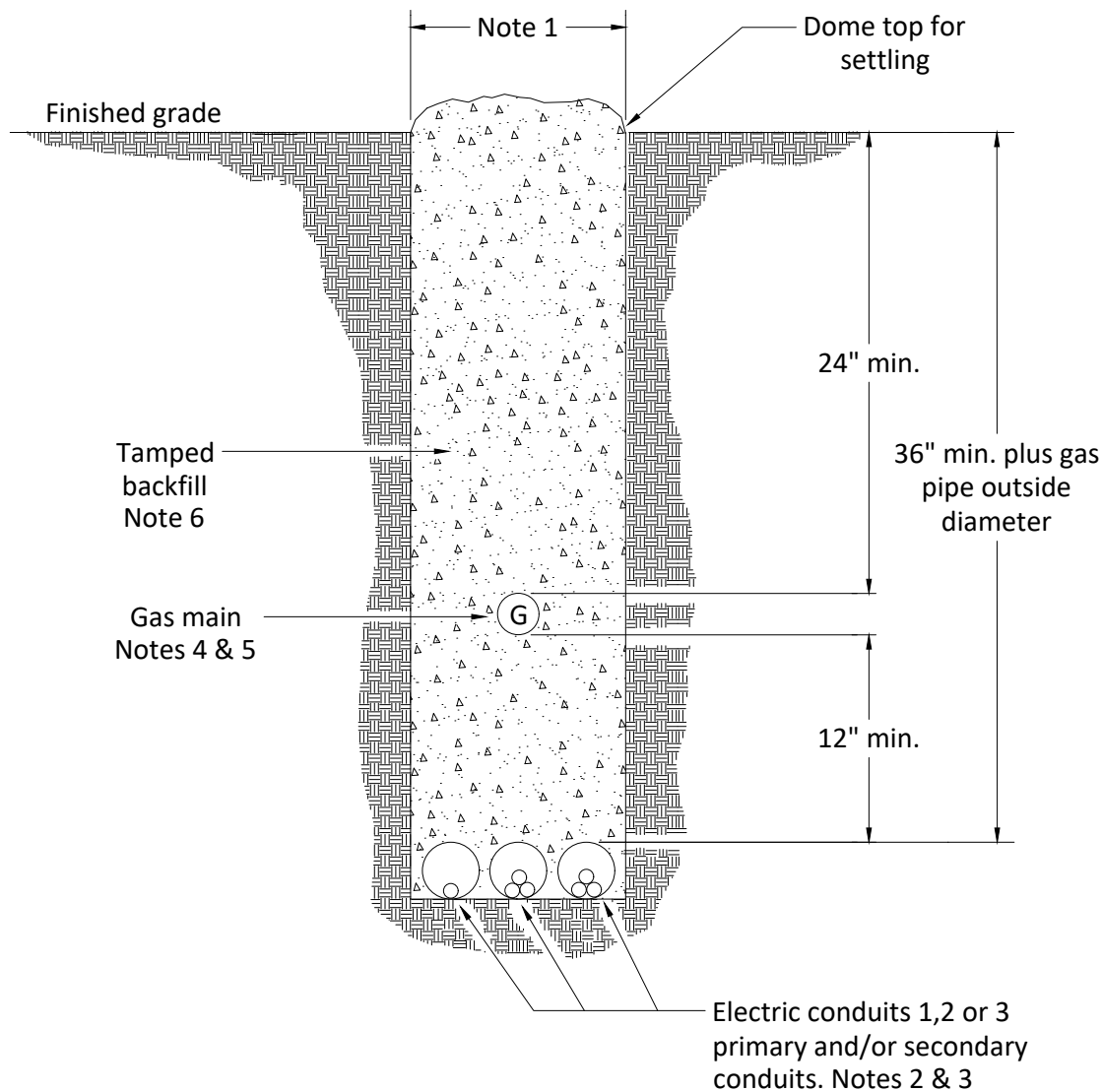
Notes:

1. Minimum 24" depth to top of both gas pipe and communication facilities. Communication shall not be placed above the gas pipe.
2. Minimum 12" vertical separation between surface of gas, communication facilities and electrical conduits.
3. Minimum 12" horizontal separation between surface of communication facilities and gas pipe.
4. Minimum 36" depth plus pipe outside diameter to top of electrical conduits.
5. Trench must be wide enough to ensure 12" separation at all points between the gas main and communication facilities.
6. The gas pipe shall only be placed against undisturbed soil that is free of stones and where there are no hard particles larger than 1/2".
7. Backfill material and compaction shall meet or exceed each utility's specifications.



**JOINT USE TRENCH WITH
GAS, ELECTRIC
AND COMMUNICATION**

DDS-4 UG DETAIL SHEET 4 OF 58



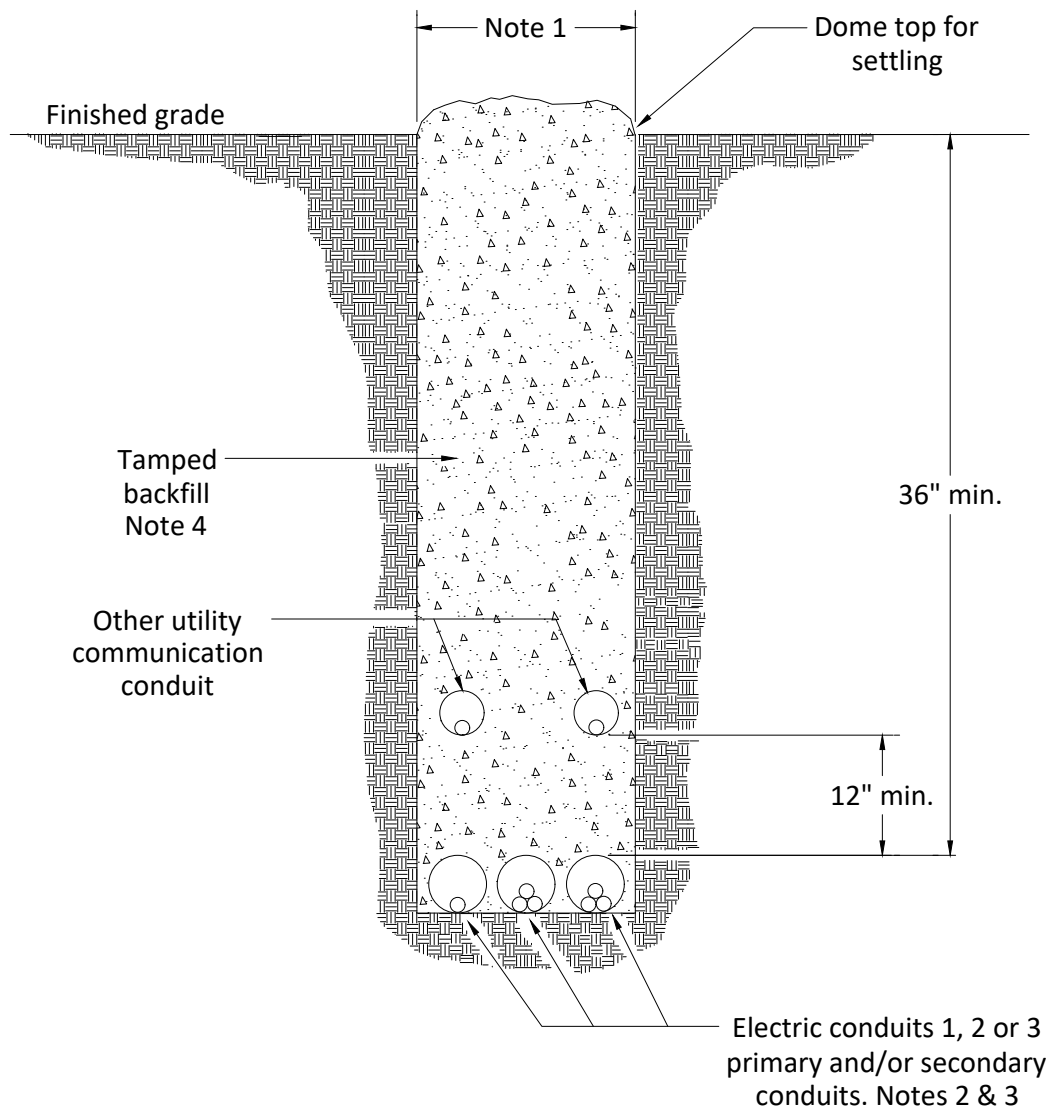
Notes:

1. 12" min. with more than one electrical supply conduit.
4" min. with one electrical supply conduit (in solid rock pipe diameter determines min. width).
2. Ampacities are reduced for multiple circuits in a trench.
3. See detail sheets 7 and 8 for notes and instructions.
4. The gas line in a joint trench shall be polyethylene.
5. When a gas line crosses under an enclosure such as a pedestal, pad mount transformer or splice/pull box, it will be sleeved in a section of polyethylene or schedule 40 PVC. The sleeve will extend a minimum of 3' beyond the edge of the enclosure on each side. Maintain a 12" separation between gas line and electrical supply conduit(s).
6. Backfill material and compaction shall meet or exceed each utility's specifications.



**TRENCH REQUIREMENTS
JOINT USE ELECTRIC AND GAS**

DDS-4 UG DETAIL SHEET 5 OF 58



Notes:

1. 12" min. with more than one electrical supply conduit.
4" min. with one electrical supply conduit (in solid rock pipe diameter determines min. width).
2. Ampacities are reduced for multiple circuits in a trench.
3. See detail sheets 7 and 8 for notes and instructions.
4. Backfill material and compaction shall meet or exceed each utility's specifications.



**TRENCH REQUIREMENTS
JOINT USE
ELECTRIC AND COMMUNICATION**

DDS-4 UG DETAIL SHEET 6 OF 58

1. Trench alignment shall be as straight as conditions permit. Any deviations from planned alignment shall have prior approval by the project engineer/inspector. All trench cuts shall be in accordance with existing safety regulations in effect.
2. Trench bottom should be undisturbed, tamped, or relatively smooth earth. Where excavation is in rock, the conduit should be laid on a layer of clean backfill.
3. All backfill should be free of debris or other material that may damage the conduit system or cause settling. The material should fill the voids around the conduit to prevent hot spots and settling.
4. Backfill should be adequately compacted. Backfill not under pavement should be compacted to the density of the surrounding undisturbed soil. Backfill under pavement should be compacted to not less than 95% of the density of undisturbed soil as determined by ASTM D698.
5. See sheet 8 for instructions for joining PVC conduit.
6. Each conduit run shall be checked by pulling a mandrel through the entire length at the completion of the civil installation.
7. A pull tape shall be left in each conduit. Conduit shall be plugged at both ends.

Approved Pull Tapes			
Conduit Size	Manufacturer	Catalog No.	TSN
1", 2" & 3"	Arnco Neptco, Inc.	BL-WP25 WP2500P	321068
4" & 6"	Arnco Neptco, Inc.	BL-WP60 RP6000N	397616

8. Contact company representative for trench dimensions for more than 2 conduits in same ditch.



**INSTALLATION OF CONDUITS
NOTES AND INSTRUCTIONS**

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The chemicals used in solvent welding of conduit are intended to penetrate the surface of both pipe and fitting, which after curing result in a complete fusion at the joint. The over-use or under-use of chemicals results in leaky joints or weakened pipe.

1. Clean conduit by wiping off all dust, dirt and moisture from surfaces to be cemented either by mechanical or chemical cleaning.
 - 1.1. Mechanical cleaning - Fine abrasive paper or cloth (180 grit or finer) or clean oil-free steel wool.
 - 1.2. Chemical cleaning- Cleaner recommended by manufacturer or equivalent (methyl ethyl ketone - Mek).
2. With a non-synthetic bristle brush apply an even coating of cement to the outside of the pipe and inside the socket. Make sure that the amount of cement applied to the conduit is equal to the depth of the socket. Before assembly, if some evaporation of solvent from the surfaces to be joined is noted, reapply cement, then assemble.

If cement being used has an appreciable change in viscosity or shows signs of jelling, it shall be discarded. In no case shall thinner be used in an attempt to restore jelled PVC cement. Thinner may only be used to change the viscosity of a medium bodied cement to that of a regular bodied cement for application on PVC pipe smaller than 2 1/2" diameter. A medium bodied cement shall be used on 2 1/2" to 6" PVC pipe.

Use a primer to soften the joining surfaces before applying cement. Allow longer cure time. (See item 5).

3. Join pipe within 20 seconds of applying cement. Turn the pipe 1/4 turn to ensure even distribution of cement on surfaces to be bonded. Make sure that pipe is inserted to the full depth of the socket.
4. Clean off any bead or excess cement that appears at the outer shoulder of the fitting. Excess cement allowed to remain in contact with the material is apt to cause weakening of the material, and subsequent failure.
5. Newly assembled joints should be handled carefully until the cement has cured to the recommended set period. Set periods are related to the ambient temperature as follows:

30 min. minimum at 60° to 100° F
1 hr. minimum at 40° to 60° F
2 hr. minimum at 20° to 40° F
4 hr. minimum at 0° to 20° F



INSTRUCTIONS FOR JOINING PVC CONDUIT

DDS-4 UG DETAIL SHEET 8 OF 58

Conduit Nominal Size (in.)	Minimum Bend Radius (in.)	Type of Bend Material for Pulls:
1	18	PVC
2	24	PVC
3	24	PVC
4	36 (See notes 3 & 4)	PVC
6	36	PVC

Notes:

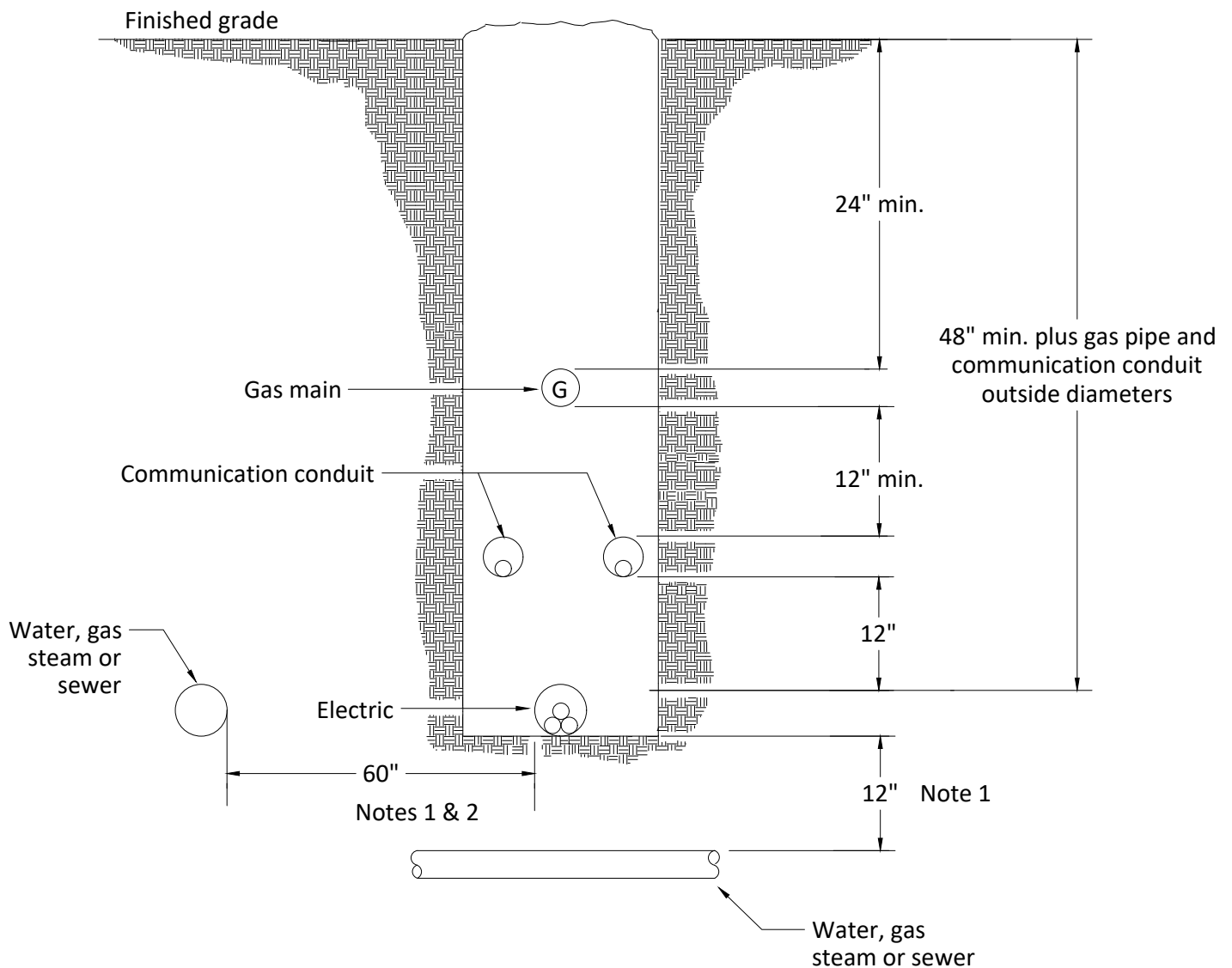
1. Sch. 80 PVC conduit shall be used for all above ground installations (pole and meter risers). Sch. 40 may be used for all below ground installations.
2. No field bends.
3. 24" sweep 90s on 4" PVC may be used when the required conduit depth is less than 30" from final grade.
4. 24" sweep 90s on 4" PVC may be used on primary applications when a proper depth of the conduit can not be attained under a deep well pad or deep window application.

(The complete 90 must be below final grade or the pad window)



**CONDUIT BEND RADIUS
AND MATERIAL**

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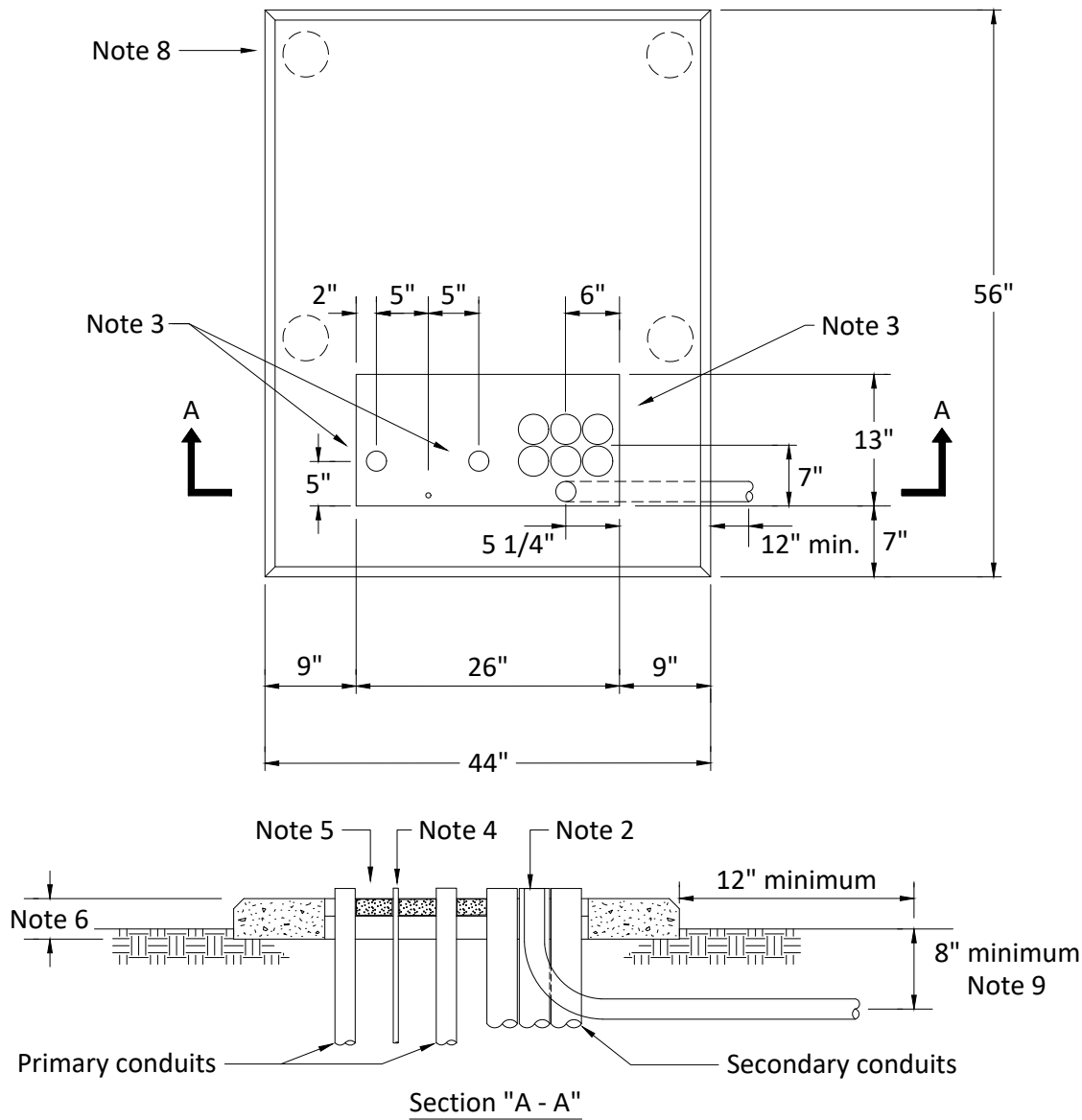
Notes:

1. Vertical crossing clearance from other utilities shall be 12". A 60" lateral separation of paralleling foreign utilities (excluding gas and communications) shall be required. An exception would be to allow gas, telephone and/or CATV in the same ditch as company conduit system providing the NESC requirements for conduit separation are met or exceeded and the communications circuits are installed in conduit.
2. It is understood that only 12" separation is required on public rights-of-way. Personnel involved in excavation on public rights-of-way are fully aware of the hazards involved. However, excavation on private property can be done by individuals who are not likely to be fully aware of the hazards. Therefore, the 60" lateral separation is required to help prevent injury to personnel doing excavation on private property.



**CLEARANCE REQUIREMENTS
FROM FOREIGN UTILITIES
ON PRIVATE PROPERTY**

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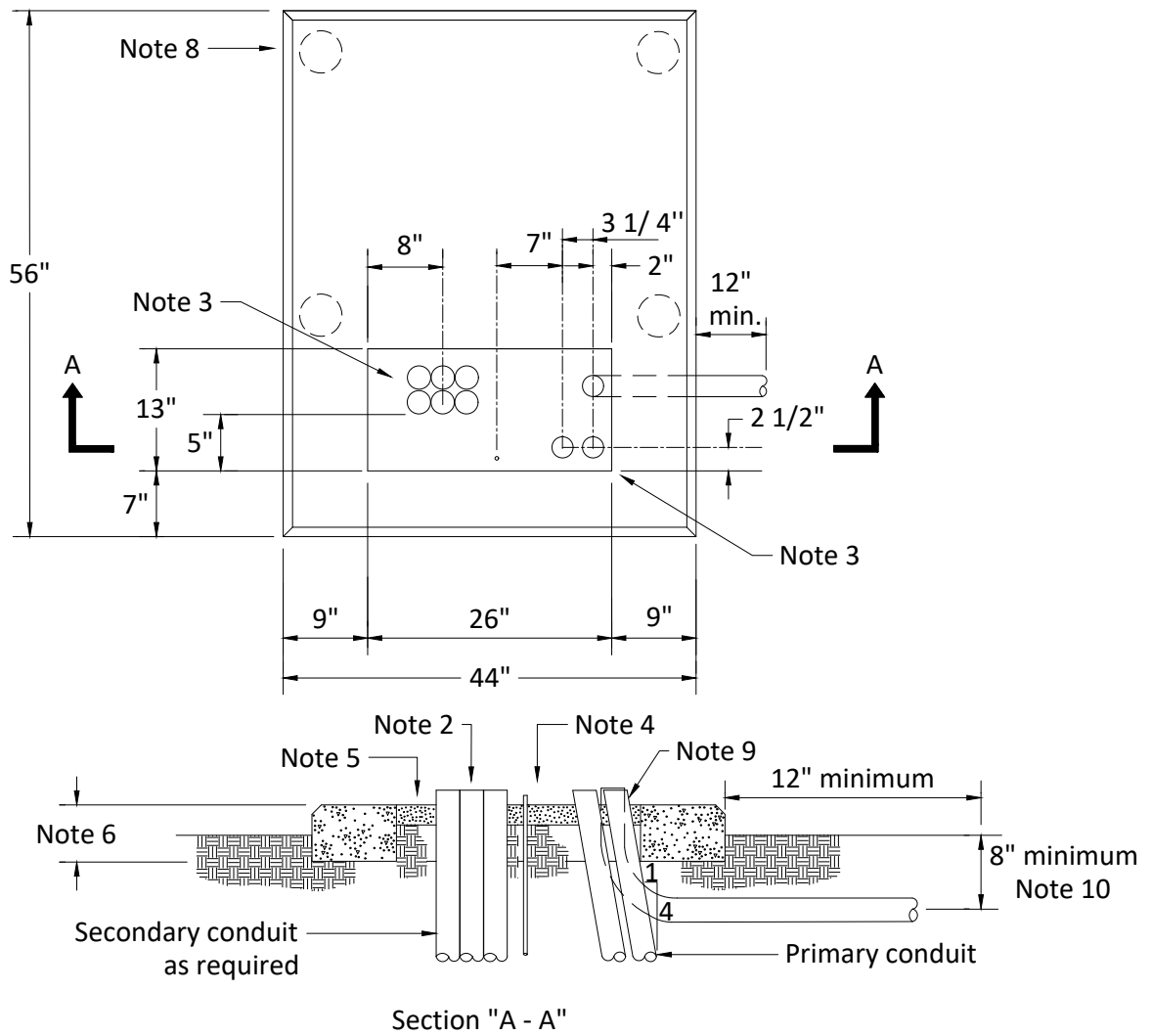
Notes:

1. Consult company representative for (1) number, size and location of conduits in pad window and (2) whether design is type I or type II conduit arrangement.
2. No more than 8 - 2", 6 - 3" or 4 - 4" conduits including spares shall be placed in the secondary side of pad window.
3. Reference detail sheet 9 for bend radius for all horizontal and vertical conduit bends.
4. Consult company representative on where to obtain 5/8" x 8' copper clad ground rod. Ground rod to be obtained and installed by contractor. Installation depth shall be 7' - 6".
5. Grout window as per detail sheet 13.
6. The dimension is 6" for precast concrete pad and 4" for polymer concrete pads.
7. Reference detail sheet 14 for foreign utility equipment ground.
8. Piers are required on all pads unless waived by company inspector. Reference detail sheet 15 for pier detail.
9. The 3" flex conduit shall have a minimum of 8" of cover as it exits on the right hand side of the transformer pad.



**TRANSFORMER PAD-PRECAST
SINGLE-PHASE DEAD FRONT
TYPE I**

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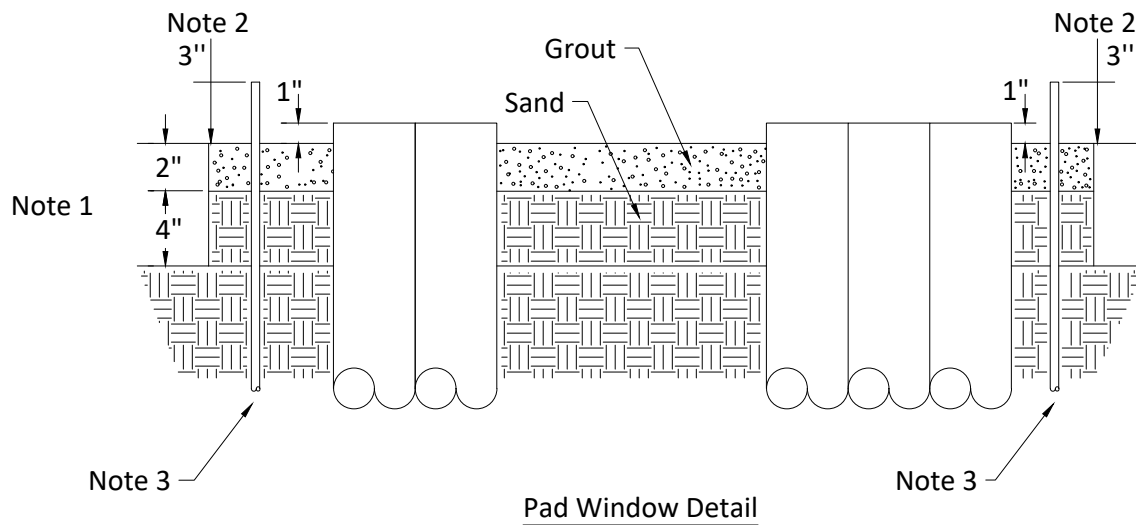
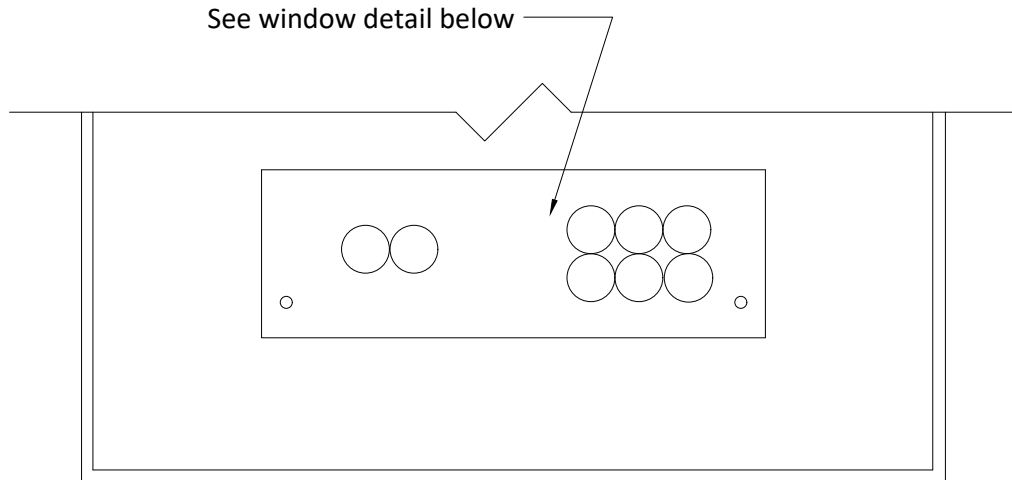
Notes:

1. Consult company representative for (1) number, size and location of conduits in pad window and (2) whether type I or type II conduit arrangement.
2. No more than 8 - 2", 6 - 3" or 4 - 4" conduits including spares shall be placed in the secondary side of pad window.
3. Reference detail sheet 9 for bend radius for all horizontal and vertical conduit bends.
4. Consult company representative on where to obtain 5/8" x 8' copper clad ground rod. Ground rod to be obtained and installed by contractor. Installation depth shall be 7' - 6".
5. Grout window as per detail sheet 13.
6. This dimension is 6" for precast concrete pad and 4" for polymer concrete pads.
7. Reference detail sheet 14 for foreign utility equipment ground.
8. Piers are required on all pads unless waived by company inspector. Reference detail sheet 15 for pier detail.
9. The conduits must be installed to ensure that the total maximum bending radius for the primary cable does not exceed 9" (angle primary conduit whenever possible).
10. The 3" flex conduit shall have a minimum of 8" of cover as it exits on the right hand side of the transformer pad.



**TRANSFORMER PAD-PRECAST
SINGLE-PHASE DEAD FRONT
TYPE II**

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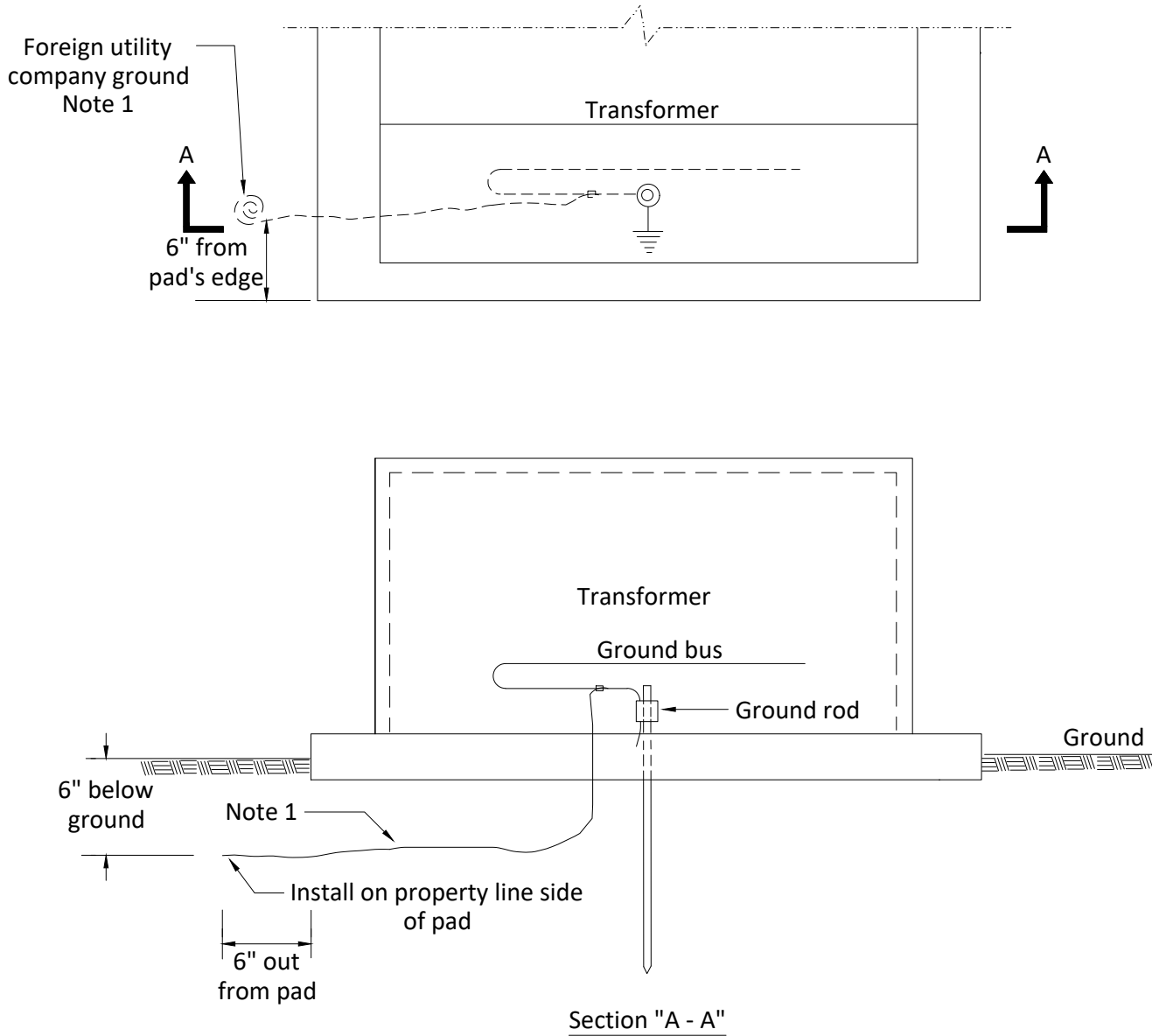
Notes:

1. The grout shall be portland based and sanded. Do not use concrete.
2. Fill in pad window with 4" of earth backfill and 2" of grout.
3. Ground rods shall extend a maximum of 3" above grouting to assure adequate driven depth and allow for adequate connecting space.
4. Ground rods shall extend a minimum of 7' - 6" into earth.
5. Gravel fill is not acceptable.



**GROUTING DETAIL
FOR TRANSFORMER
PAD WINDOWS**

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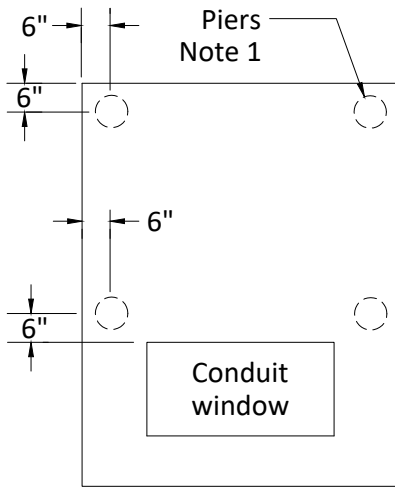


Notes:

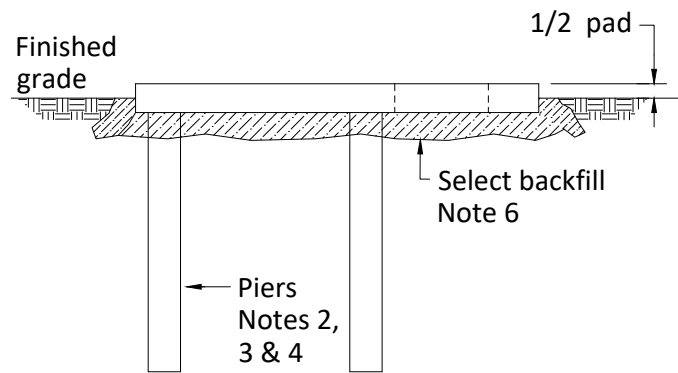
1. On new installations, install #6 s.d. bare copper as shown for foreign utility company bonding.
2. The national electrical safety code rule 384 C recommends bonding of all above ground metallic power and communications apparatus (pedestals, terminals, apparatus cases, transformer cases, etc.) that are separated by a distance of 6' or less.



**METHOD OF PROVIDING
UTILITY COMPANY
EQUIPMENT GROUND**



Transformer Pad



Side View for Level Terrain

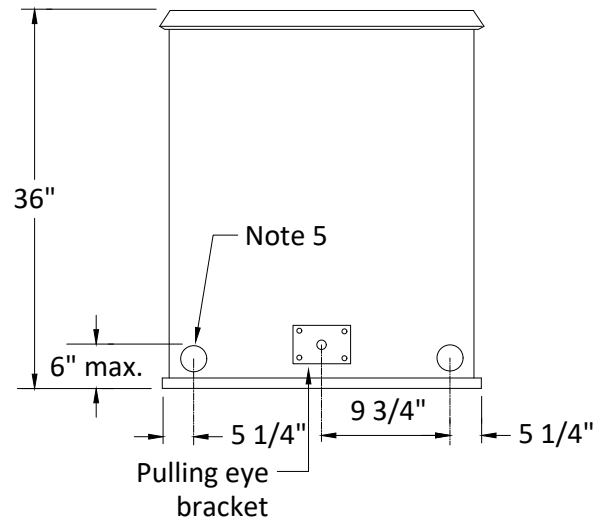
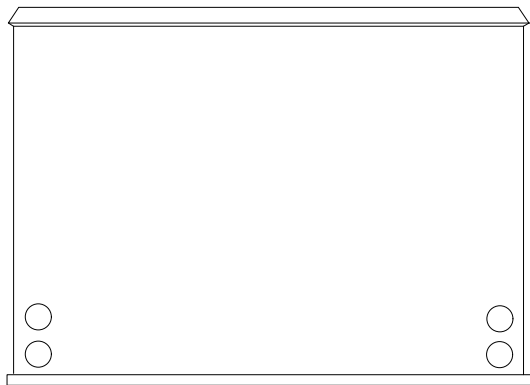
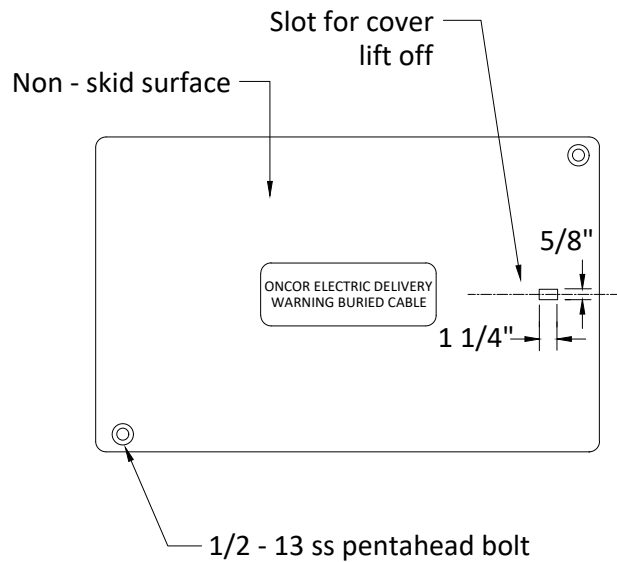
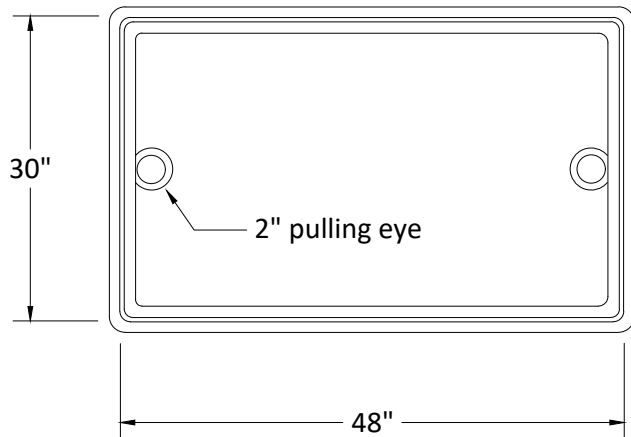
Notes:

1. Piers shall be installed under pad when dirt has been disturbed under the load bearing area of pad. Tamp backfill (95% compaction) to top of pier supports (use ditch spoil when possible).
2. Cut support piers from section of 4" PVC conduit.
3. Place piers as shown. Fill with concrete.
4. Top of piers should be level and 3" below final ground level to a depth of:
 - (1) Minimum of 36" in undisturbed earth (soil).
 - (2) Bottom of ditch.
 - (3) Beginning of solid rock.
5. After placing pad, fill voids under and around pad with select ditch spoil.
6. All backfill under and around pad shall be well tamped.



**SINGLE-PHASE TRANSFORMER PAD
PIER INSTALLATION**

DDS-4 UG DETAIL SHEET 15 OF 58



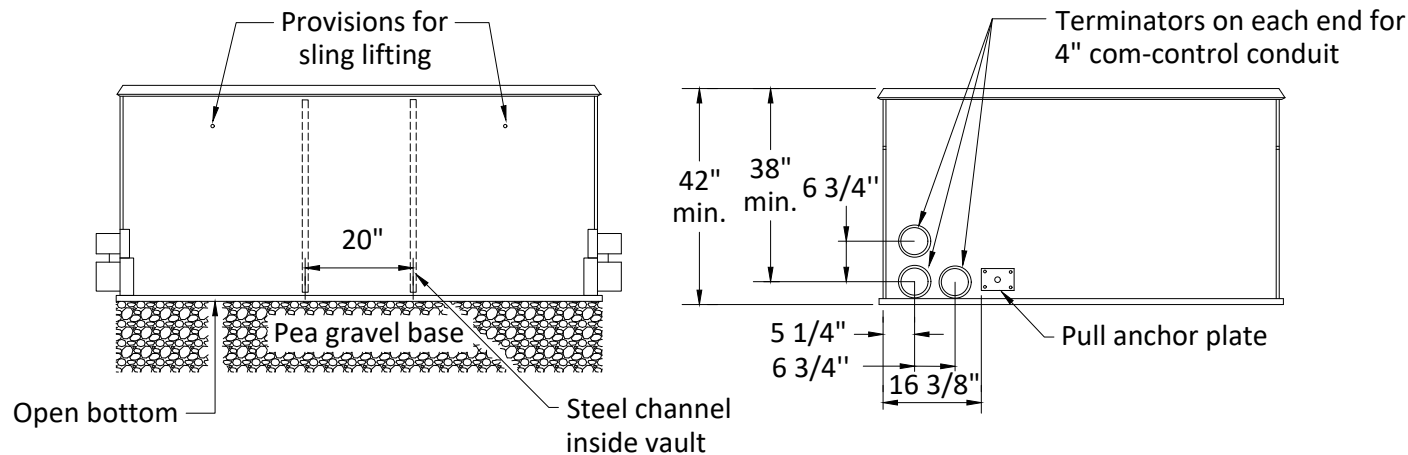
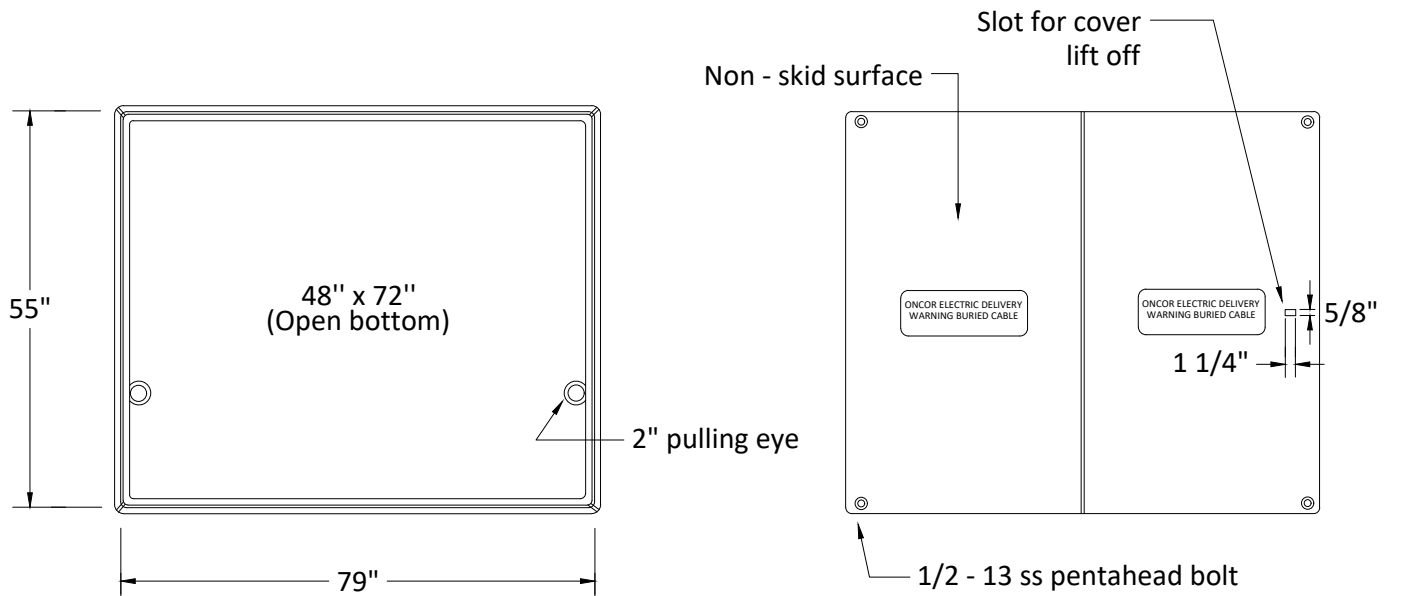
Notes:

1. Polymer concrete pull box has an ANSI TIER-15 vertical design loading (light vehicular rollover).
2. Precast concrete pull box has an AASHTO H-20 vertical design loading (heavy vehicular rollover).
3. Number and location of pentahead bolts and lifting provisions may vary among manufactures.
4. Limit to 1 phase of 1/0 conductor.
5. 2 1/2" diameter knockout provision for 2" conduit terminator.



**SINGLE-PHASE PRIMARY
SUBSURFACE SPLICE/PULL BOX
INSTALLATION**

DDS-4 UG DETAIL SHEET 16 OF 58

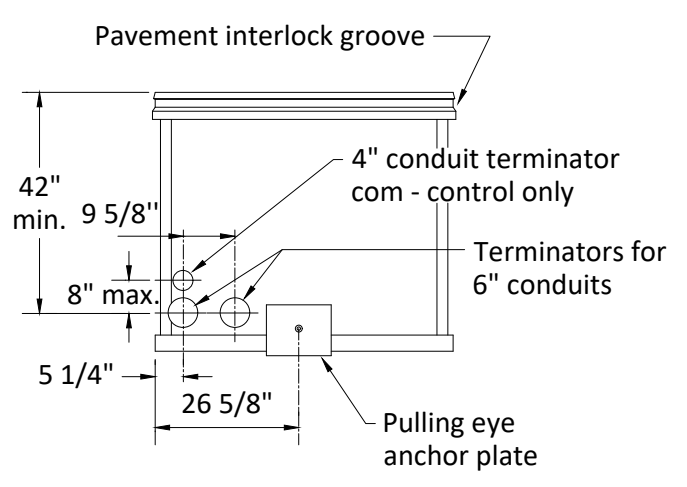
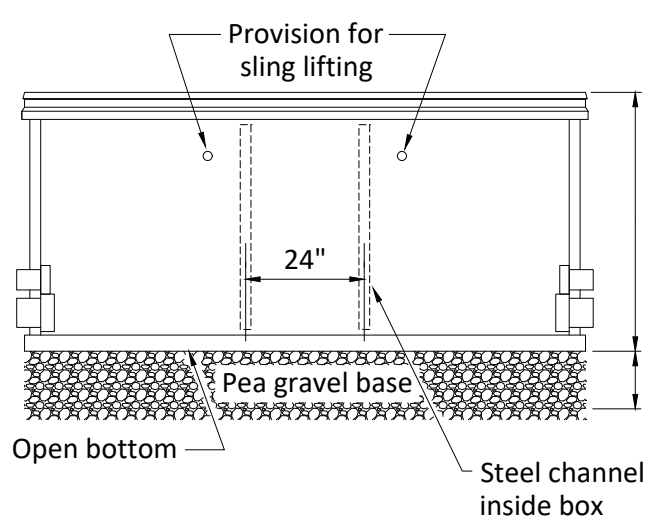
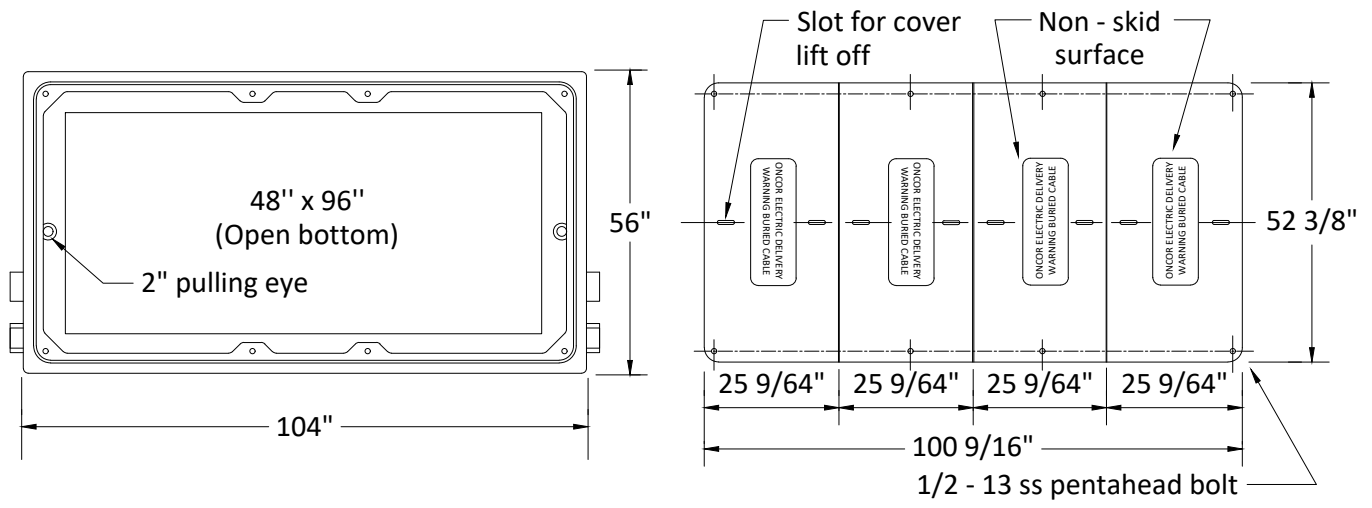


Notes:

1. Polymer concrete pull box has an ANSI TIER-15 vertical design loading (light vehicular rollover).
2. Precast concrete pull box has an AASHTO H-20 vertical design loading (heavy vehicular rollover).
3. Number and location of pentahead bolts and lifting provisions may vary among manufacturers.
4. Limit to 3 phases of 1/0 or 4/0 conductor.



**4X6X3
THREE-PHASE PRIMARY
SUBSURFACE SPLICE/PULL BOX
INSTALLATION**



- Notes:
1. Polymer concrete pull box has an ANSI TIER-15 vertical design loading (light vehicular rollover).
 2. Precast concrete pull box has an AASHTO H-20 vertical design loading (heavy vehicular rollover).
 3. For locations in all streets or roadways subject to continuous daily and repetitive vehicular rollover, the installation of a manhole shall be required.
 4. Number and location of pentahead bolts and lifting provisions may vary among manufacturers.
 5. Limit to 3 phases of 500-1000 kcmil conductor. (Box is designed for 1 circuit only)



**4X8X4
THREE-PHASE PRIMARY
SUBSURFACE SPLICE/PULL BOX
INSTALLATION**

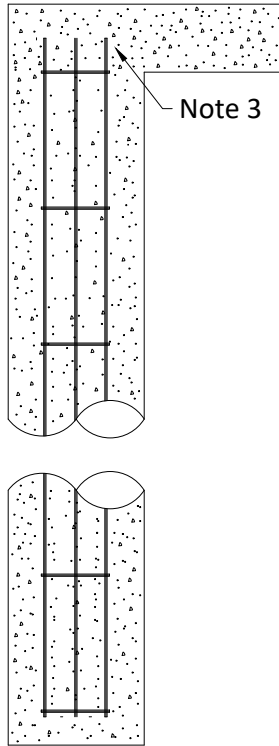
1. Contact company representative for pad size and number and location of primary and secondary conduits.
2. Reference detail sheet 9 for bend radius for all horizontal and vertical conduit bends.
3. Ground rods to be obtained and installed by contractor. Installation depth shall be 7' - 6". Reference detail sheets for size.
4. Reference detail sheet 14 for location of foreign utility equipment ground.
5. Refer to detail sheets 49, 50, 51 and 52 for minimum clearances from surrounding objects.
6. Piers are required on all single-phase transformer pads unless waived by the company inspector. Reference detail sheet 15 for pier detail for single-phase pads.
7. Beams shall be installed on all three-phase transformer pads set in unstable soils and in areas where drainage could cause soil under the pad to wash out. The depth of beams shall be as shown or to rock. If rock is encountered within 3" of surface, beams are not required.
8. Piers are required on all three-phase transformer pads and on all switchgear pads unless waived by the company inspector. Reference detail sheets 20 and 21 for piers for three-phase transformer and switchgear pads.
9. Reinforcing steel shall conform to ASTM A615 and shall be deformed, intermediate grade (grade 60). All reinforcing steel shall be cleaned of all coatings that adversely affect bonding capacity. All reinforcing steel shall be accurately positioned and rigidly held in place during pouring.
10. All reinforcing steel shall have a 3" clearance from the bottom. There shall be a 3" clearance from sides to steel running parallel thereof. There shall be a 2" clearance from end of steel to sides and window.
11. Outer surface edges of pads to be chamfered 1 1/2" x 45°. Rounding of edges with a rounding trowel is acceptable in lieu of chamfering.
12. Tamp all disturbed soil underneath pad to 95% compaction as per ASTM D698.
13. Concrete shall conform to ASTM C150 for type I or type III high early. Concrete shall be proportioned to produce a compressive strength of 3000 psi at 28 days. Concrete slump shall be 3 - 4".
14. Aggregates shall conform to ASTM C33 and shall be clean and free from deleterious amounts of acids, alkalis, organic matter or other foreign substances. The maximum aggregate size shall not exceed 3/4".
15. Mixing water shall be clean and free from oils, acids, alkalis, salts, organic materials or other substances that may be deleterious to concrete or steel.
16. No admixtures will be permitted without the approval from the company.
17. Concrete may be mixed on the job or ready mix concrete may be used.
18. For concrete mixed on the job, a mixer with a minimum two (2) sack capacity shall be used. Cement and aggregates shall be proportioned on calibrated scales. Water for mixing shall be accurately measured. All concrete shall be placed within one hour after mixing.
19. If ready mixed concrete is used, the driver of each truck shall furnish a ticket showing the time the truck was loaded at the batch plant. Any truck which has not discharged its complete load one hour and thirty minutes after loading shall be rejected unless a retardant, approved by the company, has been added to the concrete at the time of batching. Ready mixed concrete shall conform to ASTM C94.



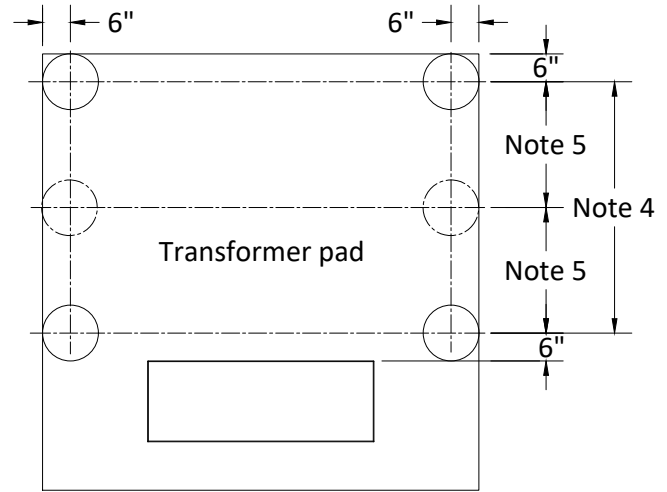
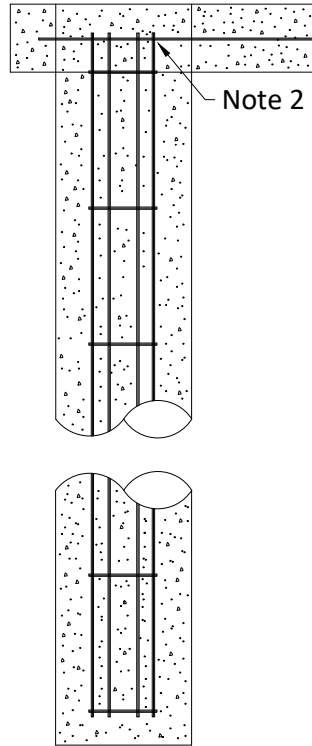
**GENERAL NOTES FOR
POURED IN PLACE
CONCRETE PAD**

DDS-4 UG DETAIL SHEET 19 OF 58

Pier Detail for Cast-in-Place Pad with 4 - 6 Piers

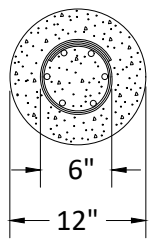


Pier Detail for Precast Pad with Pour-thru-Pier Holes

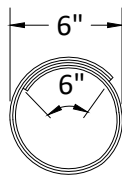


Pier Reinforcing Schedule			
Number	Size	Length	Shape
6	#5	5'	Straight
6	#3	2' - 1"	Hoop (Detail A)

0.145 cu yards concrete/pier
Total weight of (1) pier: 565 lbs.



Section "A - A"



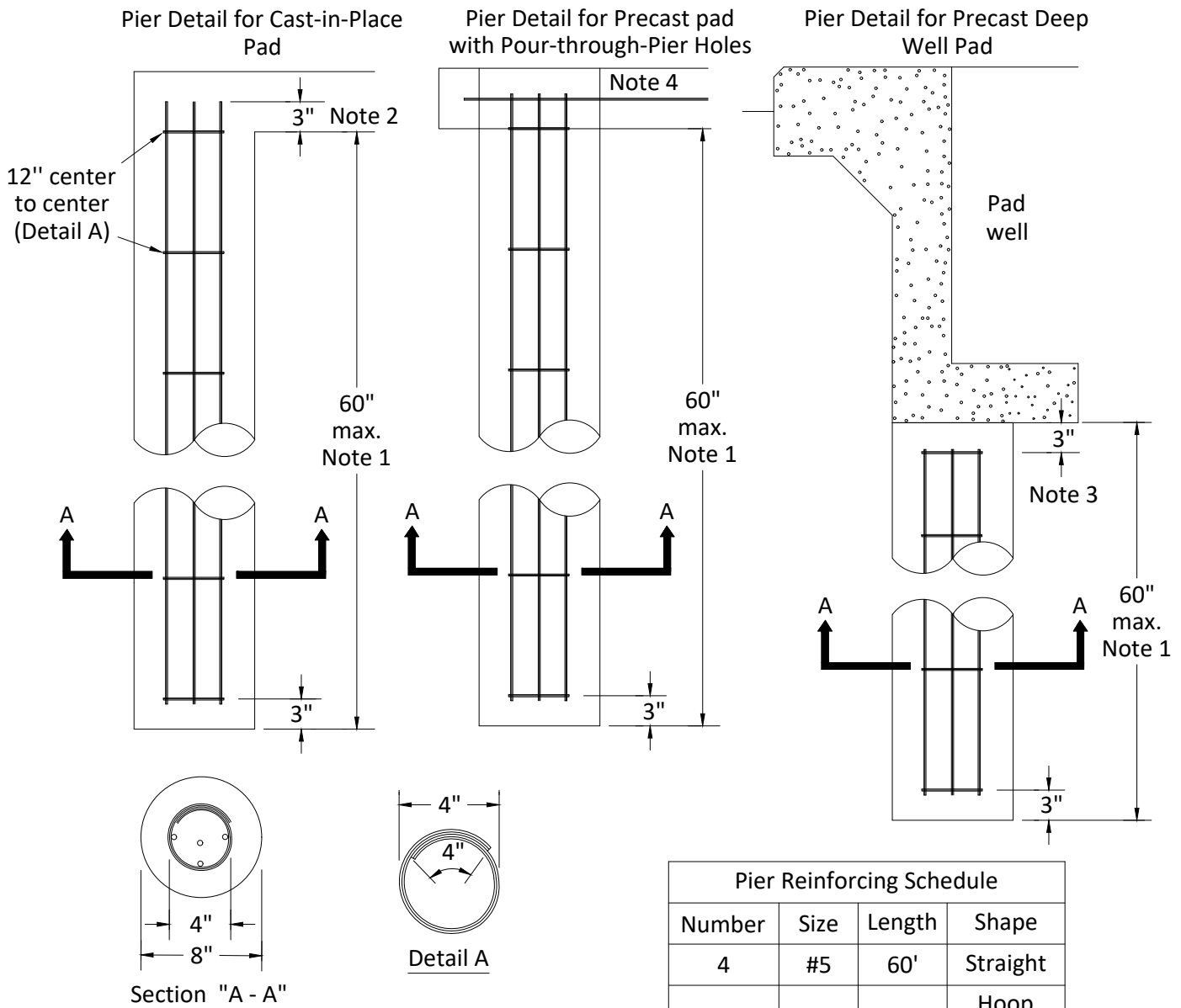
Detail A

Notes:

1. Pier depth shall be 5' below bottom of pad unless rock or other hard surfaces are encountered. If rock or other hard surface are encountered prior to a 5' depth. Pier depth shall be extend 6" into hard surfaces.
2. Precast pads, pier reinforcing is to tie to the exposed pad reinforcements revealed inside the cast in pour-thru-pier holes.
3. For cast-in-place pads the pier reinforcing rods are to extend 3" into the pad.
4. Four pier positioned as shown are recommended for all precast concrete pads.
5. Six piers installations will only be necessary on cast-in-place pads for transformers larger than 1500 kVA.



**PIER DETAILS
FOR THREE-PHASE
TRANSFORMER PADS**



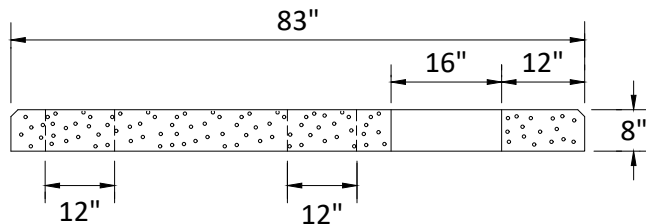
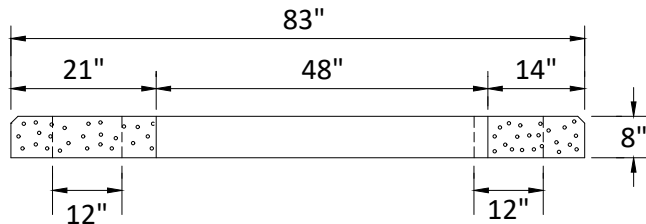
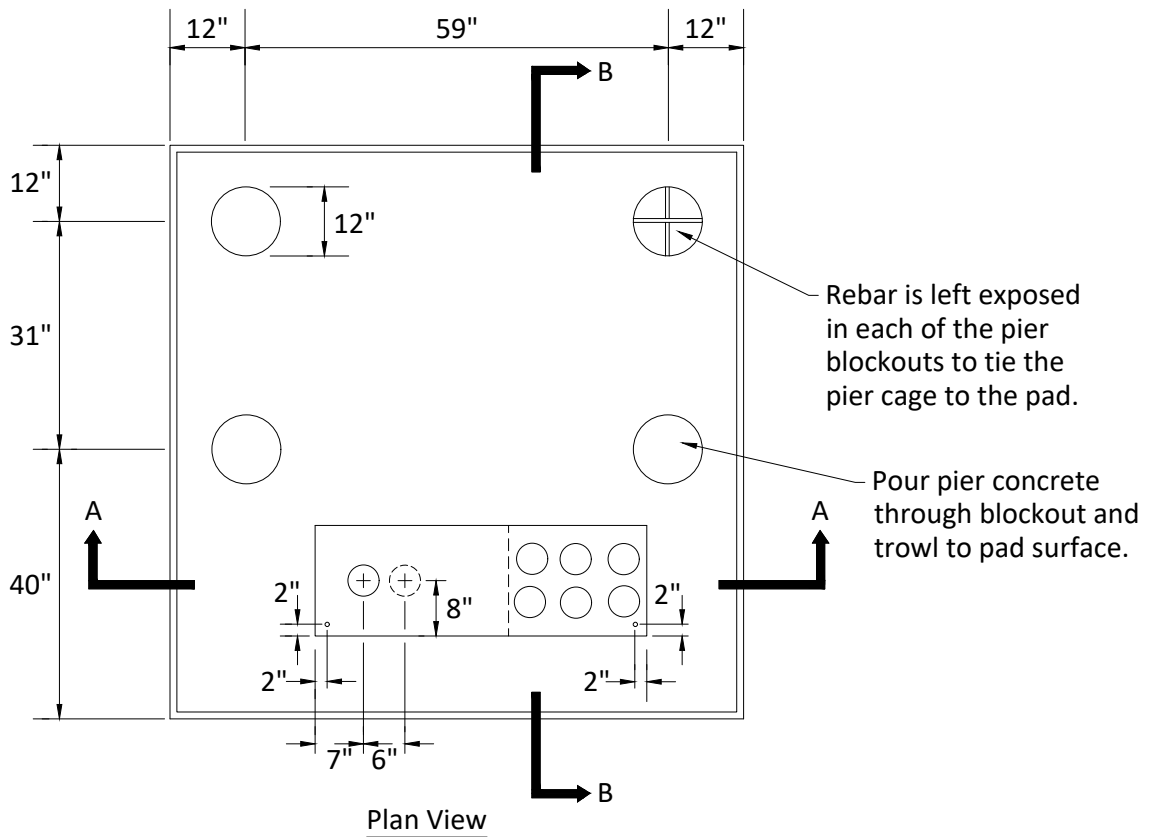
Pier Reinforcing Schedule			
Number	Size	Length	Shape
4	#5	60'	Straight
6	#3	19'	Hoop (Detail A)

0.065 cu yards of concrete/pier
 Total weight of (1) pier: 278 lbs.

- Notes:
1. Pier depth shall be 5' below bottom of pad unless rock or other hard surfaces are encountered. If rock or other hard surfaces are encountered prior to a 60" depth, pier depth shall extend 6" into hard surface.
 2. For cast-in-place pads, the pier reinforcing rods are to extend 3" into pad.
 3. For precast deep well pads, the pier reinforcing rods are to stop short of the edges of the concrete by 3".
 4. For precast pads with pour through pier holes, the pier reinforcing rods are tied to the reinforcement steel cast into the pad.



**PIER DETAIL
 25 KV/15 KV LIVE FRONT
 SWITCHGEAR PAD**



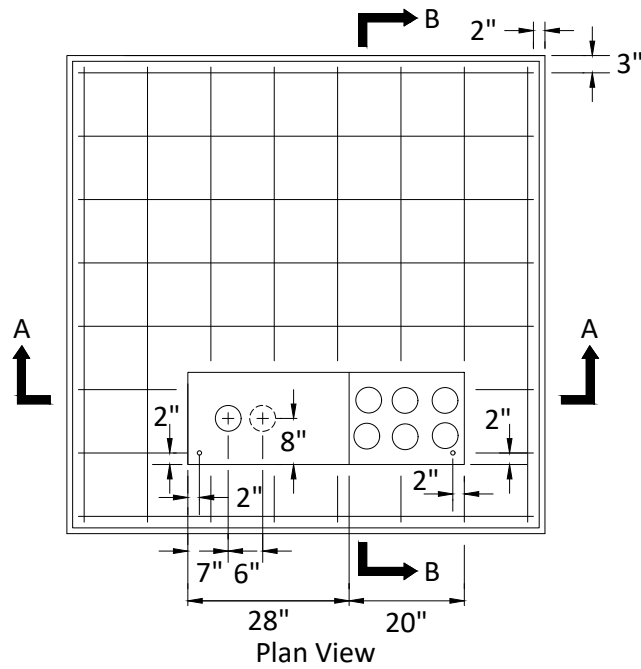
Notes:

1. See detail sheet 13 for grouting detail for radial transformer pad window.
2. See detail sheet 20 for pier details for three-phase radial transformer concrete pads.



**TRANSFORMER PAD THREE-PHASE
PRECAST CONCRETE
75 - 150 kVA RADIAL**

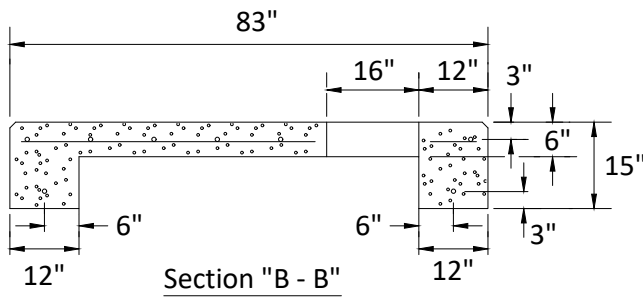
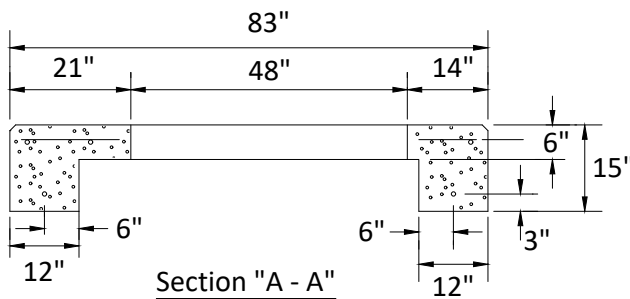
DDS-4 UG DETAIL SHEET 22 OF 58



Reinforcement spacing: 11" centers

Reinforcing Schedule		
Number of #3 bars	Length	Weight (lbs.)
9	79"	22.3
5	51"	8.0
2	17"	1.1
2	10"	0.6
5	8"	1.2

0.8 cu yards concrete
Total weight of pad: 3,190 lbs.



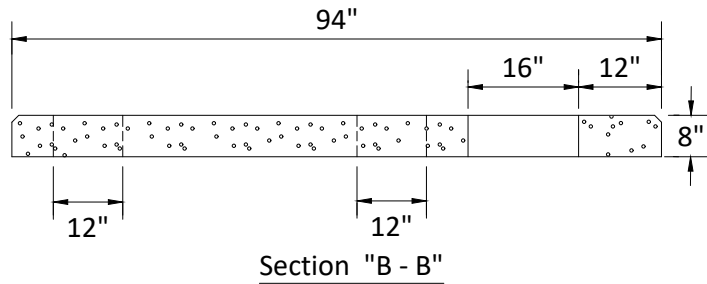
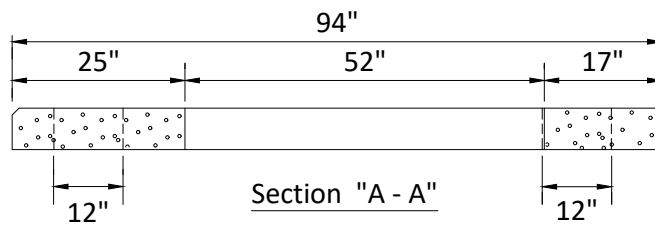
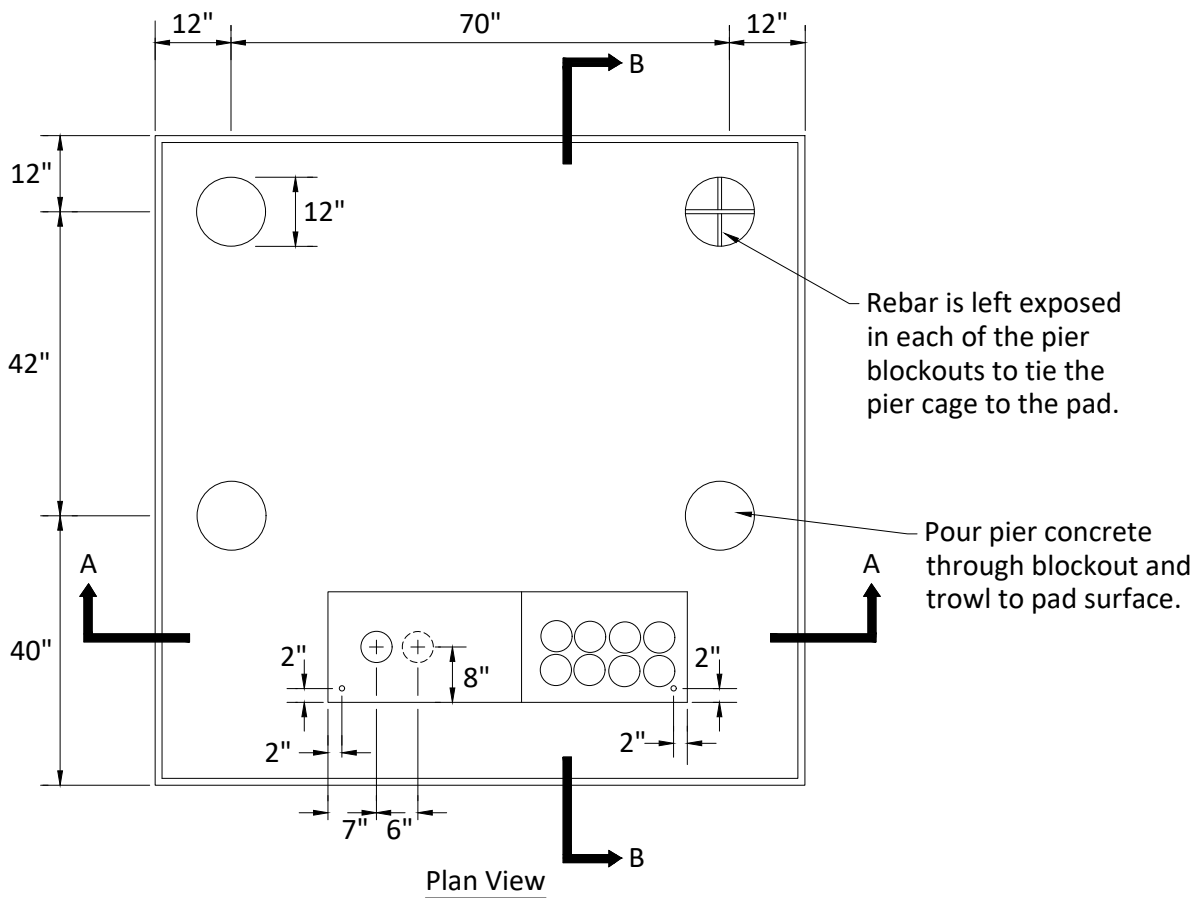
Notes:

1. See detail sheet 19 for general notes.
2. Contractor to obtain and install (2) 5/8" x 8' copper ground rods as shown. Installation depth shall be 7' - 6".
3. Piers are required on all three-phase transformer pads unless waived by the company inspector. Reference detail sheet 20 for pier details.
4. Begin secondary conduits at right edge of pad window. Add conduits as required right to left. Do not cross dividing line between primary and secondary compartments.
5. Grout window as per detail sheet 13.



**TRANSFORMER PAD THREE-PHASE
CAST-IN-PLACE CONCRETE
75 - 150 kVA RADIAL**

DDS-4 UG DETAIL SHEET 23 OF 58



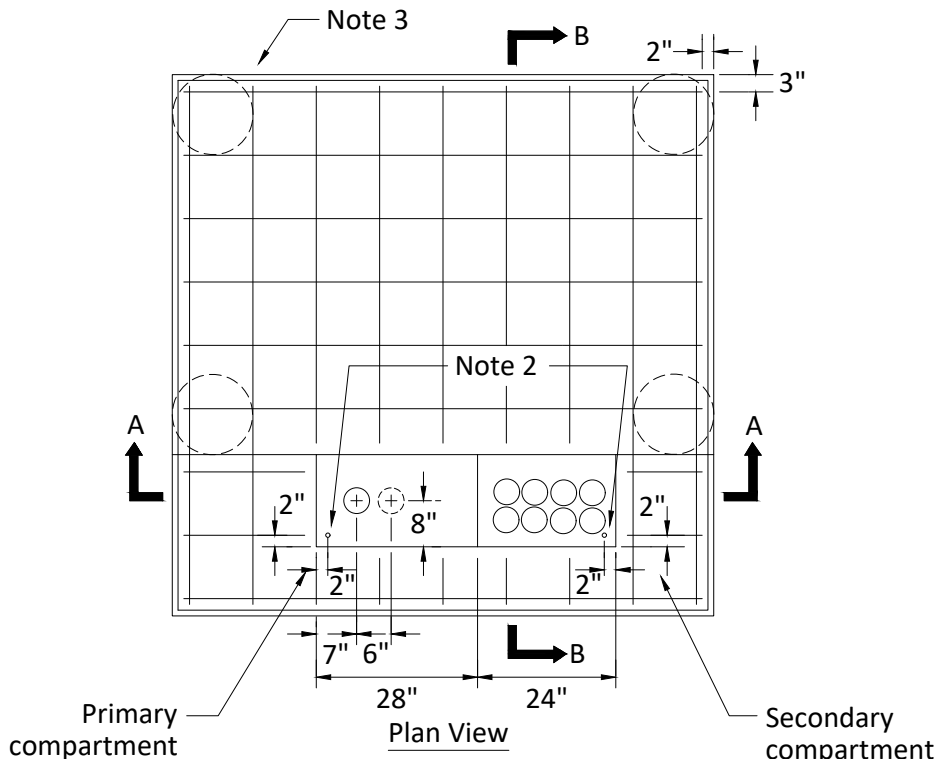
Notes:

1. See detail sheet 13 for grouting detail for radial transformer pad window.
2. See detail sheet 20 for pier details for three-phase radial transformer concrete pads.



**TRANSFORMER PAD THREE-PHASE
PRECAST CONCRETE
225 - 500 kVA RADIAL**

DDS-4 UG DETAIL SHEET 24 OF 58

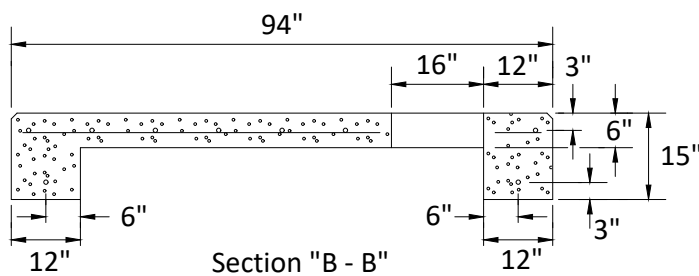
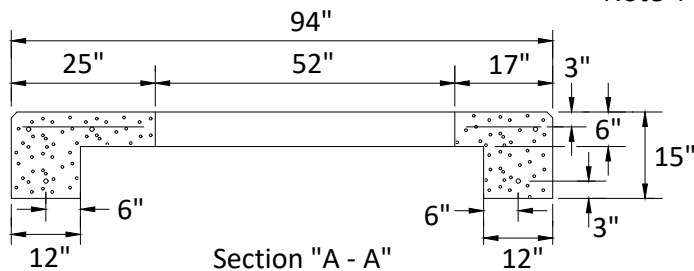


Reinforcement spacing: 11" centers

Reinforcing Schedule Pad with Beams (Notes 2 & 3)		
Number of #3 bars	Length	Weight (lbs.)
15	90"	42.3
5	62"	9.7
2	21"	1.3
2	13"	0.8
5	8"	1.2

1.8 cu yards concrete
Total weight of pad: 7,250 lbs.

Primary compartment
Secondary compartment
Note 4



Reinforcing Schedule Pad without Beams		
Number of #3 bars	Length	Weight (lbs.)
11	90"	31.0
5	62"	9.7
2	21"	1.3
2	13"	0.8
5	8"	1.2

1.0 cu yards concrete
Total weight of pad: 4,170 lbs.

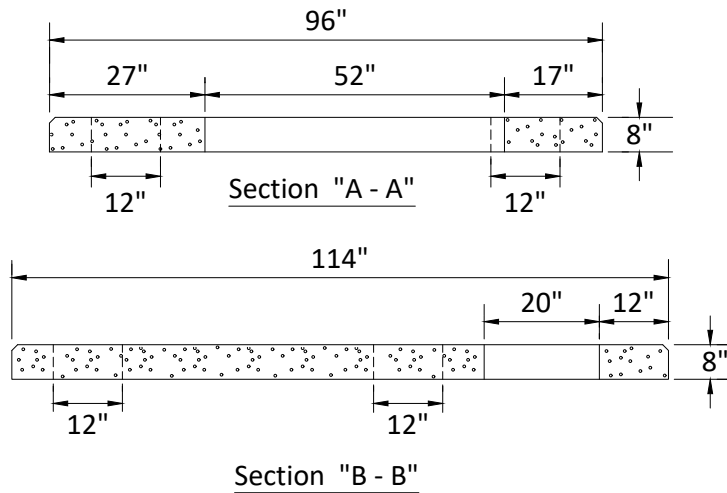
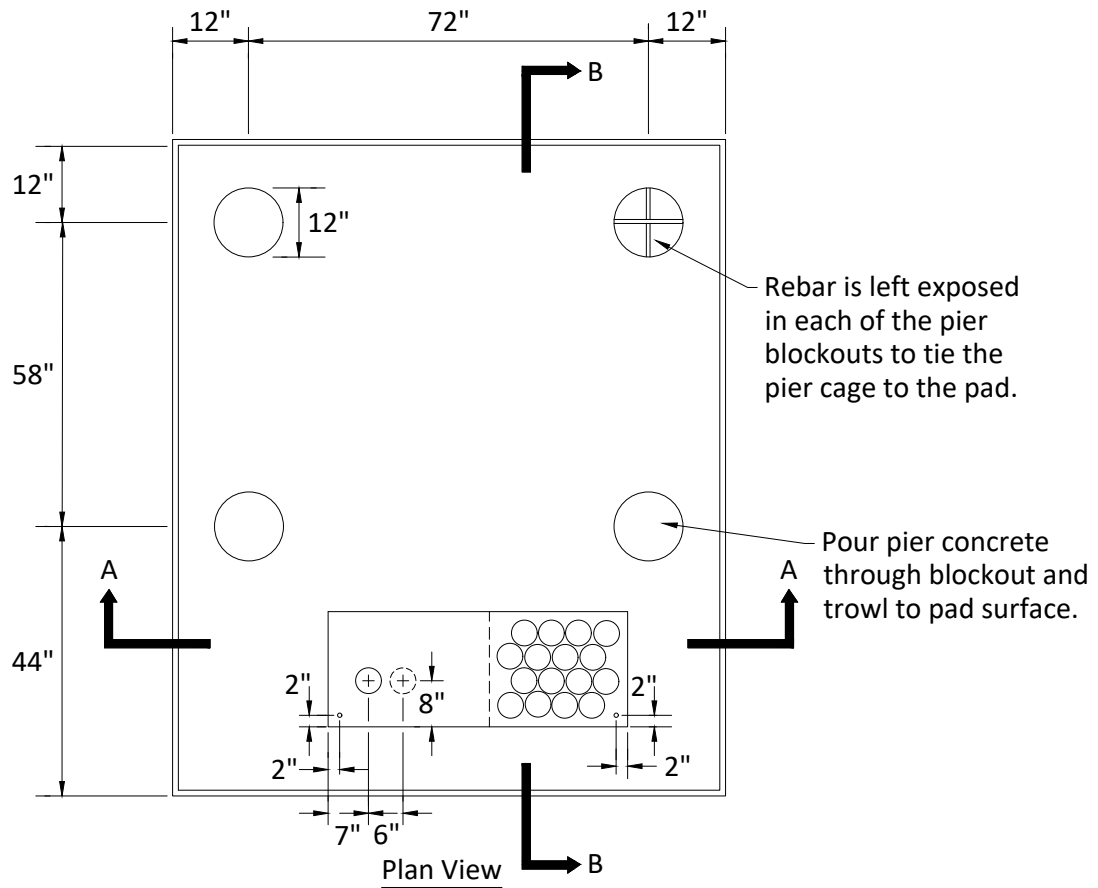
Notes:

1. See detail sheet 19 for general notes.
2. Contractor to obtain and install (2) 5/8" x 8' ground rods as shown. Installation depth shall be 7' - 6".
3. Piers are required on all three-phase transformer pads unless waived by the company inspector. Reference detail sheet 20 for pier details.
4. Begin secondary conduits at right edge of pad window. Add conduits as required right to left. Do not cross dividing line between primary and secondary compartments.
5. Grout window as per detail sheet 13.



**TRANSFORMER PAD THREE-PHASE
CAST-IN-PLACE CONCRETE
225 - 500 kVA RADIAL**

DDS-4 UG DETAIL SHEET 25 OF 58



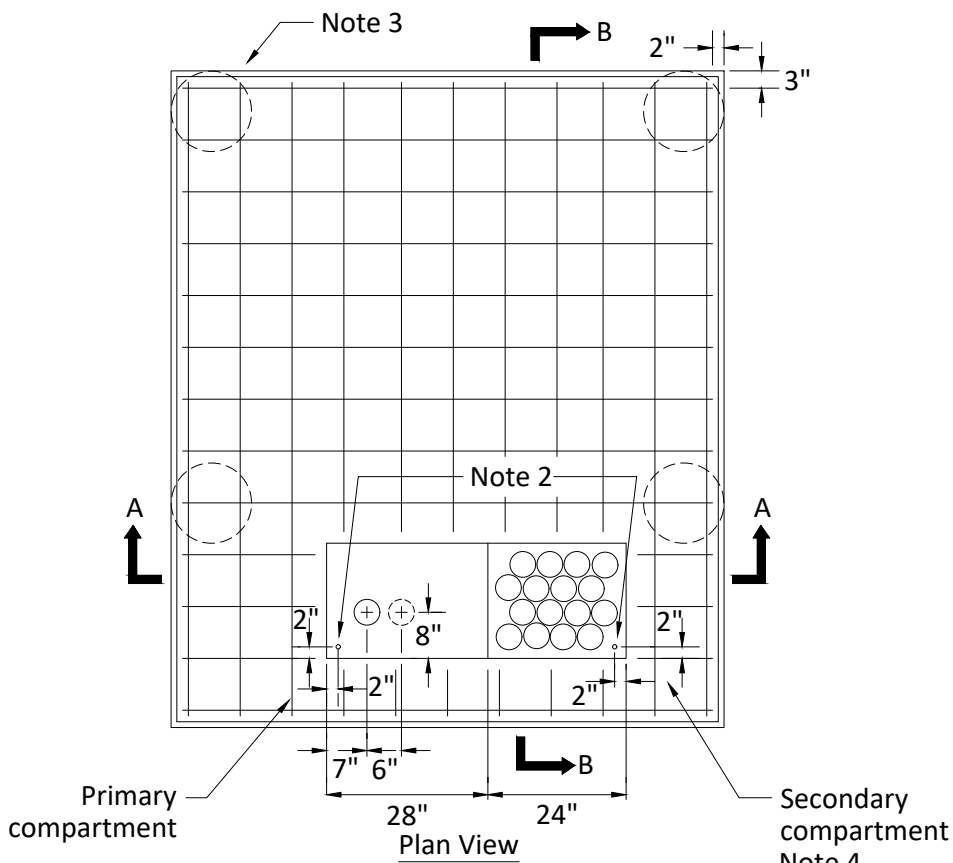
Notes:

1. See detail sheet 13 for grouting detail for radial transformer pad window.
2. See detail sheet 20 for pier details for three-phase radial transformer concrete pads.



**TRANSFORMER PAD THREE-PHASE
PRECAST CONCRETE
750 - 1000 kVA RADIAL**

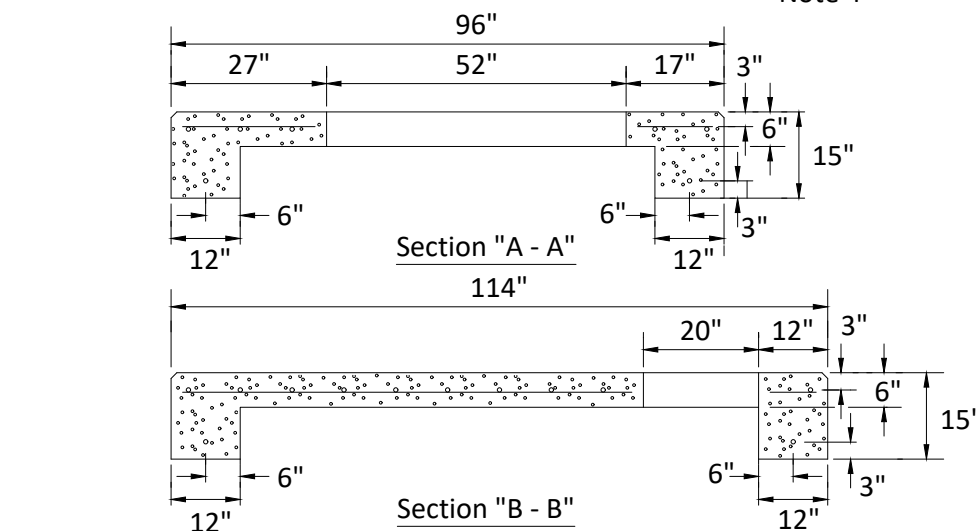
DDS-4 UG DETAIL SHEET 26 OF 58



Reinforcement spacing: 9" centers

Reinforcing Schedule Pad with Beams (Notes 2 & 3)		
Number of #3 bars	Length	Weight (lbs.)
12	92"	32.2
7	110"	8.0
6	78"	1.1
3	23"	0.6
3	13"	1.2
6	8"	1.5

2.1 cu yards concrete
Total weight of pad: 8,645 lbs.



Reinforcing Schedule Pad without Beams		
Number of #3 bars	Length	Weight (lbs.)
10	92"	28.8
5	110"	17.2
6	78"	14.7
3	23"	2.2
3	13"	1.2
6	8"	1.5

1.3 cu yards concrete
Total weight of pad: 5,160 lbs.

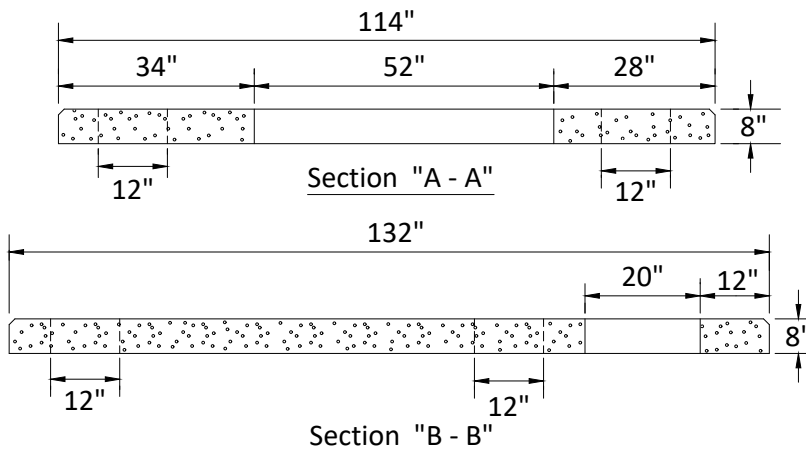
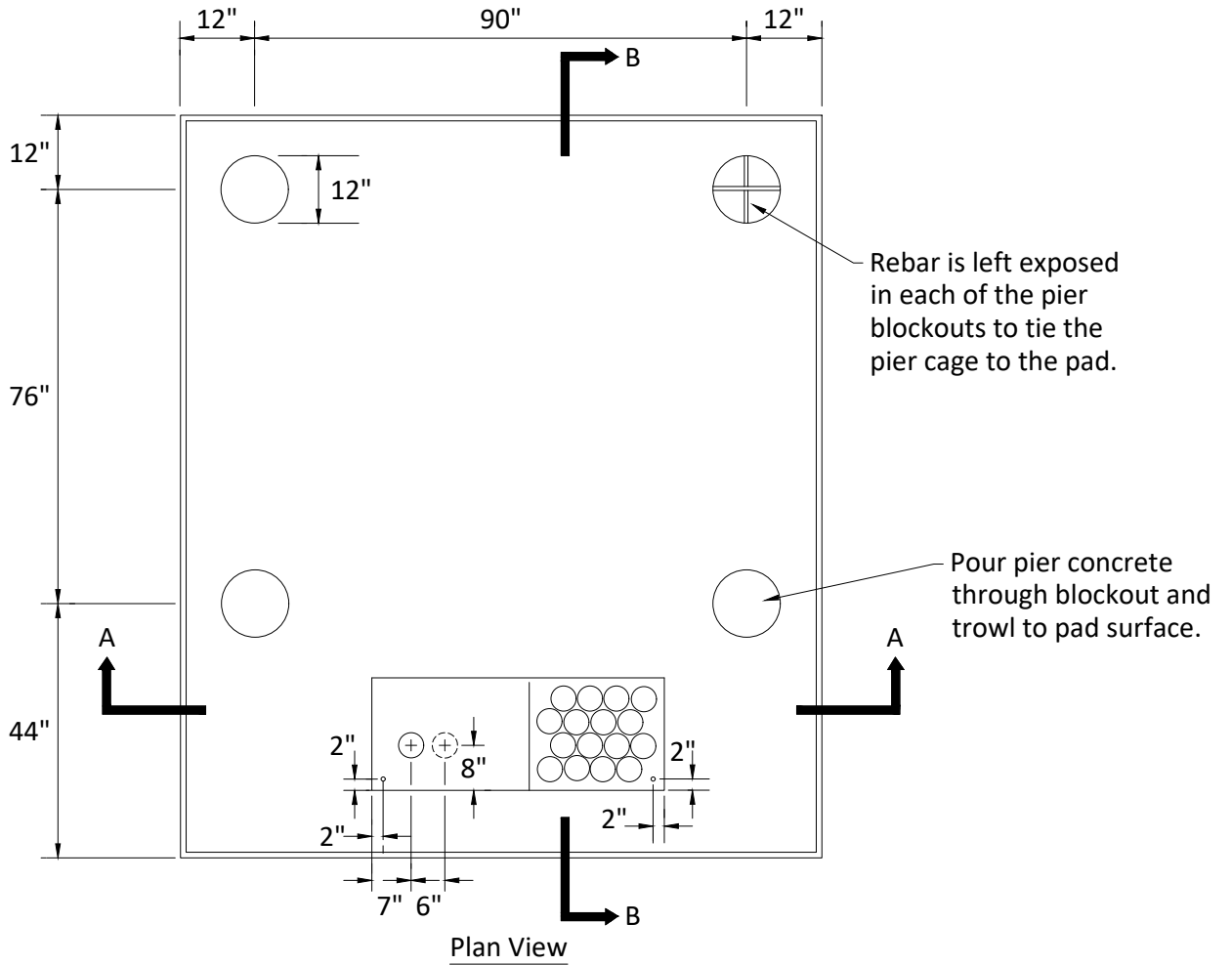
Notes:

1. See detail sheet 19 for general notes.
2. Contractor to obtain and install (2) 5/8" x 8' ground rods as shown. Installation depth shall be 7' - 6".
3. Piers are required on all three-phase transformer pads unless waived by the company inspector. Reference detail sheet 20 for pier details.
4. Begin secondary conduits at right edge of pad window. Add conduits as required right to left. Do not cross dividing line between primary and secondary compartments.
5. Grout window as per detail sheet 13.



**TRANSFORMER PAD THREE-PHASE
CAST-IN-PLACE CONCRETE
750 - 1000 KVA RADIAL**

DDS-4 UG DETAIL SHEET 27 OF 58



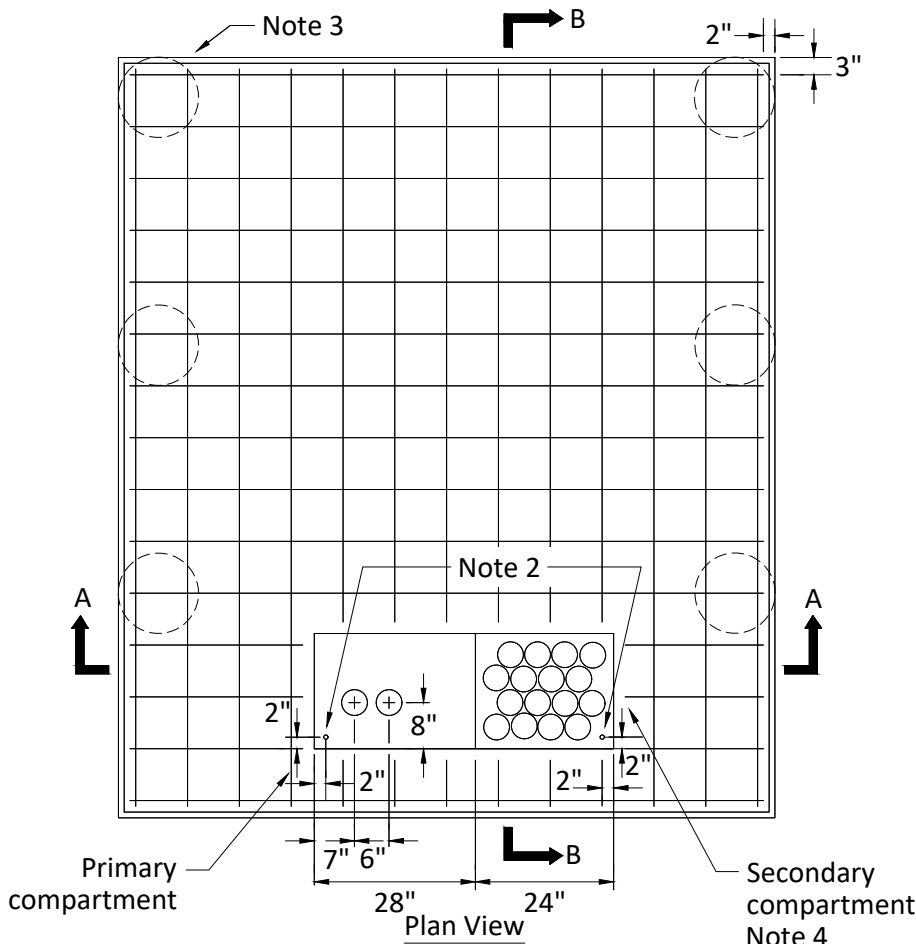
Notes:

1. See detail sheet 13 for grouting detail for radial transformer pad window.
2. See detail sheet 20 for pier details for three-phase radial transformer concrete pads.



**TRANSFORMER PAD THREE-PHASE
PRECAST CONCRETE
1500 - 2500 kVA RADIAL**

DDS-4 UG DETAIL SHEET 28 OF 58



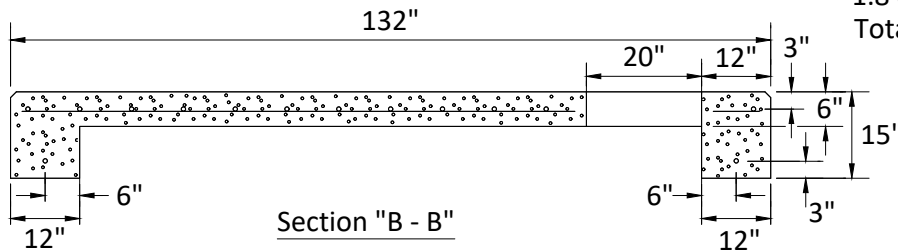
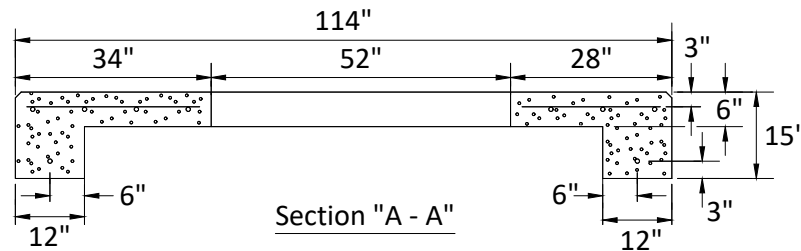
Reinforcement spacing: 9" centers

Reinforcing Schedule Pad with Beams (Notes 2 & 3)		
Number of #3 bars	Length	Weight (lbs.)
9	128"	36.1
14	110"	48.2
6	96"	18.0
6	8"	1.5
3	30"	2.8
3	24"	2.2

2.8 cu yards concrete
Total weight of pad: 11,480 lbs.

Reinforcing Schedule Pad without Beams		
Number of #3 bars	Length	Weight (lbs.)
7	128"	28.1
12	110"	41.4
6	96"	18.0
6	8"	1.5
3	30"	2.8
3	24"	2.2

1.8 cu yards concrete
Total weight of pad: 7,300 lbs.



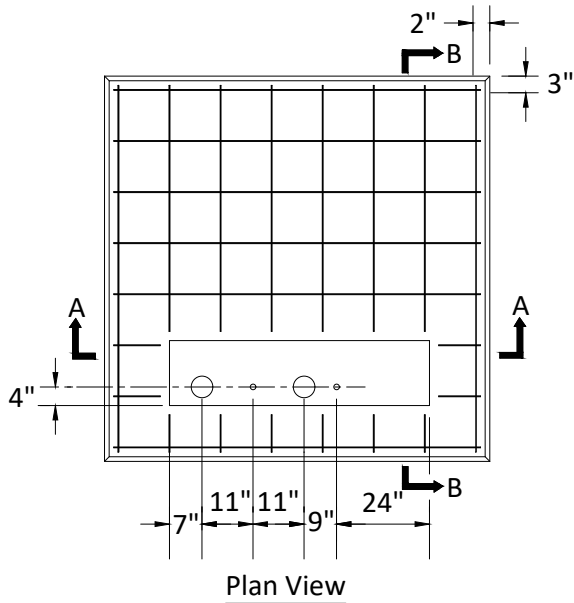
Notes:

1. See detail sheet 19 for general notes.
2. Contractor to obtain and install (2) 5/8" x 8' ground rods as shown. Installation depth shall be 7' - 6".
3. Piers are required on all three-phase transformer pads unless waived by the company inspector. Reference detail sheet 20 for pier details.
4. Begin secondary conduits at right edge of pad window. Add conduits as required right to left. Do not cross dividing line between primary and secondary compartments.
5. Grout window as per detail sheet 13.



**TRANSFORMER PAD THREE-PHASE
CAST-IN-PLACE CONCRETE
1500 - 2500 kVA RADIAL**

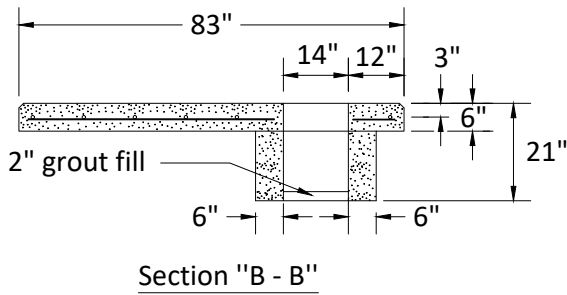
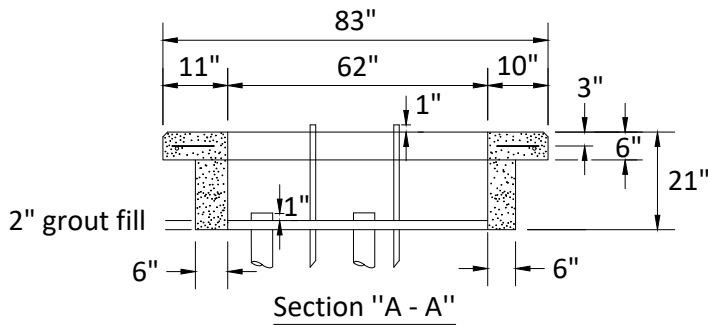
DDS-4 UG DETAIL SHEET 29 OF 58



Reinforcement spacing: 11" centers

Reinforcing Schedule		
Number of #3 bars	Length	Weight (lbs.)
8	79"	19.8
6	8"	1.5
2	6"	0.38
2	7"	0.44
6	53"	9.96

1.17 cu yards concrete
Total weight of pad: 4,590 lbs.



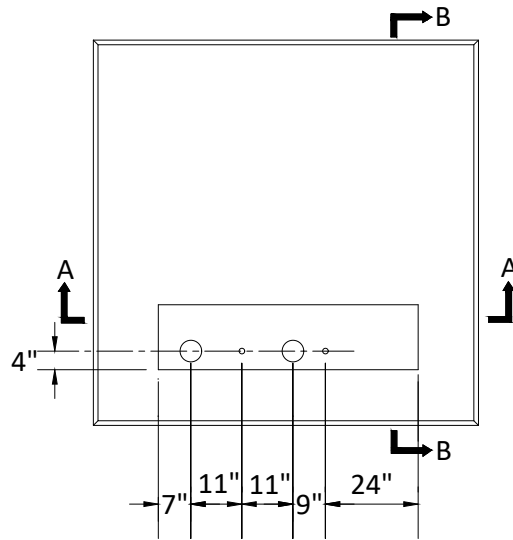
Notes:

1. See detail sheet 19 for general notes.
2. Contractor to obtain and install (2) 5/8" x 8' ground rods as shown. Installation depth shall be 7' - 6".
3. Piers are required on all three-phase transformer pads unless waived by the company inspector. Reference detail sheet 20 for pier details.
4. Begin secondary conduits at right edge of pad window. Add conduits as required right to left. Do not cross dividing line between primary and secondary compartments.
5. Grout window as per detail sheet 13.

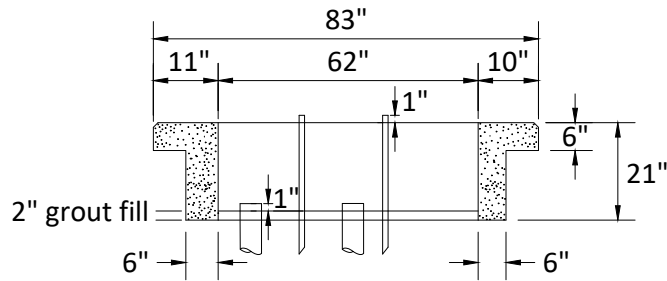


**TRANSFORMER PAD THREE-PHASE
75 - 150 kVA DEAD FRONT
LOOP FEED**

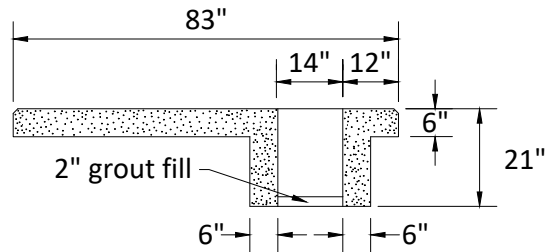
DDS-4 UG DETAIL SHEET 30 OF 58



Plan View



Section "A - A"



Section "B - B"

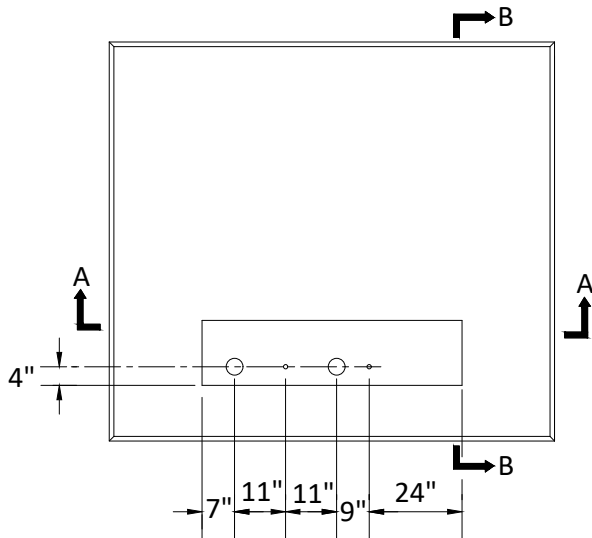
Notes:

1. See detail sheet 20 for pier details for three-phase radial transformer concrete pads.

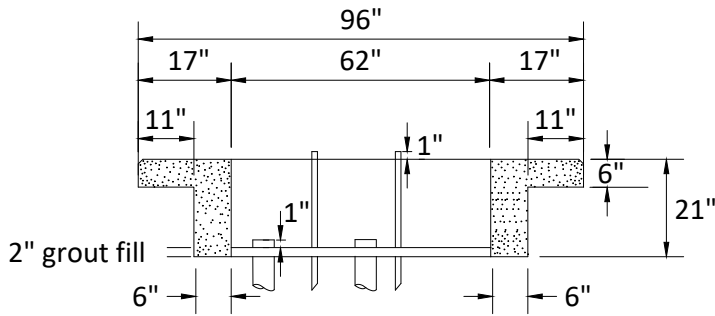


**TRANSFORMER PAD THREE-PHASE
75 - 150 kVA DEAD FRONT
LOOP FEED**

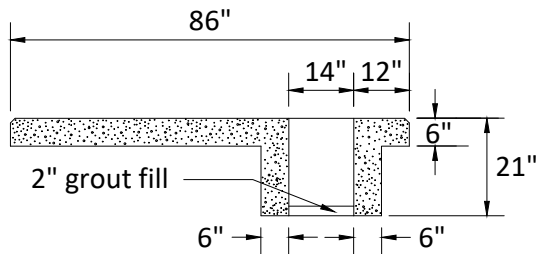
DDS-4 UG DETAIL SHEET 31 OF 58



Plan View



Section "A - A"



Section "B - B"

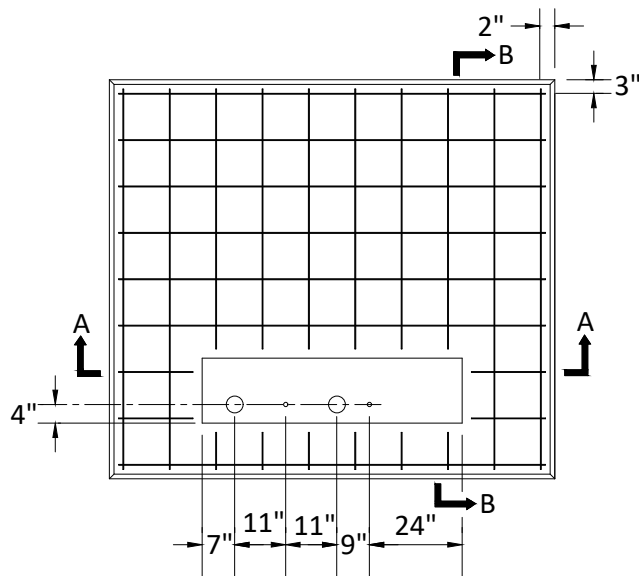
Notes:

1. See detail sheet 19 for general notes.
2. Contractor to obtain and install (2) 5/8" x 10' ground rods as shown. Installation depth shall be 7' - 6".
3. Piers are required on all three-phase transformer pads unless waived by the company inspector. Reference detail sheet 20 for pier details.
4. Begin secondary conduits at right edge of pad window. Add conduits as required right to left. Do not cross dividing line between primary and secondary compartments.
5. Grout window as per detail sheet 13.



**TRANSFORMER PAD
THREE-PHASE PRECAST CONCRETE
225 - 500 kVA DEAD FRONT LOOP FEED**

DDS-4 UG DETAIL SHEET 32 OF 58

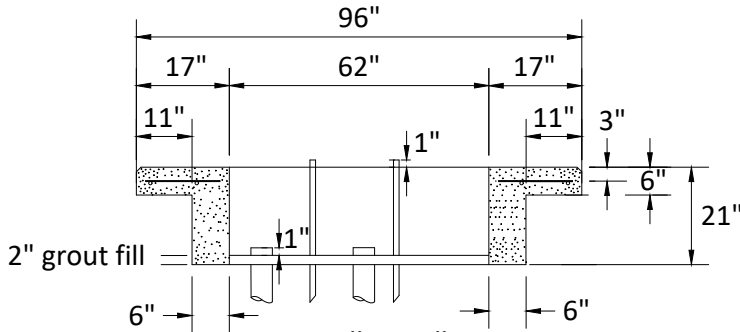


Plan View

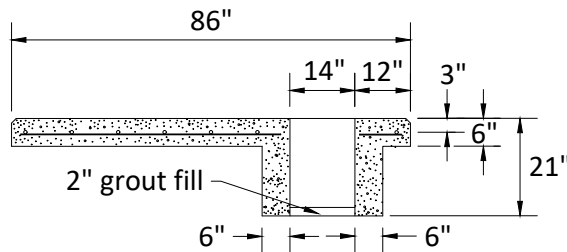
Reinforcement spacing: 10" centers

Reinforcing Schedule		
Number of #3 bars	Length	Weight (lbs.)
4	82"	10.3
6	56"	10.5
6	8"	1.5
4	13"	1.6
7	92"	20.2

1.34 cu yards concrete
 Total weight of pad: 5,270 lbs.



Section " A - A "



Section " B - B "

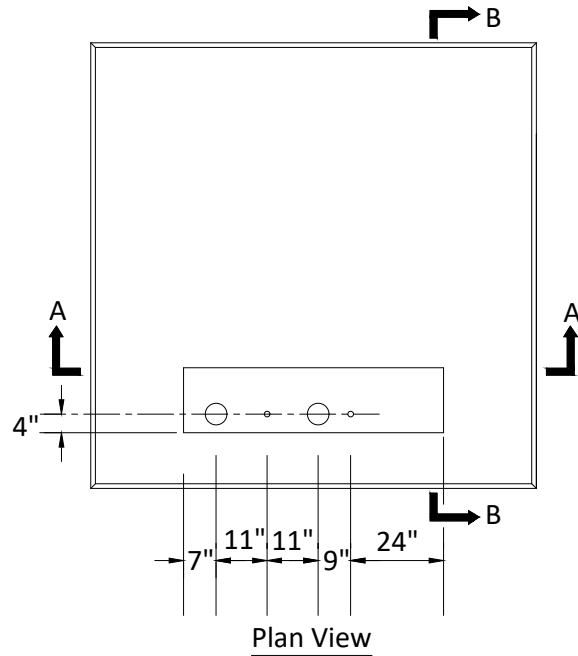
Notes:

1. See detail sheet 19 for general notes.
2. Contractor to obtain and install (2) 5/8" x 8' ground rods as shown. Installation depth shall be 7' - 6".
3. Piers are required on all three-phase transformer pads unless waived by the company inspector. Reference detail sheet 20 for pier details.
4. Begin secondary conduits at right edge of pad window. Add conduits as required right to left. Do not cross dividing line between primary and secondary compartments.
5. Grout window as per detail sheet 13.

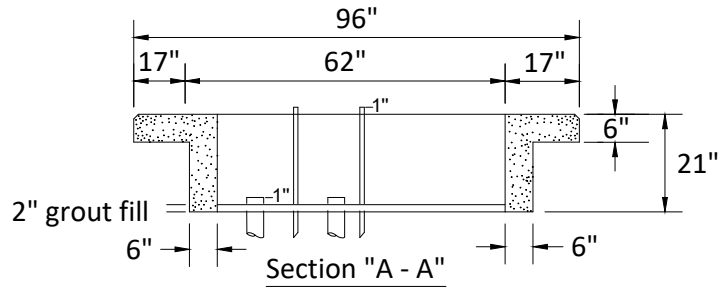


**TRANSFORMER PAD
 THREE-PHASE
 CAST-IN-PLACE CONCRETE
 225 - 500 kVA LOOP FEED**

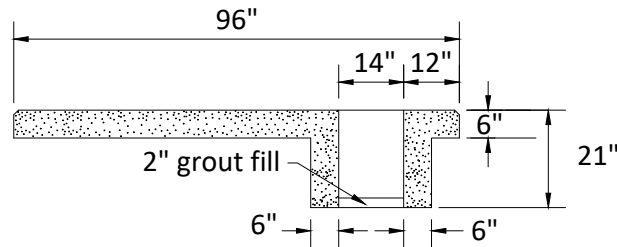
DDS-4 UG DETAIL SHEET 33 OF 58



Plan View



Section "A - A"



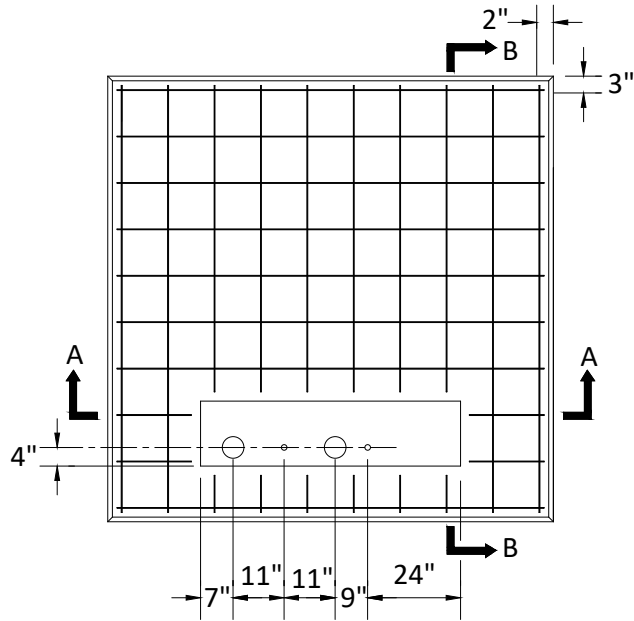
Section "B - B"

Notes:

1. See detail sheet 19 for general notes.
2. Contractor to obtain and install (2) 5/8" x 8' ground rods as shown. Installation depth shall be 7' - 6".
3. Piers are required on all three-phase transformer pads unless waived by the company inspector. Reference detail sheet 20 for pier details.
4. Begin secondary conduits at right edge of pad window. Add conduits as required right to left. Do not cross dividing line between primary and secondary compartments.
5. Grout window as per detail sheet 13.



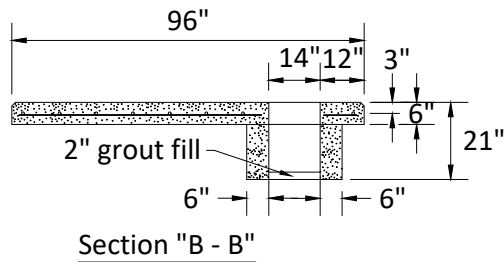
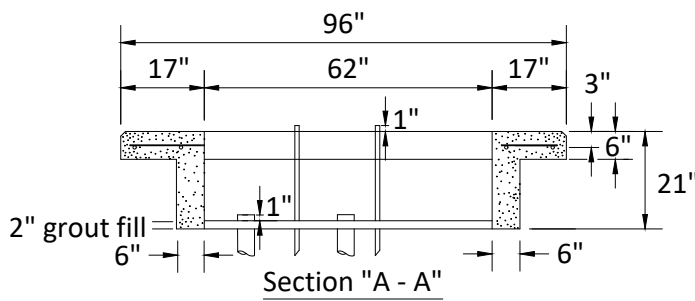
**TRANSFORMER PAD
THREE-PHASE
PRECAST CONCRETE
750 kVA DEAD FRONT LOOP FEED
DDS-4 UG DETAIL SHEET 34 OF 58**



Reinforcement spacing: 10" centers

Reinforcing Schedule		
Number of #3 bars	Length	Weight (lbs.)
12	92"	34.5
6	8"	1.5
6	66"	12.4
4	13"	1.6

1.47 cu yards concrete
Total weight of pad: 5,770 lbs.



Notes:

1. See detail sheet 19 for general notes.
2. Contractor to obtain and install (2) 5/8" x 10' ground rods as shown. Installation depth shall be 7' - 6".
3. Piers are required on all three-phase transformer pads unless waived by the company inspector. Reference detail sheet 20 for pier details.
4. Begin secondary conduits at right edge of pad window. Add conduits as required right to left. Do not cross dividing line between primary and secondary compartments.
5. Grout window as per detail sheet 13.



**TRANSFORMER PAD
THREE-PHASE 750 kVA
DEAD FRONT LOOP FEED**

DDS-4 UG DETAIL SHEET 35 OF 58

Three-phase Transformer	Maximum Number of 4" PVC Conduits		Maximum Number of Cables including the Neutral	
	208Y/120	480Y/277	208Y/120	480Y/277
75 - 150	6	6	24	24
225 - 300	6	6	24	24
500	8	6	32	24
750	12	6	48	24
1000	16	8	64	32
1500	-	12	-	48
2000	-	16	-	64
2500	-	16	-	64

Notes:

1. For three-phase pad mount transformers, the customer's service conductor must be 1000 kcmil or smaller. The maximum number of runs (three-phase conductors and one neutral conductor) shall be as shown in above table.
2. For single-phase 240/120 volt transformers, the customer's service conductor must be 350 kcmil or smaller. The maximum number of runs (two-phase conductors and one neutral conductor) and the size of the conduits shall be as shown in the following table:

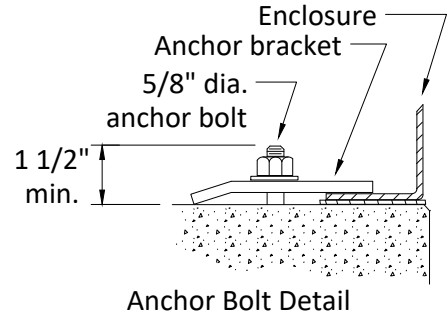
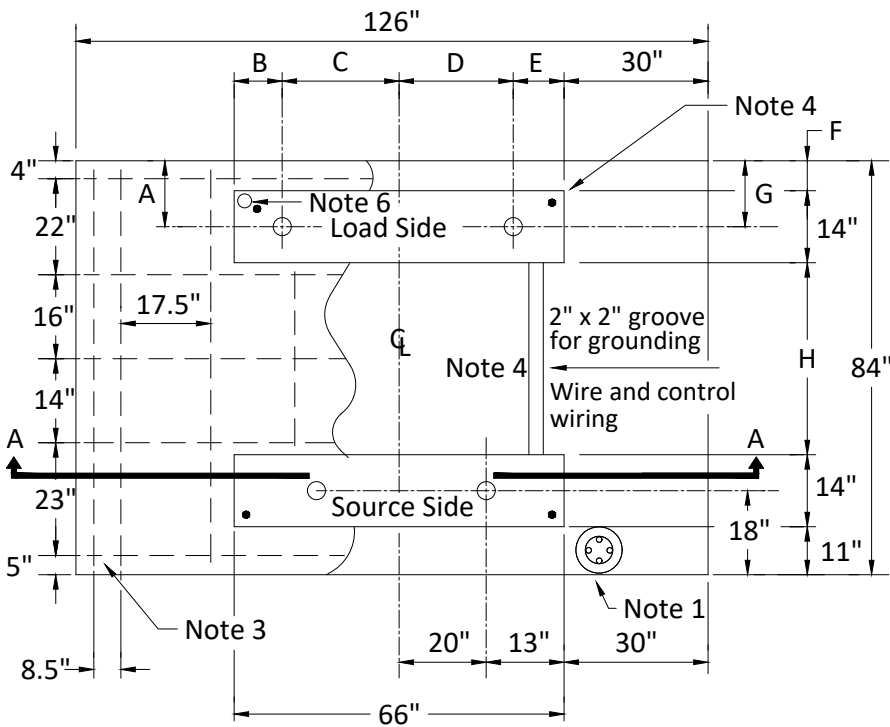
Customer's Conductor Size	Conduit Sizes	Maximum Number of Runs
#6 - #3/0	2"	8
#4/0 - 350 kcmil	3"	6
500 kcmil	4"	4

3. If the number of runs installed by the customer is more than the maximum shown, a connection enclosure with pad may be required. Consult company representative for details.



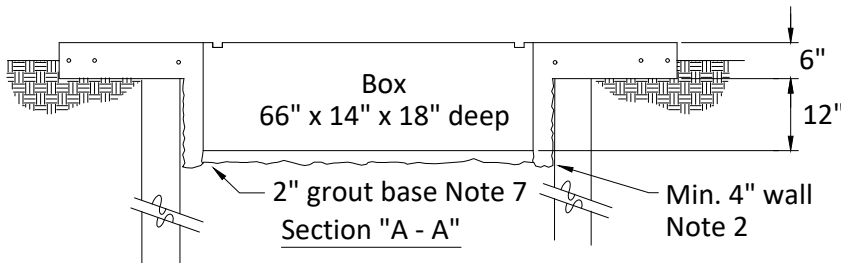
MAXIMUM NUMBER OF SECONDARY CONDUITS AND CABLES FOR PADMOUNTED TRANSFORMERS

DDS-4 UG DETAIL SHEET 36 OF 58



Reinforcing Schedule		
Number of #3 bars	Length	Weight (lbs.)
5	122"	19.1
6	80"	15.0
3	33"	3.1

Total weight (concrete & rebar): 7,040 lbs.



25kV	A	B	C	D	E	F	G	H
PMH - 9	15"	11"	22"	22"	11"	8"	15"	37"
PMH - 10	18"	13"	20"	20"	13"	11"	18"	34"
PMH - 11	15"	11"	22"	20"	13"	8"	18"	37"

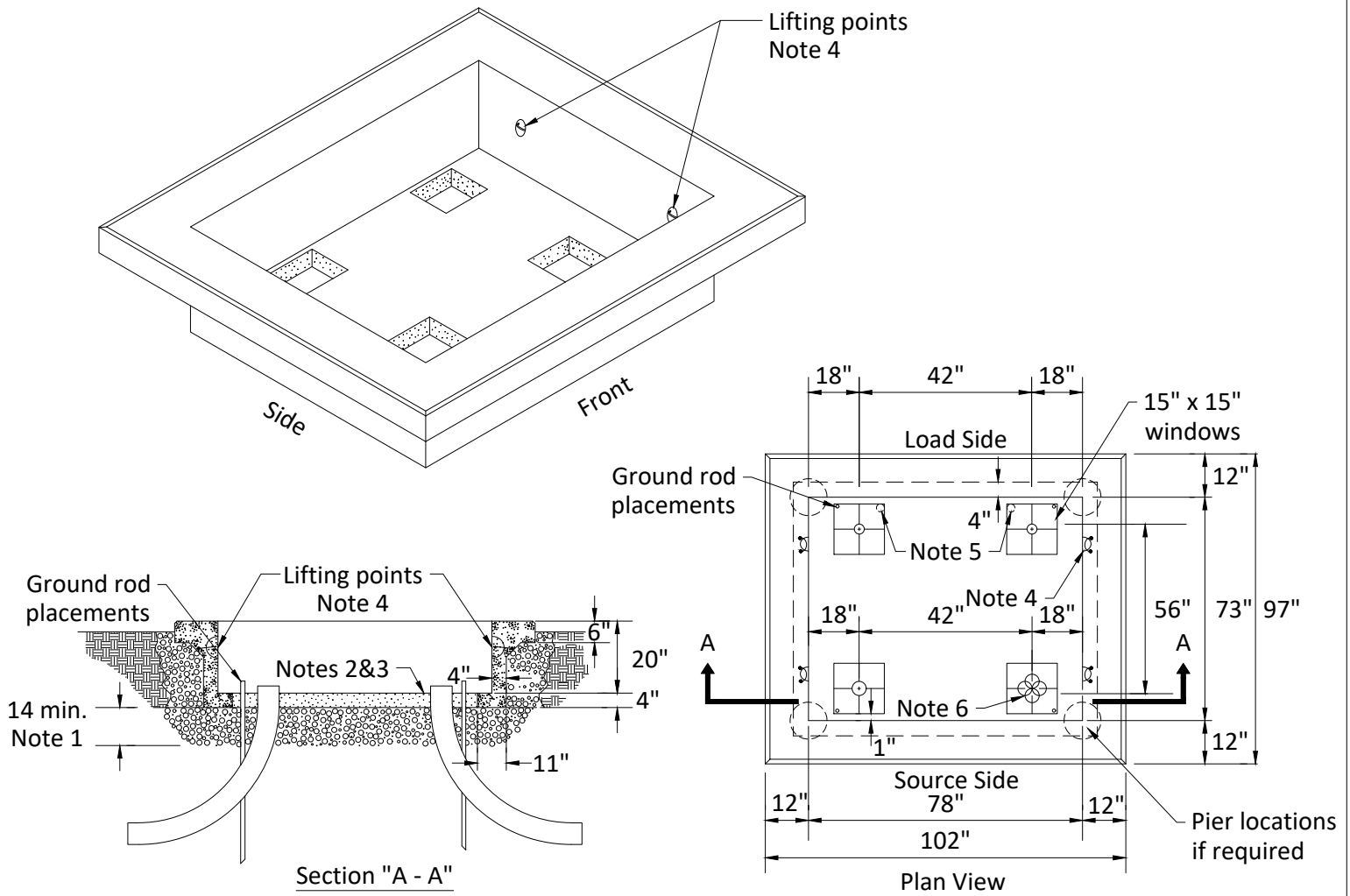
Notes:

1. Piers are required on all switchgear pads unless waived by the company inspector. Reference detail sheet 21 for pier detail.
2. Use wire mesh for concrete reinforcement around deep well box.
3. Ends of re-bar shall remain a minimum of 2" inside of concrete and shall be intermediate grade 60 and conform to ASTM A615.
4. Contact company representative on where to acquire 5/8" x 10' copper clad ground rods. Ground rods to be obtained and installed by contractor. Installation depth shall be 7' - 6".
5. For clearances on all sides of the switchgear see detail sheet 49, 50, 51 and 52.
6. For pads plumbed into duct banks, install 3" communication conduit from manhole to front right corner of load side conduit opening of pad.
7. Grout as per detail sheet 13.



**CONCRETE PAD POURED IN PLACE
25 kV LIVE FRONT AUTOMATED
SUPERVISORY CONTROL SWITCHGEAR**

DDS-4 UG DETAIL SHEET 37 OF 58



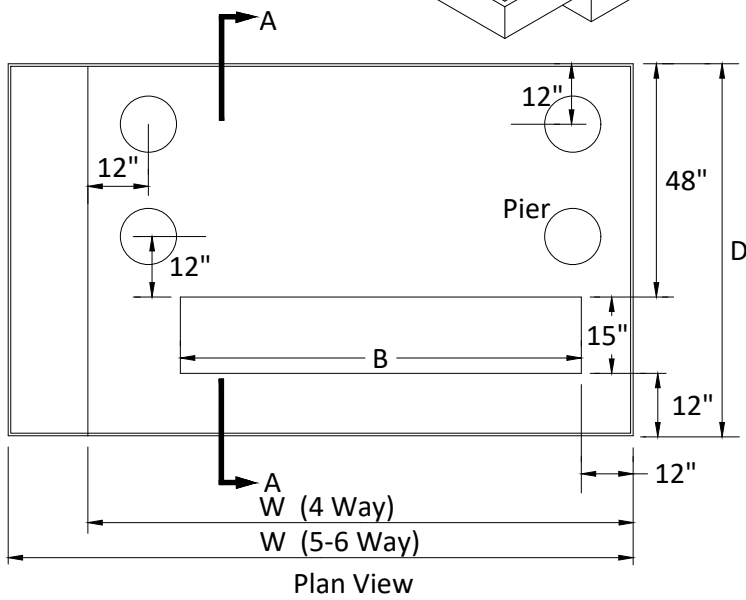
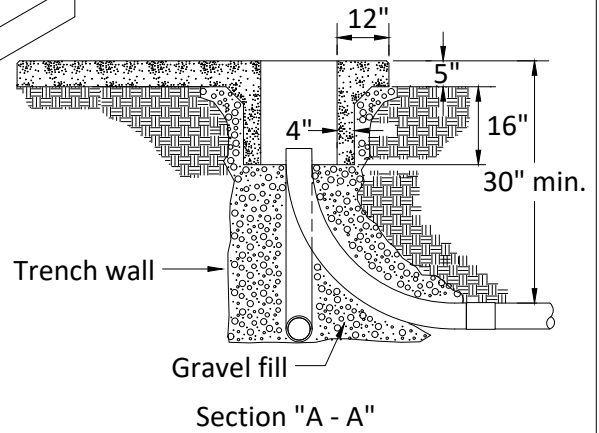
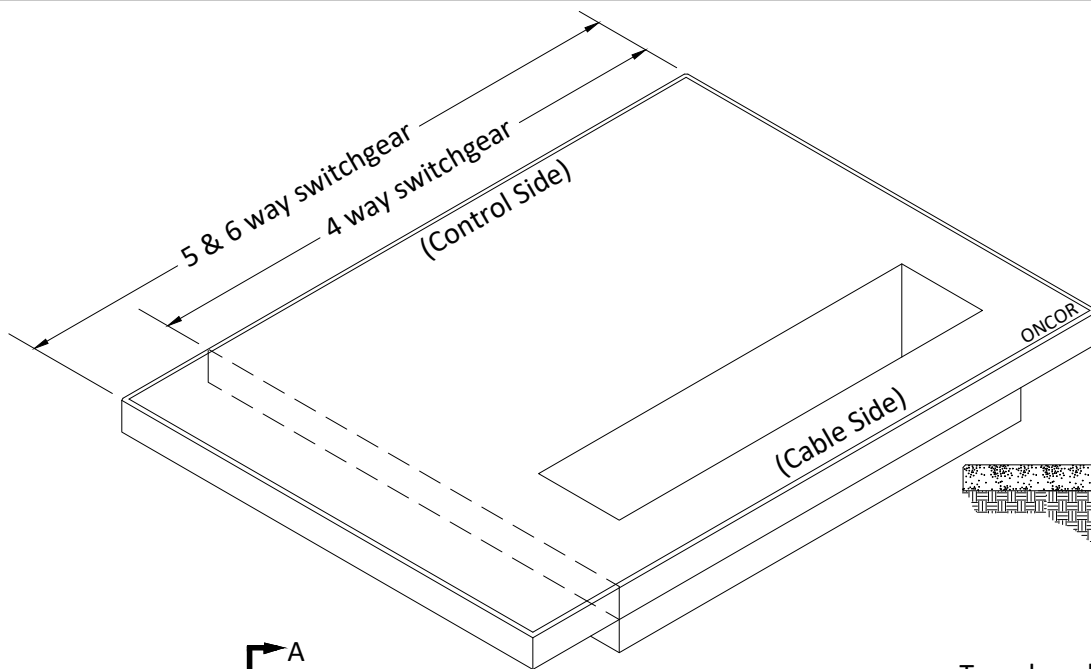
Notes:

1. To prevent settling and improve pad stabilization add a minimum of 14" medium size gravel bottom and sides.
2. Conduit shall not extend more than 2" above the conduit window opening.
3. To allow for adequate drainage do not seal conduit window openings with grout. Fill with aggregate only.
4. Lifting points (4) rated at 2000 lbs. each. Total pad weight is 6,100 lbs.
5. For pads plumbed to concrete encase duct, install 3" communication conduit from manhole to a load side opening.
6. Example of conduit placements (vertical or horizontal) when spare conduits are required.



**PRECAST DEEP WELL PAD
DEAD FRONT / LIVE FRONT
25 KV SWITCHGEAR**

DDS-4 UG DETAIL SHEET 38 OF 58



Switchgear Ways				
Switch	W (in.)	B (in.)	D (in.)	Weight (lbs.)
3 - way	97	64	75	4127
3 - way RSC	97	64	75	
4 - way	97	64	75	
5 - 6 way	127 1/2	94	75	5465
4 - 5 way ATO	127 1/2	94	75	
4 - 5 way RSC	127 1/2	94	75	

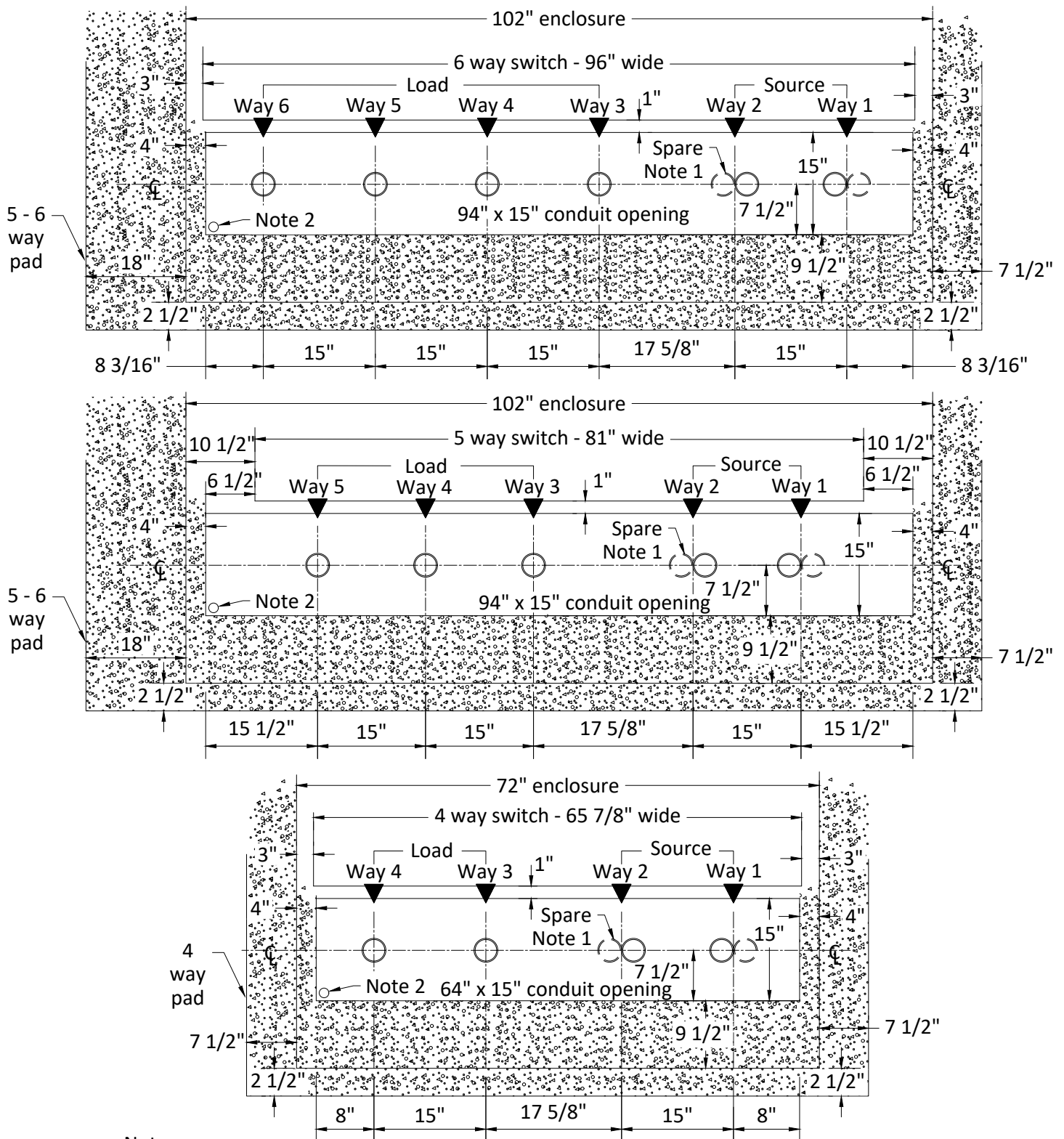
Notes:

1. For stabilization and drainage install small to medium gravel under pad deep well.
2. For clearances on all sides of the switchgear see detail sheets 49, 50, 51 and 52.
3. Piers are required on all pads unless waived by the company inspector. Reference detail sheet 21 for pier detail.
4. Lift pad with provided lifting points only. See lifting rings inside wall of deep well.
5. Conduit not to extend more than 3" above bottom of deep well.
6. Minimum trench depth at pad to top of conduit for the following conduits:
 6" conduit - 61"
 4" conduit - 47"
 2" conduit - 40"
7. Refer to detail sheet 40 for conduit locations.
8. Additional area for control cabinet when mounting remote supervisory controlled switchgear.
9. Contact company representative on where to acquire 5/8" x 10' copper clad ground rods. Ground rods to be obtained and installed by contractor. Installation depth shall be 7' - 6".
10. Contact company representative on where to acquire precast concrete pad.



**PRECAST DEEP WELL PAD
FOR 25 kV DEAD FRONT
SWITCHGEAR**

DDS-4 UG DETAIL SHEET 39 OF 58



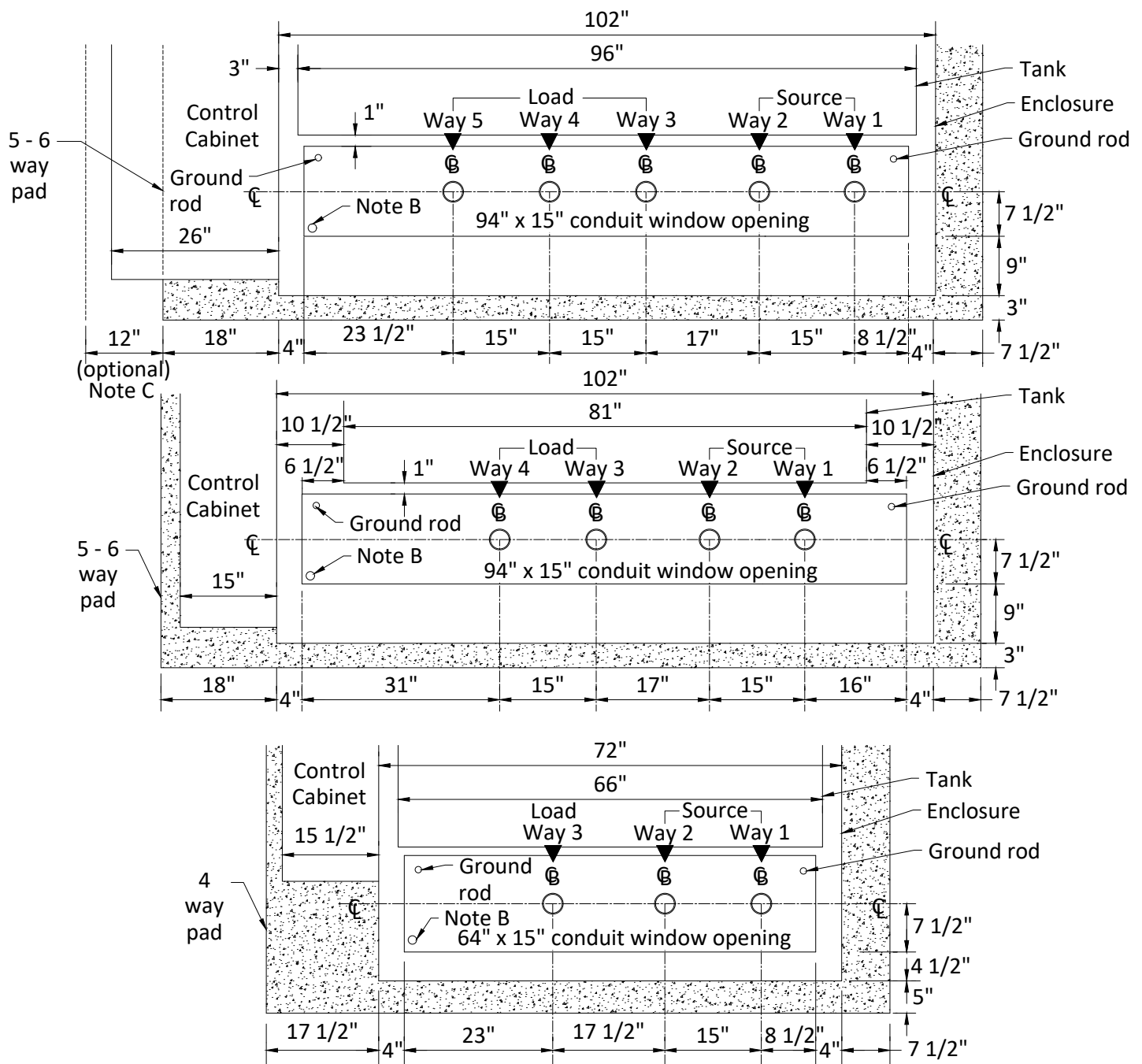
Notes:

1. Conduit shall be centered on center bushing of each switched way. If spare conduit is required, both shall be centered as shown on center bushing of switched way.
2. For pads plumbed into duct banks, install 3" communication conduit from manhole to front left corner of the conduit opening of pad.



**CONDUIT LOCATIONS
DEAD FRONT PAD MOUNT 25 kV SF6
INSULATED SWITCHGEAR
(MANUAL OPERATION)**

DDS-4 UG DETAIL SHEET 40 OF 58

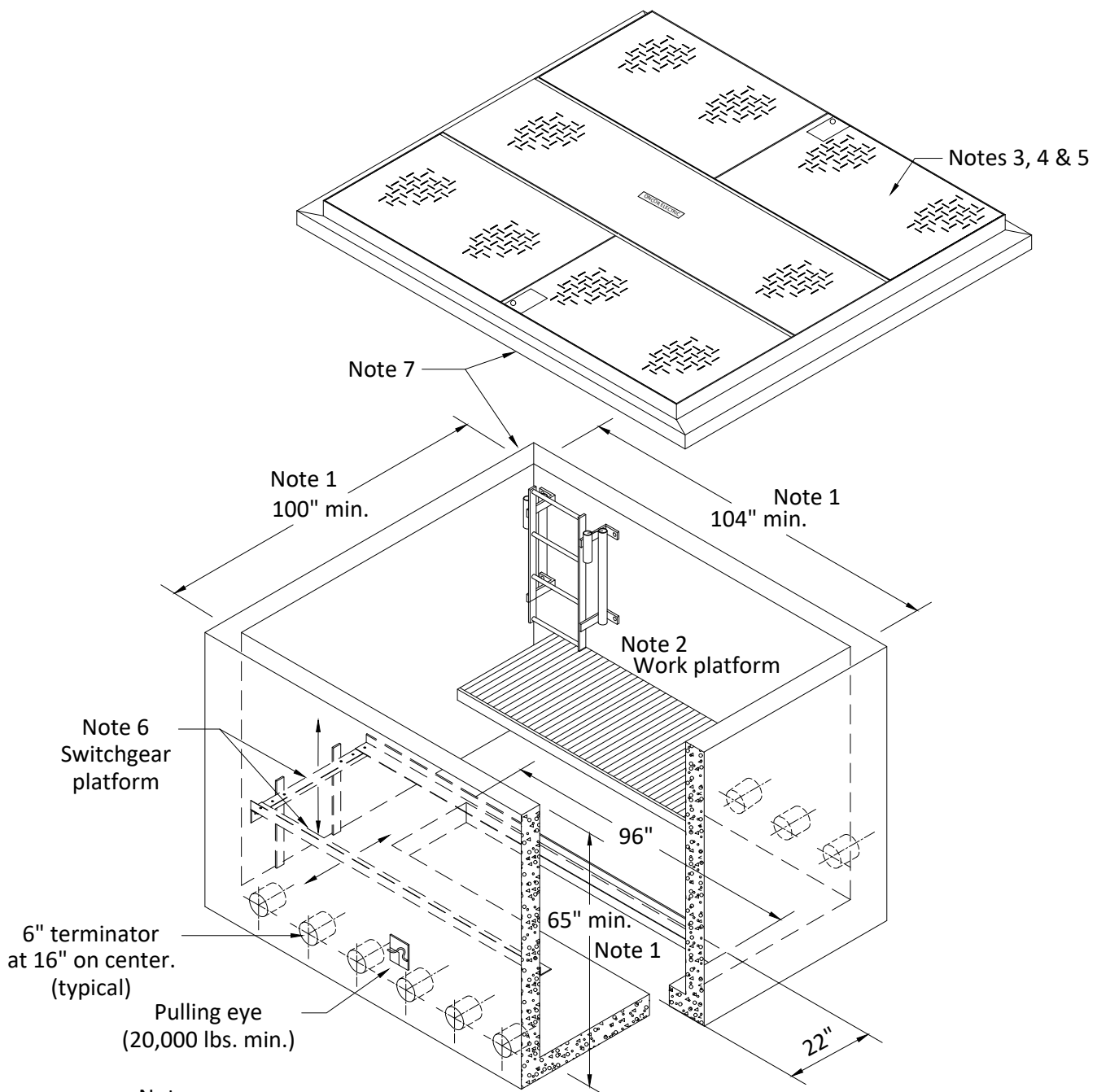


Notes:

1. Conduit shall be centered on center bushing position of each switched way. If spare conduit is required, both shall be centered as shown on center bushing position of each switched way.
2. For pads plumbed into duct banks, install one 3" communication/control conduit from the manhole to front left corner of the conduit window opening of the pad.
3. To better protect the oversized control cabinet from damage, field pour a concrete pad extension a minimum of 12" x 75" x 6" and dowel into the precast pad approximately every 12" to prevent separation.



**DEAD FRONT PAD MOUNT
25 kV SF6 INSULATED SWITCHGEAR
(RSC OPERATION)**



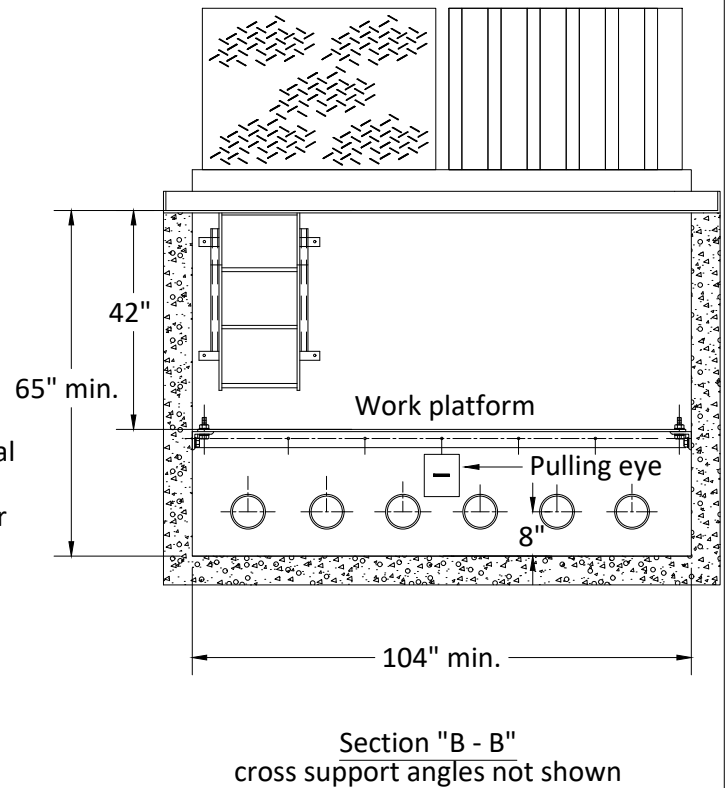
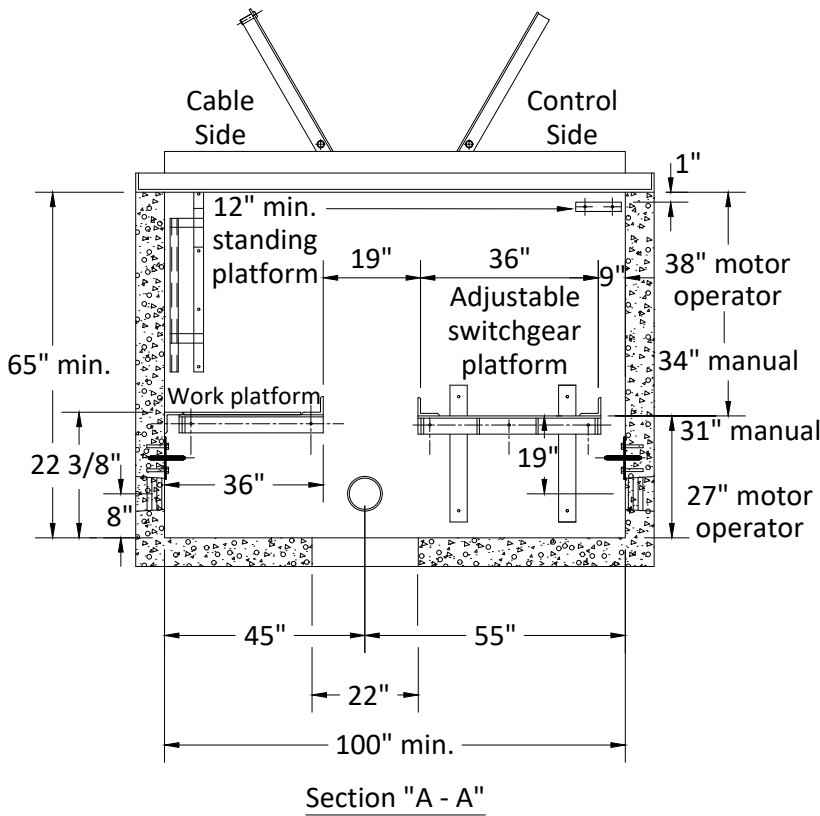
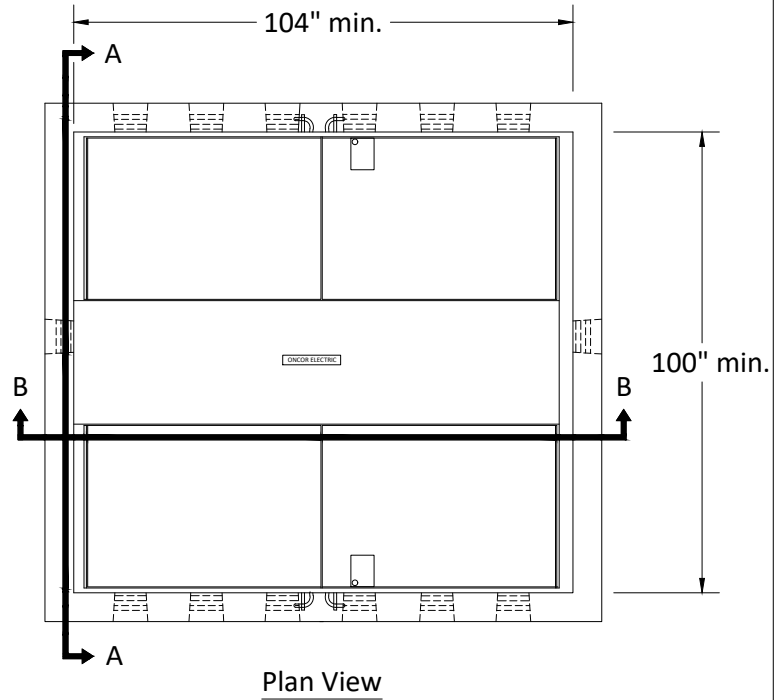
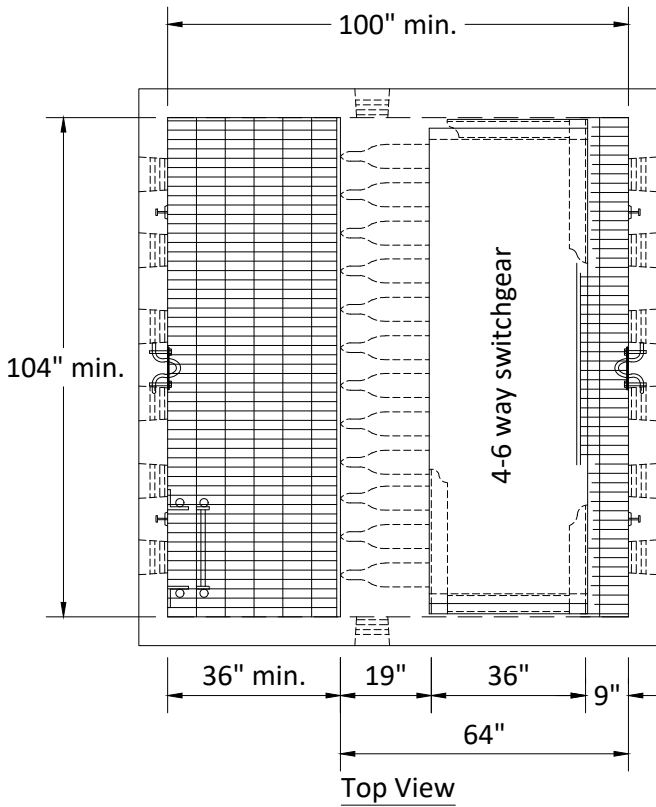
Notes:

1. All dimensions shown are minimum inside measurements. Contact distribution standards for actual mfg. dimensions.
2. Ladder, platforms, support angles and cover are pre-installed.
3. Steel diamond plate torsion assisted covers.
4. Vertical loads to cover shall not exceed 16,000 lbs. live wheel weight.
5. Vaults shall not be installed in locations designated accessible by vehicular traffic.
6. Adjustable switchgear platform for 4 - 6 way switchgear.
7. For clearances on all sides of the switchgear see detail sheets 49, 50, 51 and 52.
8. Contact company representative on where to acquire 5/8" x 10' copper clad ground rod. Ground rod to be obtained and installed by contractor. Installation depth shall be 7' - 6".
9. Contact company representative on where to acquire precast vault.



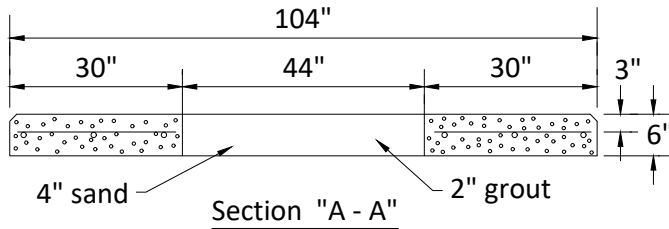
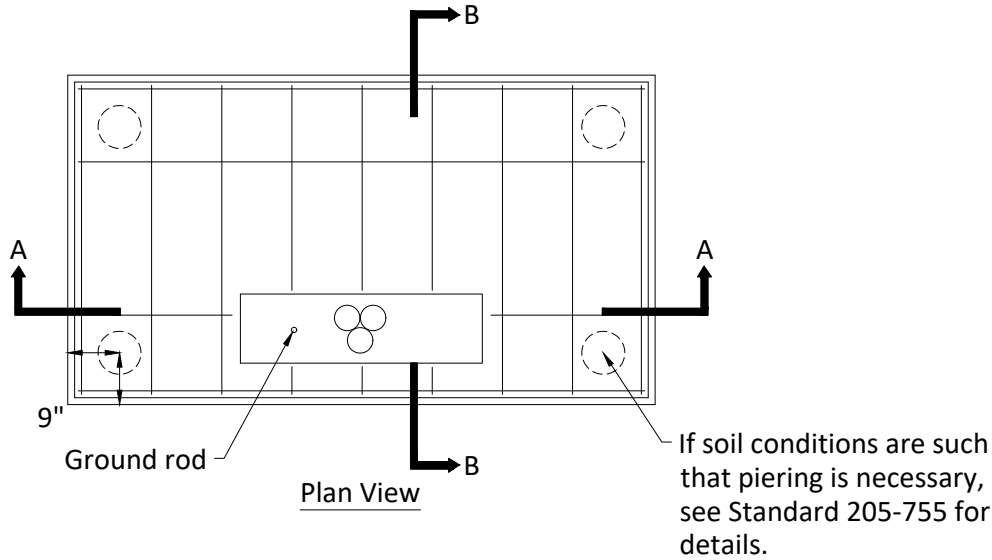
**PRECAST VAULT FOR
SUBSURFACE DEAD FRONT
SWITCHGEAR**

DDS-4 UG DETAIL SHEET 42 OF 58

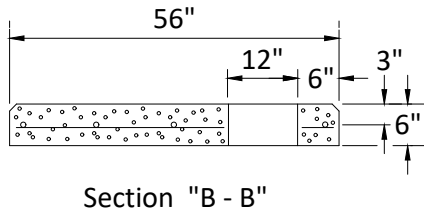


**PRECAST VAULT FOR
SUBSURFACE DEAD FRONT
SWITCHGEAR**

DDS-4 UG DETAIL SHEET 43 OF 58



Reinforcement spacing: approx. 12" center to center



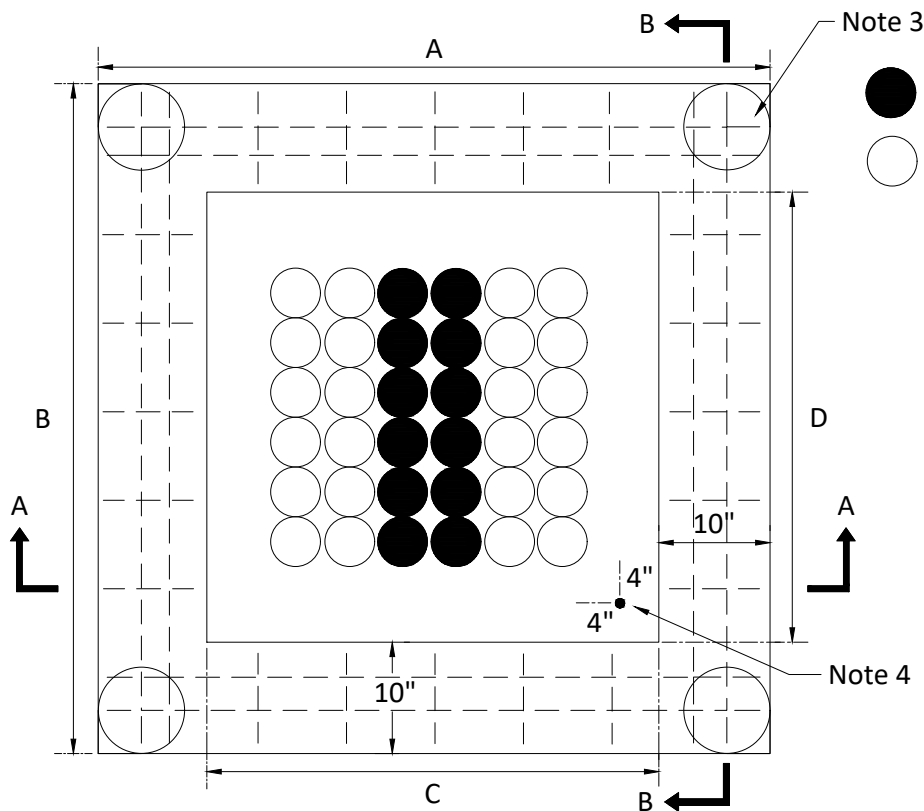
Reinforcing Schedule Pad without Beams		
Number of #3 bars	Length	Weight (lbs.)
6	52"	9.8
4	100"	12.5
3	32"	3.0
3	4"	0.4
2	27"	1.7

Approximately 1/2 cu yards of concrete



**CAST-IN-PLACE PAD
THREE-PHASE PRIMARY FEEDTHROUGH
200 A DEAD FRONT SECTIONALIZER**

DDS-4 UG DETAIL SHEET 44 OF 58

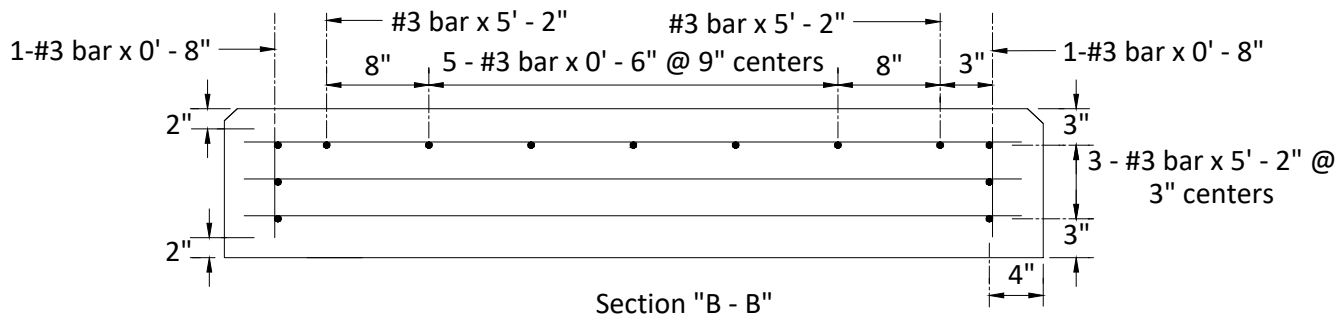
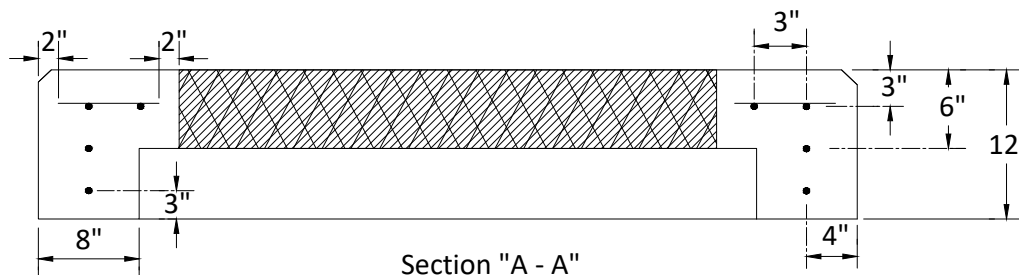


● Company owned conduits - as needed - always in the middle
 ○ Customer owned conduits - as needed

Enclosure	Dimensions			
	A	B	C	D
Opening Size				
54" x 54"	66"	66"	46"	46"

Reinforcing Schedule 66 x 66		
Number of #3 bars	Length	Weight (lbs.)
16	62"	31.1
20	6"	3.8
4	8"	1.0

0.53 cu yards concrete
 Total weight of pad: 2,170 lbs.



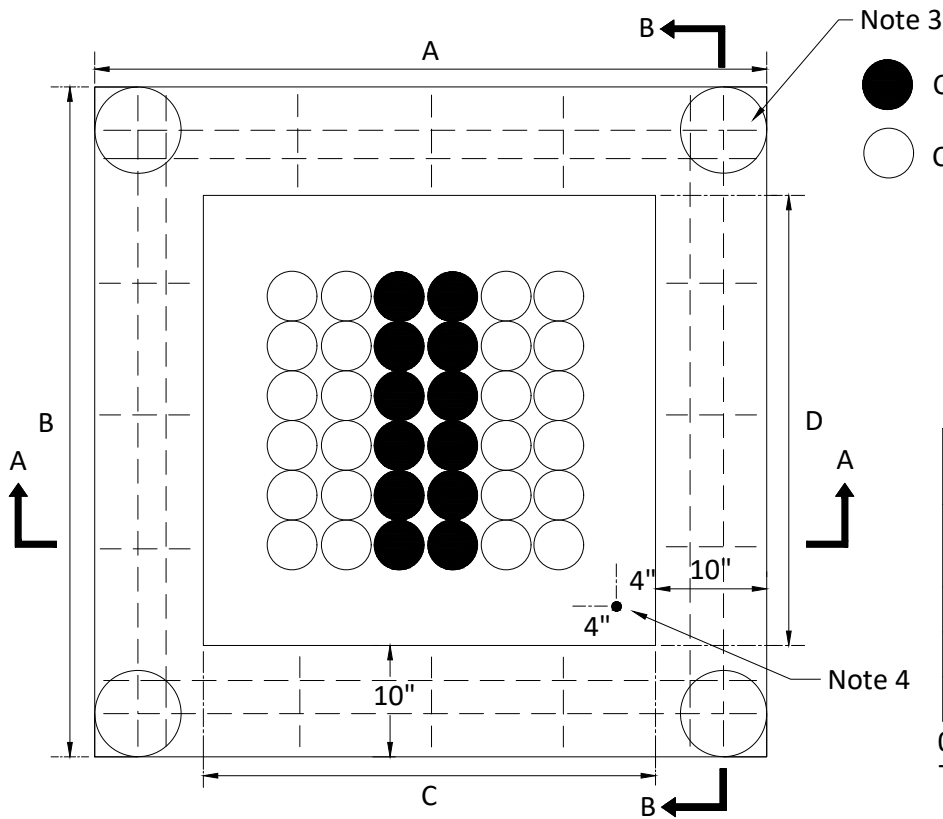
Notes:

1. See sheet 47 for enclosure details.
2. Conduit configuration will depend on quantity and size of conduits.
3. Piers shall be installed on all pads. Reference sheet 21 for pier detail.
4. Contractor to obtain and install (1) 5/8" x 8' copper ground rod as shown. Installation depth shall be 7' - 6".
5. Reference sheet 19 for additional notes.



**PAD DETAILS FOR
 54" X 54"
 SECONDARY ENCLOSURE**

DDS-4 UG DETAIL SHEET 45 OF 58



Note 3

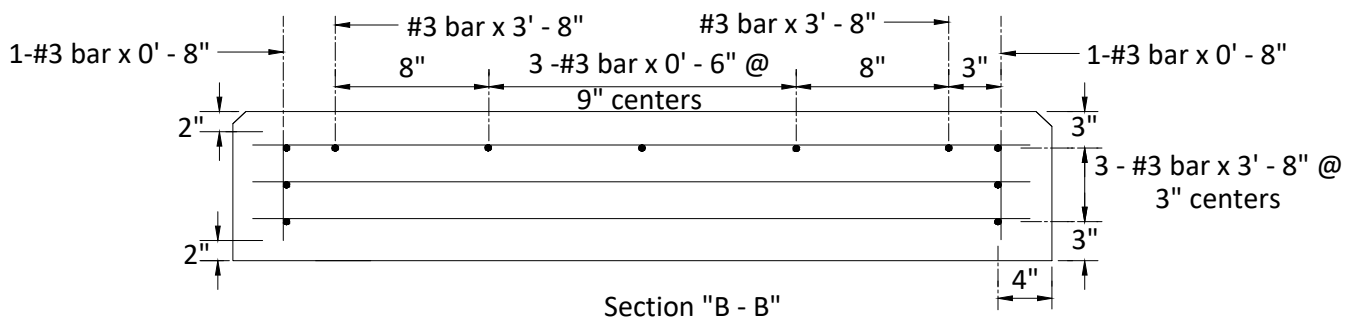
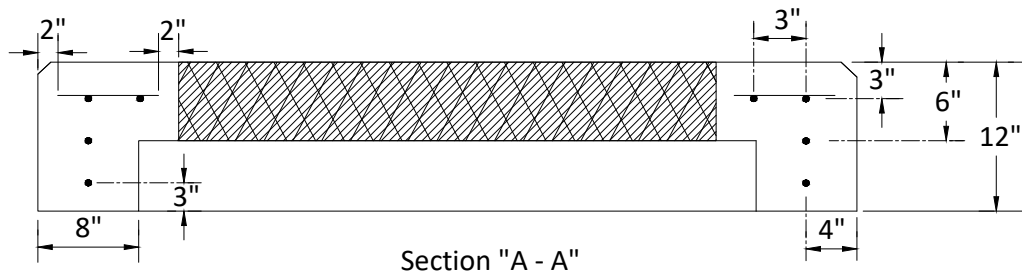
● Company owned conduits - as needed - always in the middle

○ Customer owned conduits - as needed

Enclosure Opening Size	Dimensions			
	A	B	C	D
36" x 36"	48"	48"	28"	28"

Reinforcing Schedule 48 x 48		
Number of #3 bars	Length	Weight (lbs.)
16	44"	22.1
12	6"	2.2
4	8"	1.0

0.36 cu yards concrete
Total weight of pad: 1,485 lbs.



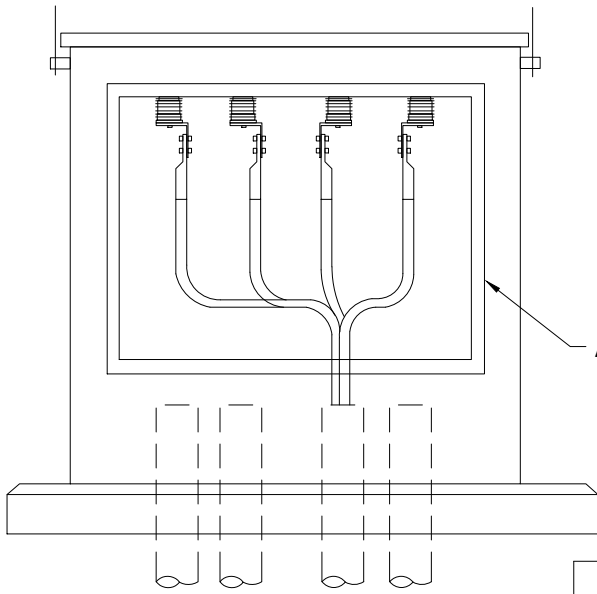
Notes:

1. See sheet 47 for enclosure details.
2. Conduit configuration will depend on quantity and size of conduits.
3. Piers shall be installed on all pads. Reference sheet 21 for pier detail.
4. Contractor to obtain and install (1) 5/8" x 8' copper ground rod as shown. Installation depth shall be 7' - 6".
5. Reference sheet 19 for additional notes.

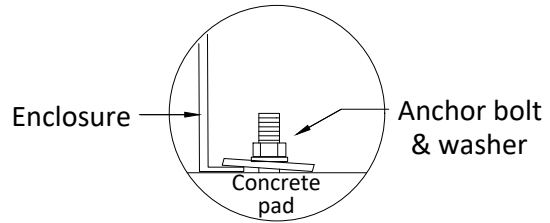


**PAD DETAILS FOR
36" X 36"
SECONDARY ENCLOSURE**

DDS-4 UG DETAIL SHEET 46 OF 58



Front View

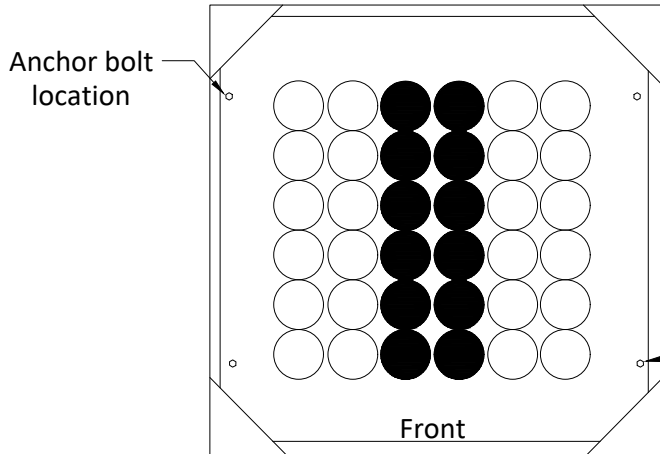
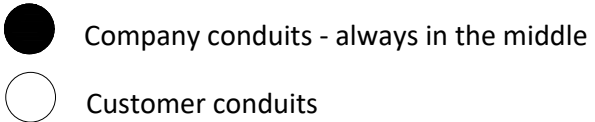


Anchor Bolt Detail

Access doors on front and rear

Specifications			
Size	Normal Rating	Center Tap Rating	Sets of Holes
36 x 36	2000 amps	3500 amps	16
54 x 54	3600 amps	6300 amps	24

Examples of Conduit Arrangement



Top View

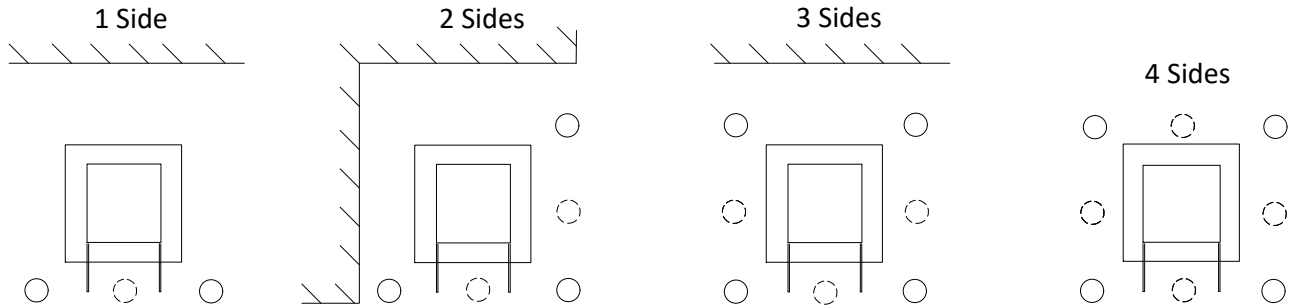
Notes:

1. When installing near a transformer, make sure there is at least 5' of clearance from the front and rear of enclosure and transformer and 3' of clearance on each side.
2. See sheets 45 and 46 for pad details.

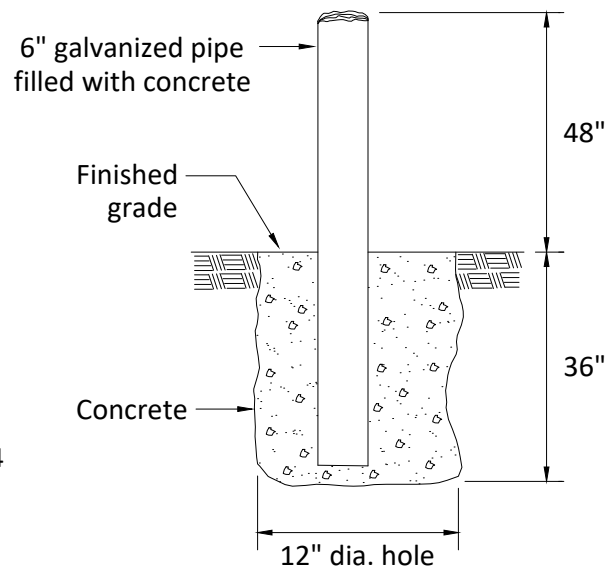
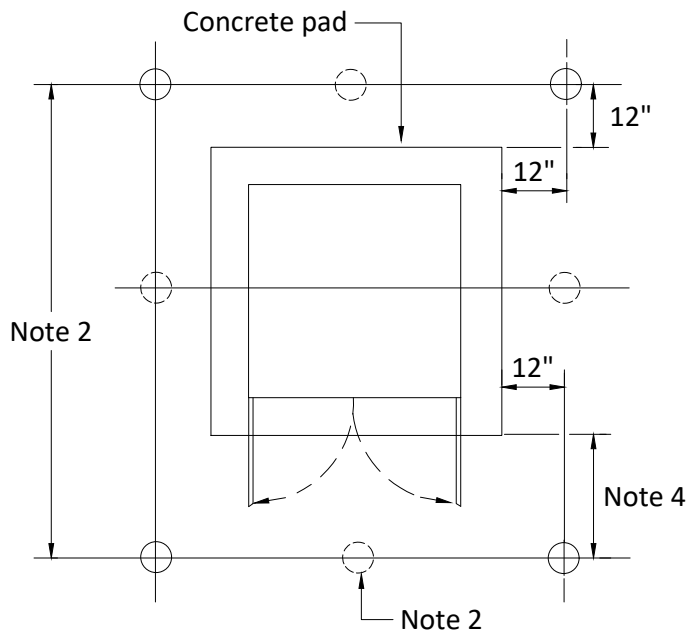


**THREE-PHASE
PAD MOUNTED
SECONDARY ENCLOSURE**

DDS-4 UG DETAIL SHEET 47 OF 58



Typical Layout for Traffic and Parking

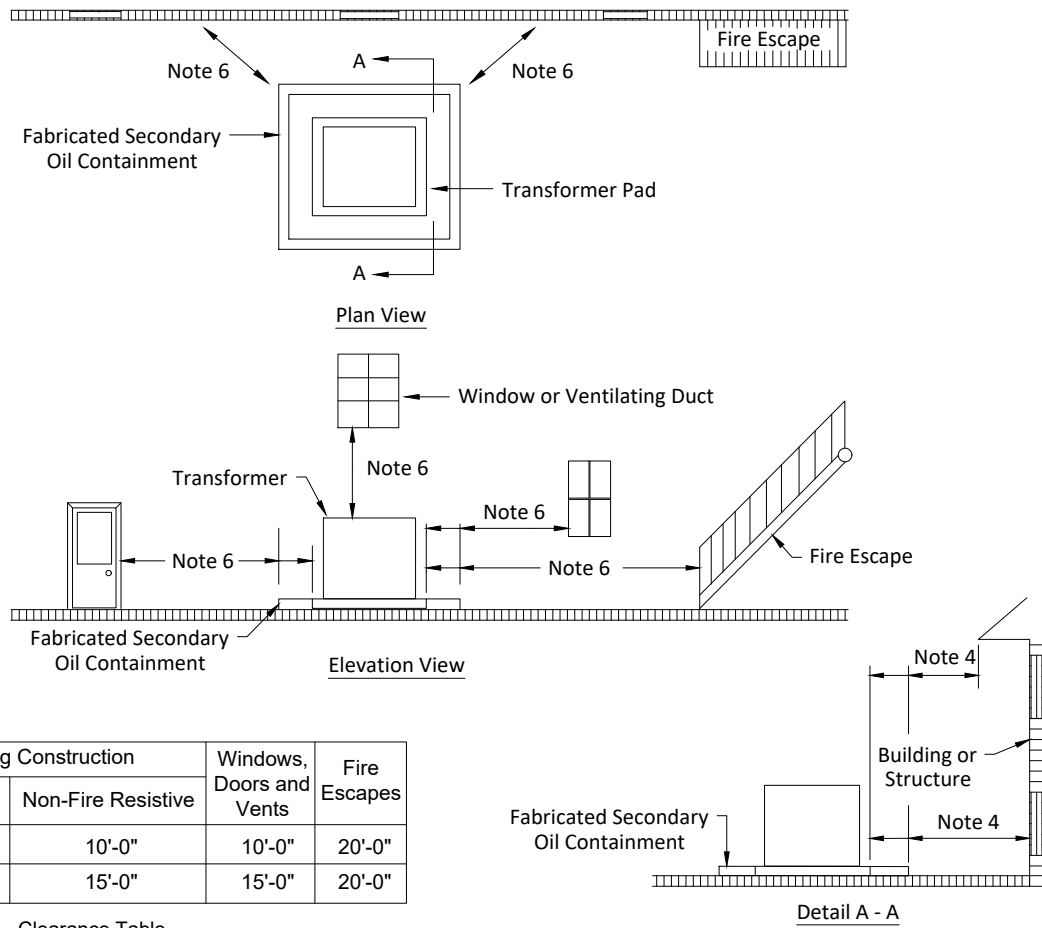


Notes:

1. Install guard post where protection from damage due to vehicular traffic is needed.
2. Distance between posts should not exceed 4'. Add additional posts where necessary to meet this condition. Verify location of post in front of transformer to allow for door opening (or removable post can be installed to achieve clearance).
3. Increase height to 48" and depth to 36" in truck loading areas, and increase size to 6" galvanized pipe.
4. This distance to be large enough to allow full opening of all equipment door(s). Contact company representative to verify dimension.



GUARD POST INSTALLATION



Transf. Type	Building Construction		Windows, Doors and Vents	Fire Escapes
	Fire Resistive Note 5	Non-Fire Resistive		
1 Phase	5'-0"	10'-0"	10'-0"	20'-0"
3 Phase	5'-0"	15'-0"	15'-0"	20'-0"

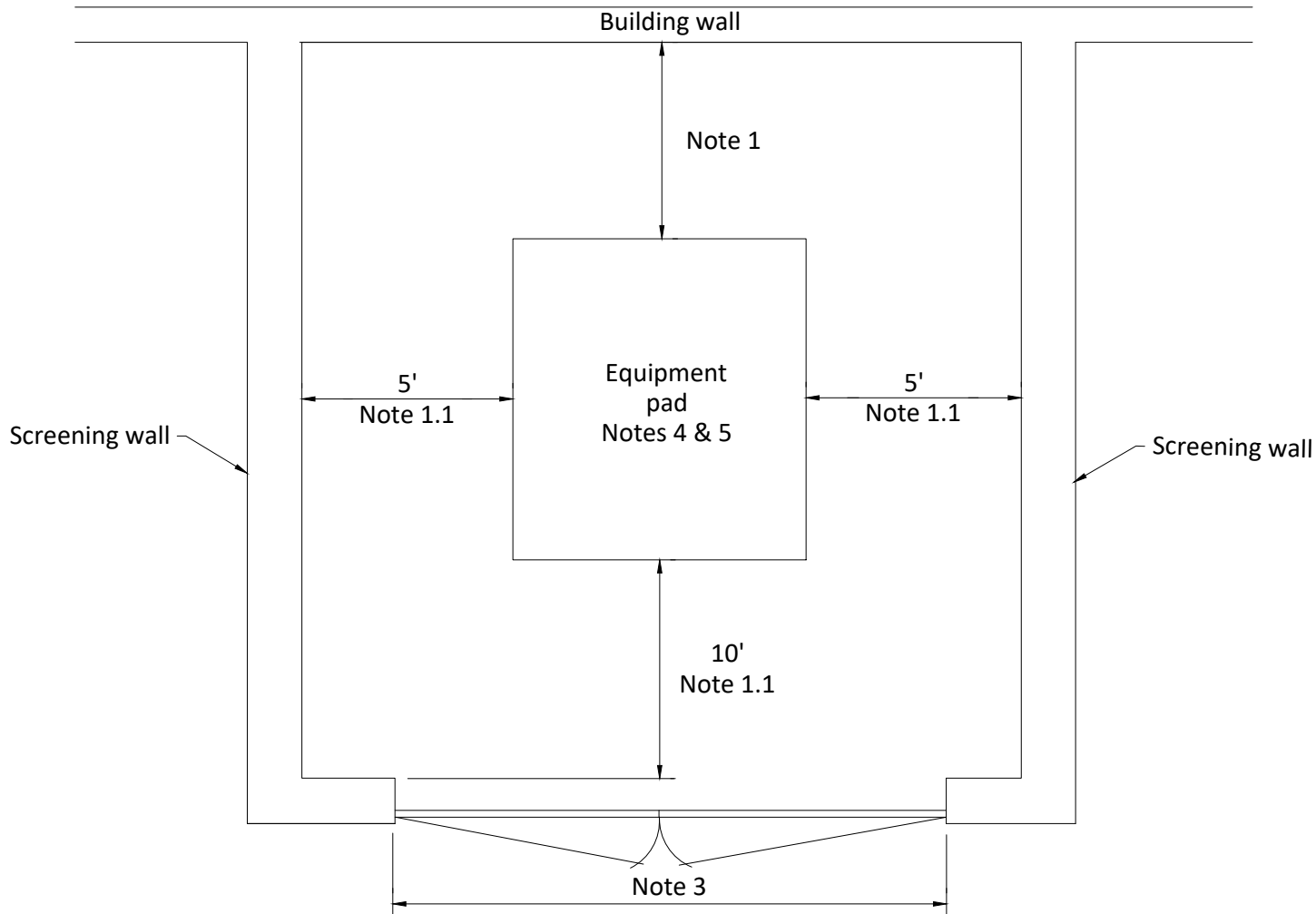
Clearance Table

Notes:

1. All clearances shall comply with the clearance table. All dimensions specified are minimal dimensions.
2. Oncor facilities shall not be installed over underground parking garages or similar building structures, located 10' or less below ground level, unless the Oncor facilities are installed in an Oncor approved vault.
3. Oncor facilities shall not be installed under any building extents (eaves, overhangs, balconies, etc) unless the Oncor facilities are installed in an Oncor approved vault.
4. If the building has an extent, the building's reference point for measuring clearances is based on the height of the extent. Where the extent is 35' or more above ground level, clearances shall be measured horizontally from the building wall to the edge of the equipment pad or oil containment, if used. Where the extent is less than 35' above ground level, clearances shall be measured horizontally from the building extent's drip-line to the edge of the equipment pad or oil containment, if used.
5. To meet the fire-resistant dimensions, all material including building extents must meet a minimum 2-hour fire rating. Exception, if the extent is located 35' or more above ground level, only the wall is required to meet the 2-hour fire rating.
6. Clearance to building doors, windows, vents and fire escapes shall be measured radially from closest point of the Oncor equipment or oil containment, if used.
7. If hot stick use is required on operating side of pad mounted equipment, a 10' minimum clearance shall be maintained.
8. There should not be any ground level obstructions, such as, but not limited to, dedicated parking places, shrubs, cooling towers, gas meters, fencing, etc. within 10' of the operating side of the equipment or 5' from the non-operating side of the equipment.
9. Liquid flow in the immediate area surrounding Oncor transformers should be away from buildings. Where the ground is flat or slopes toward buildings, a fabricated secondary oil containment sufficient to contain all transformer oil for transformers 500 kVA and larger shall be provided.
10. There shall not be any piping or conduit under the pad, except mutually agreed upon communication conduits entering the transformer.



**CLEARANCES OF
PAD MOUNTED TRANSFORMERS
FROM BUILDINGS**



Notes:

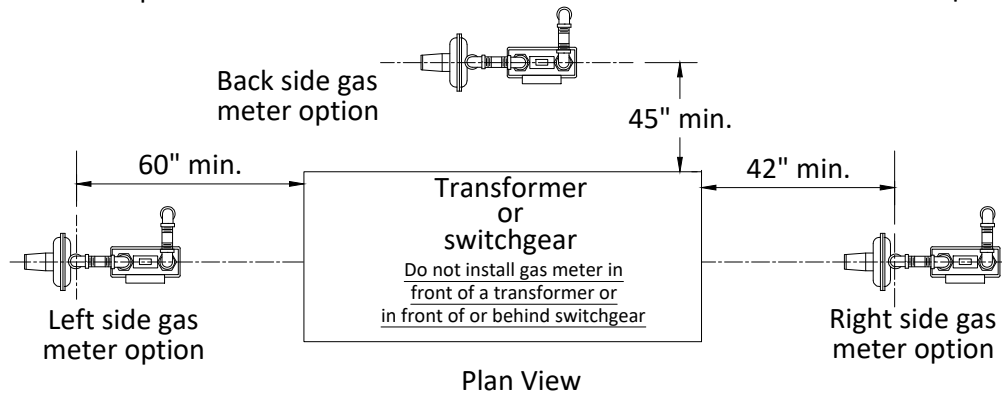
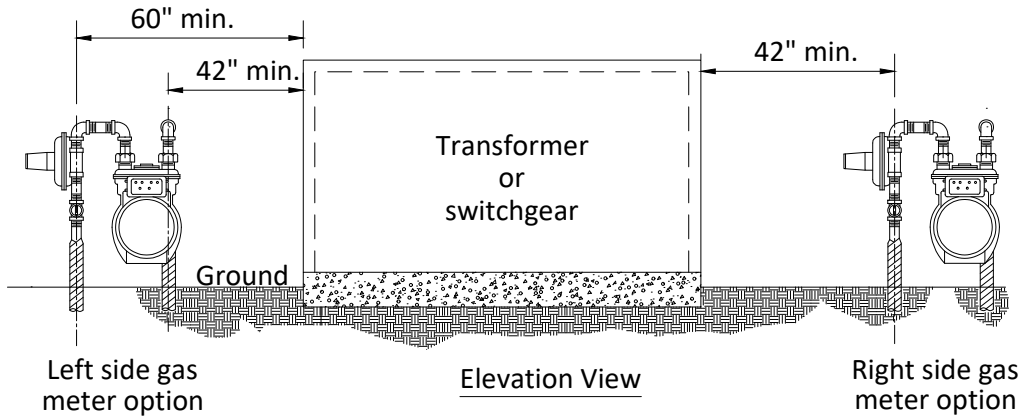
1. Clearances to building walls shall be the greater of:
 - 1.1. Clearances listed in detail sheet 49 for oil filled equipment,
 - 1.2. 10' if hot stick use is required on this side of equipment, or
 - 1.3. 5' if hot stick use is not required on this side of equipment.
2. A minimum of 5' clearance is allowed if "hot stick" is not required.
3. Gate shall open outward and the width shall be no less than 10'.
4. Where ground is flat or slopes toward building, a dike sufficient to contain all oil for transformers 500 kVa and larger shall be provided. Reference detail sheet 49.
5. When transformers are installed, screening walls shall provide adequate ventilation.



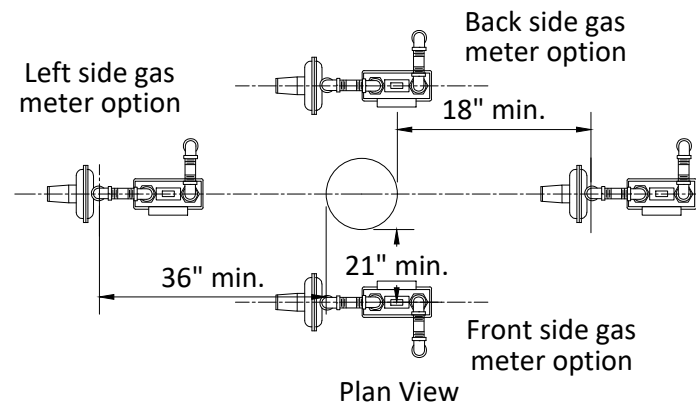
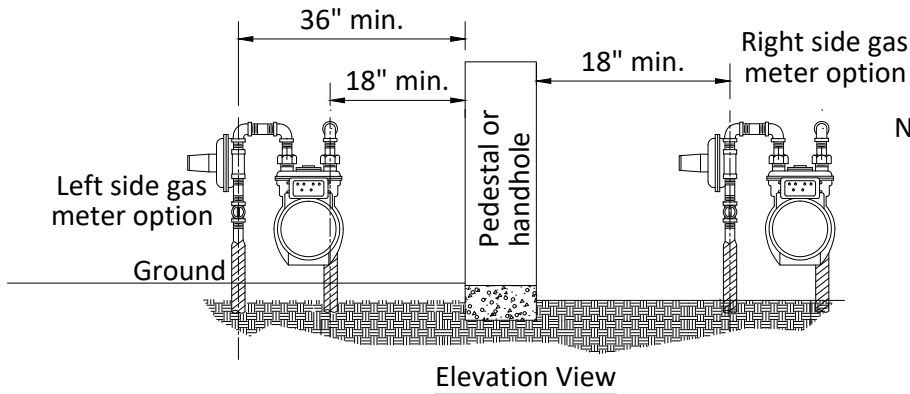
**CLEARANCES AROUND
PAD MOUNTED EQUIPMENT**

DDS-4 UG DETAIL SHEET 50 OF 58

Transformer Clearance Details



Pedestal Clearance Details



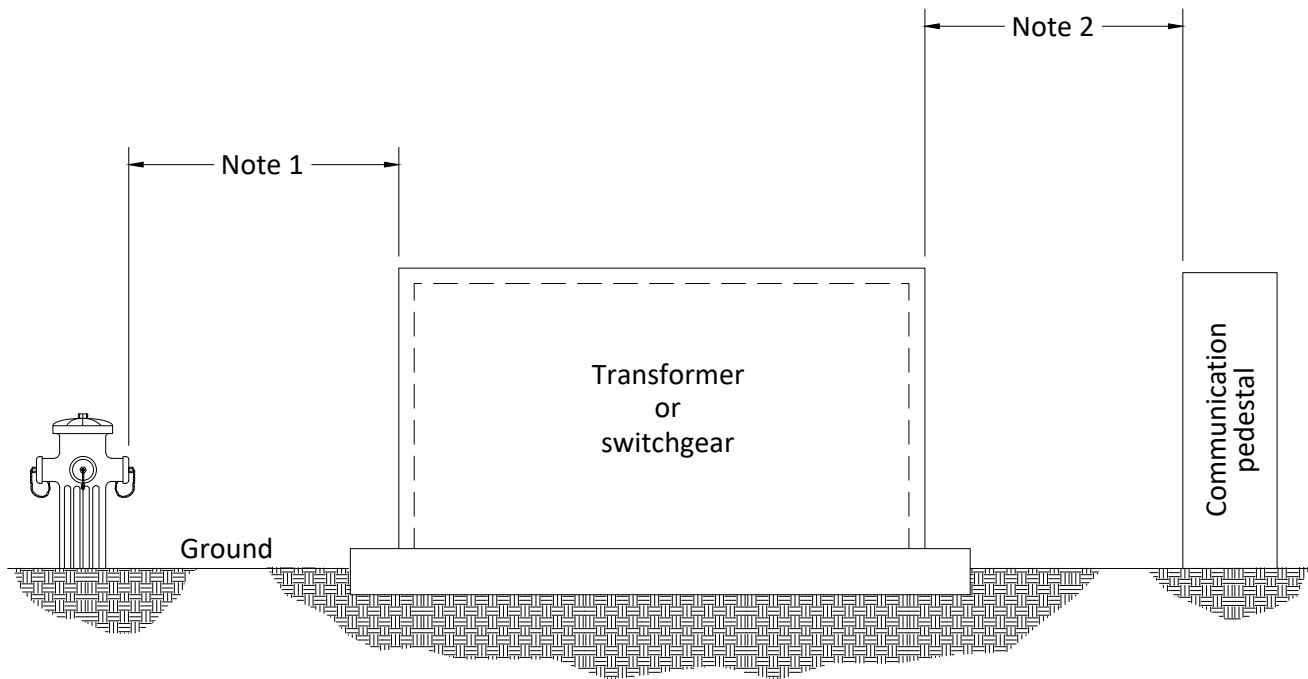
Notes:

1. Measurements are referenced from the inlet gas riser.
2. The measurements will ensure:
 - 2.1. That a minimum clearance of 36" is attained between the entire gas meter installation and the pad mounted equipment and
 - 2.2. That a minimum clearance of 12" is attained between the entire gas meter installation and all other aboveground facilities including electric and other utility pedestals and handholes.
3. This standard applies to 630 gas meter installations and smaller. For larger meter installations, contact company representative for assistance.
4. This drawing is typically used when the gas main is located in an alley or dedicated utility easement.



**ABOVEGROUND CLEARANCES
FROM GAS METER INSTALLATIONS**

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Notes:

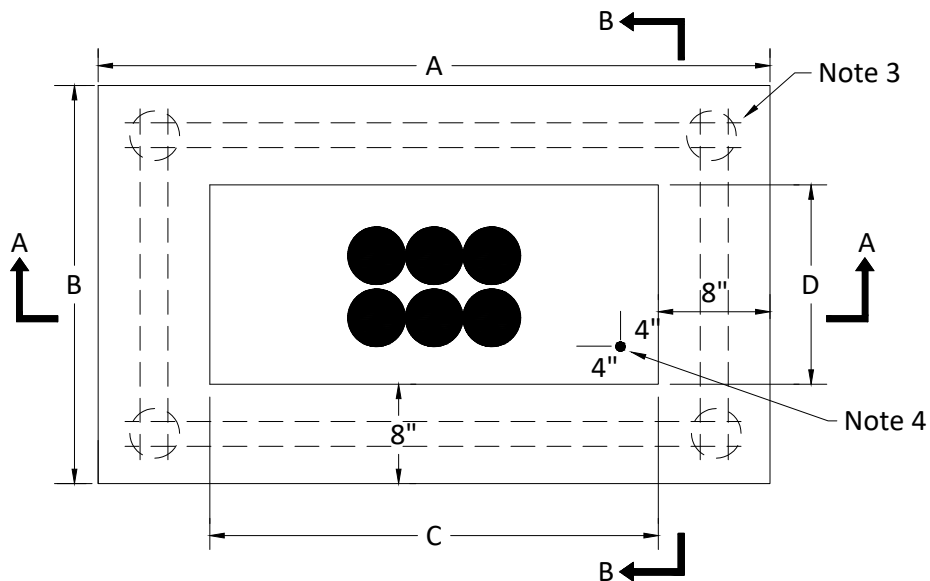
1. Pad mounted equipment, pedestals and other above ground enclosures should be located not less than 4' from fire hydrants. Where conditions do not permit a clearance of 4', a clearance of not less than 3' is allowed.
2. All above ground metallic power and communication equipment (pedestals, transformer cases, apparatus cases, etc.) that are separated by a distance of 6' or less shall be bonded. Reference detail sheet 14 for method for providing utility company equipment ground.



**CLEARANCES OF ABOVEGROUND
EQUIPMENT - FOREIGN UTILITIES
ENCLOSURES AND EQUIPMENT**

DDS-4 UG DETAIL SHEET 52 OF 58

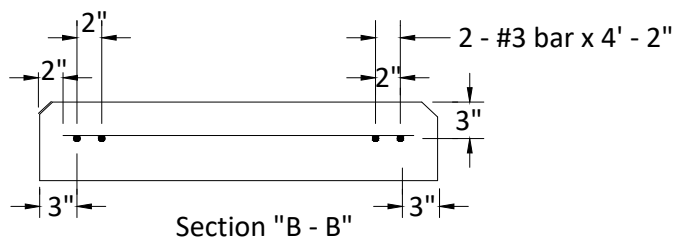
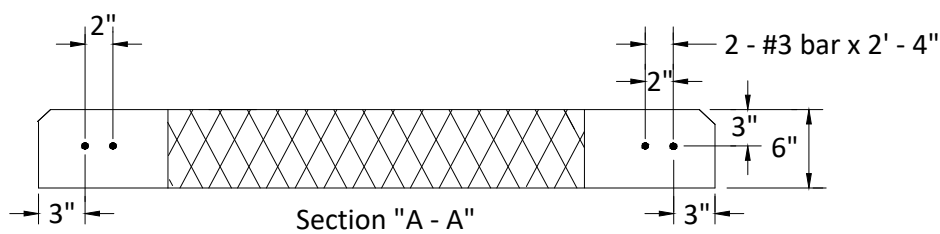
● Source conduits, as required, typically in the middle



Enclosure Size	Dimensions			
	A	B	C	D
44" x 24"	54"	32"	38"	16"

Reinforcing Schedule		
Number of #3 bars	Length	Weight (lbs)
4	50"	6.3
4	28"	3.5

0.15 cu yards concrete - pad
 0.065 cu yards concrete - piers
 Total weight of pad: 583 lbs.
 Total weight of piers: 262 lbs.

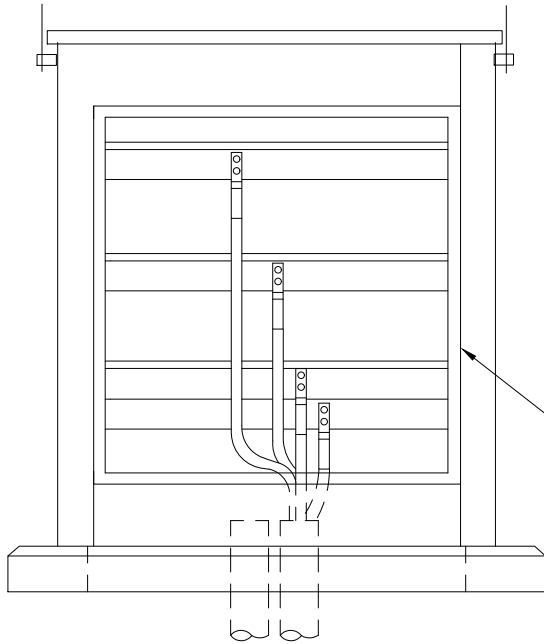


Notes:

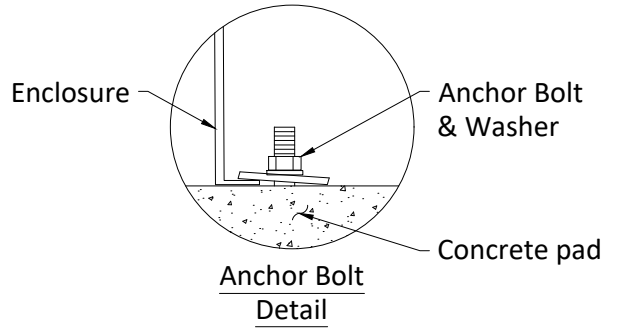
1. See sheet 54 for enclosure details.
2. Conduit configuration will depend on quantity and size of conduits.
3. Piers should be installed on all pads to a depth of 5' unless rock or other hard surfaces are encountered. If rock or other hard surfaces are encountered prior to a 5' depth, piers should extend 6" into hard surface. Reference sheet 15 for pier detail.
4. Recommended location for 5/8" x 8' copper ground rod as shown.
5. Service enclosures, when required, are to be provided by company and installed by contractor.
6. The contractor is to provide, install and maintain (1) the pad, associated raceways and cable from the service enclosure to the pad mounted transformer and (2) cable and associated raceways from the service enclosure to the meters.



**PAD DETAILS FOR
 44" X 52" X 24"
 SERVICE ENCLOSURE**



Front View

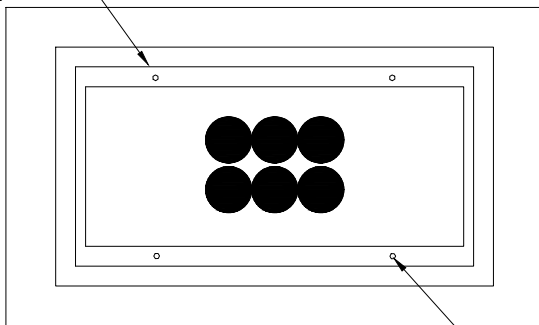


Anchor Bolt Detail

Access door

Specifications		
Center Tap Rating (A)	Sets of Set Screws	Sets of Holes
2500	30	16

Anchor bolt location



Anchor bolt location

Top View



Source conductors - always in the middle.
Load conductors shall not exit bottom.

Notes:

1. See sheet 53 for pad details.
2. Conduit configuration will depend on quantity and size of conduits.
3. Recommended location for 5/8" x 8' copper ground rod as shown.
4. Service enclosures, when required, are to be provided by company and installed by contractor.
5. The contractor is to provide, install and maintain (1) the pad, associated raceways and cable from the service enclosure to the pad mounted transformer and (2) the cable and associated raceways from the service enclosure to the meters.

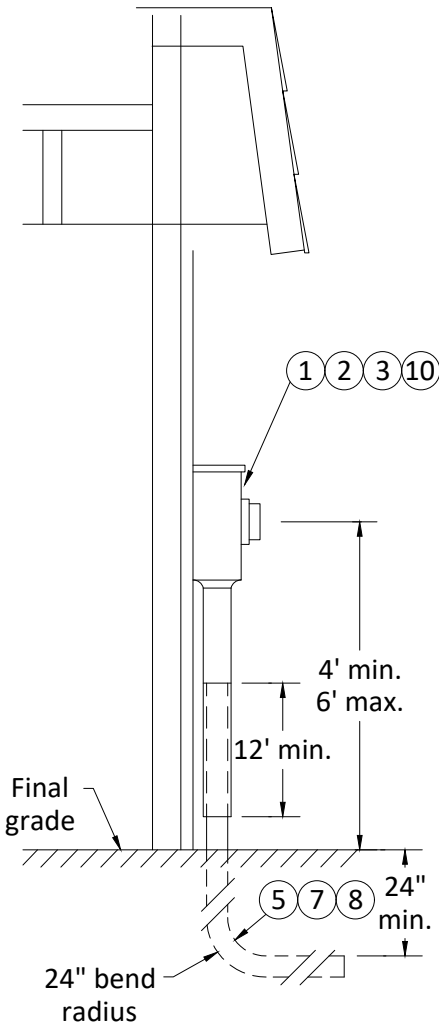


**PAD DETAILS FOR
SERVICE ENCLOSURE
44" X 52" X 24"
CUSTOMER TO INSTALL**

DDS-4 UG DETAIL SHEET 54 OF 58

UNDERGROUND THREE-PHASE AND SINGLE-PHASE SERVICE METER FOR ONE RESIDENTIAL OR ONE NON-RESIDENTIAL (ONE SECONDARY) SERVICE

FIGURE 4-B



Notes:

1. Reference the ESG, pages 48-55 for company-customer responsibility of source and load conductors and connection of these conductors.
2. Meter socket shall be provided, installed, and maintained by customer. Reference the ESG, see Table 5-C, pages 56-61 for list of approved meter sockets. Transockets, when required, shall be provided by company and installed and maintained by customer. All meter sockets (excluding transockets) require the line-side conductors to be connected to the top meter socket terminals. **Customer load conductors may not exit top half of meter socket.**
3. An insulated conduit bushing is required for raceways terminating in the meter socket. The service raceway shall not contain any conduit or other open connections.
4. Customer's ground rod conductor, #6 copper minimum shall originate in the service entrance equipment and extend to a ground rod. The ground rod conductor is permitted to be routed through the meter socket enclosure, but shall not terminate within. Company reserves the right to refuse installation of service contingent upon inspection of customer's grounding connections.
5. Reference the ESG and see 400.02, page 34 and 400.03, page 34 for company or customer responsibility for service lateral raceway installation. Schedule 40 PVC is required for company owned underground service lateral raceways. **Rigid steel, IMC, or EMT is not allowed.** Contact company representative prior to installation to determine service lateral raceway size, 2" is minimum.
6. If there is a possibility of additional customers being served from the same transformer at another location, a service disconnect is required. This only applies for instrument rated metering installations, unless prohibited by governing authority.
7. The use of flexible metallic conduit, liquid tight flexible metallic conduit, and liquid tight flexible non-metallic conduit for service entrance raceway is prohibited.
8. Service lateral conductor must enter from the BOTTOM of the meter socket, not from the side and not from the top. Service lateral conduit must be straight and inline with the meter socket with at least 3' of service lateral raceway above grade.
9. An oversized PVC conduit/raceway fitting that slips over the service lateral conduit riser is required. This fitting prevents exposure of conductors due to conduit/raceway movement due to soil expansion and contraction. Conduit inserted a minimum of 12" into the fitting.
10. Company owned service lateral conductors are installed by company and line-side (top) connections made up by company. Customer's service conductors are installed and connected in socket by customer.
11. Company recommends that customer limit to one circuit per conduit to avoid potential loading problems.

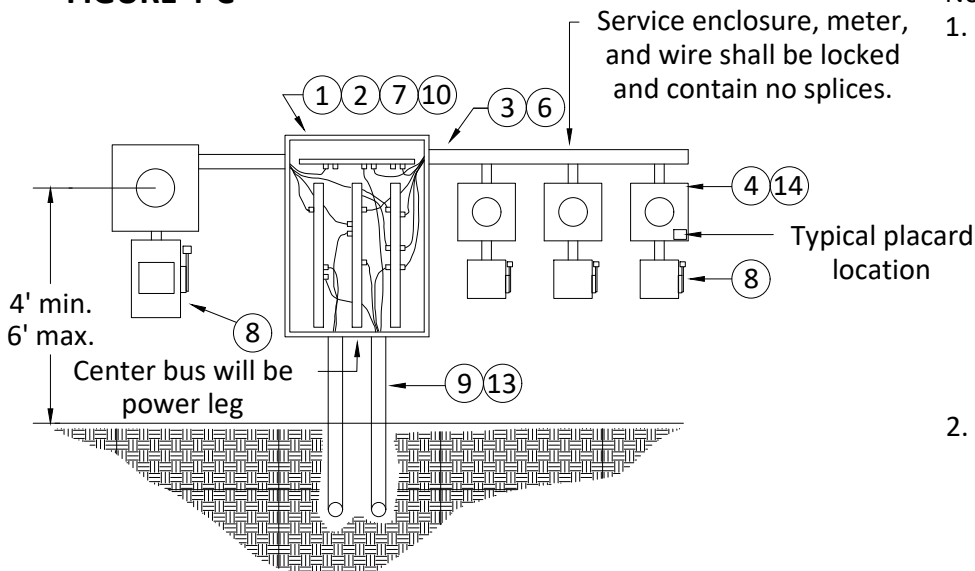


TYPICAL METER INSTALLATIONS

DDS-4 UG DETAIL SHEET 55 OF 58

UNDERGROUND SERVICE METERS, TWO OR MORE NON-RESIDENTIAL WITH SERVICE ENCLOSURE

FIGURE 4-C



Notes:

1. A service enclosure (reference the ESG and see 500.08, page 47) for Secondary Service installations through 2500 amperes and two or more meter sockets are required. Service enclosure shall be installed by customer on outside wall of building. Contact company for determination of service enclosure requirements. For duplex and multifamily installations, reference the ESG and see Figure 5-F, page 67.
2. Load conductors to meter sockets to be connected equally on both ends of bus bars to obtain full current rating of bus bars. Line conductors shall be connected to center of bus bars.

3. Conductors, gutters and raceways provided, installed and maintained by customer. Company locks or seals may be required.
4. Meter sockets shall be provided, installed and maintained by customer. Transockets, when required, shall be provided by company and installed by customer. Company locks or seals will be installed at each meter socket. Reference the ESG, see Table 5-C, pages 56-61 for list of approved meter sockets.
5. For use on service voltages through 480V.
6. Service entrance conductors to be continuous from meter sockets to service enclosure.
7. Refer to ESG, pages 48-55 for connector/conductor responsibility in service enclosures. Approved connectors, plated .375" minimum diameter bolts, Belleville washers, and oxide inhibitor are required for connections to plated aluminum bus.
8. Instrument rated service to a non-residential structure must be equipped with a disconnecting means installed on the load-side of the instrument rated metering equipment where the metering equipment is installed on a customer structure, unless prohibited by local governing authority. Service disconnect switches and breakers are both acceptable for use as the disconnecting means. The disconnecting means must have provision for a company lock. The disconnecting means must be readily accessible by company and within 3' of the meter. A 4" minimum clearance from the service disconnect switch operating lever is required. Customer must receive company approval of electrical design and/or nonstandard equipment or locations prior to installation of equipment.
9. For service lateral installation refer to the ESG and see 400.02, page 34. The service raceway shall not contain any conduit or other open connections.
10. For underground services, the bottom section of the enclosure shall be reserved for the line-side conductors. Load side conductors are not permitted to exit bottom.
11. If there is a possibility of additional instrument rated installations being served from the same transformer at another location, a service disconnect is required.
12. Insulated conduit bushings are required for raceways terminating in the meter socket.
13. The use of flexible metallic conduit, liquid tight flexible metallic conduit, and liquid tight flexible non-metallic conduit for service entrance raceway is prohibited.
14. Schedule 40 PVC is required for company owned underground service lateral raceways. **Rigid steel, IMC, or EMT is not allowed.**
15. Each socket must be clearly and permanently marked as indicated in 500.11, refer to the ESG, page 47.

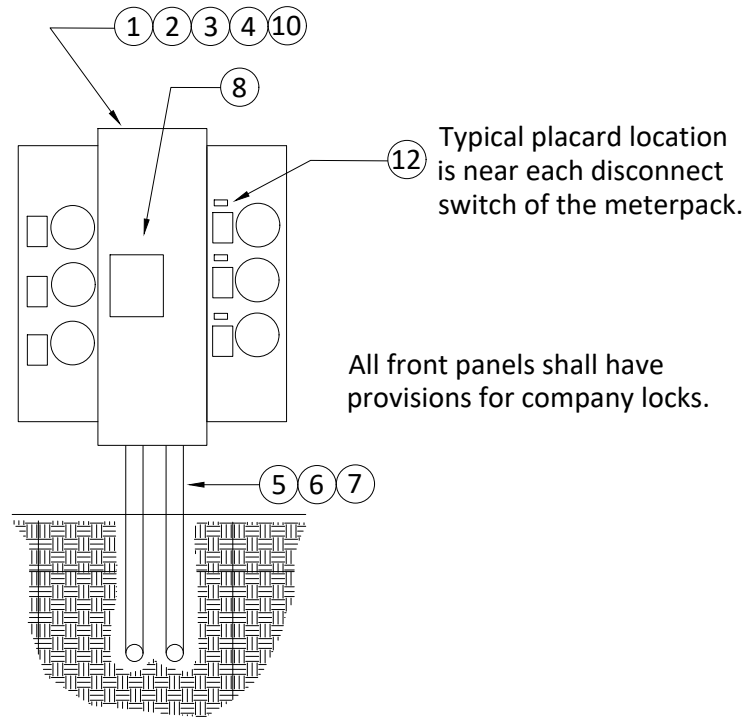


**TYPICAL METER INSTALLATIONS
(CONT.)**

DDS-4 UG DETAIL SHEET 56 OF 58

UNDERGROUND SERVICE METER PACK, MULTI-METER INSTALLATION

FIGURE 4-D



Notes:

1. A meter pack, installed by customer on outside wall of building for Secondary Service installations for two or more meter sockets, may be installed in lieu of a service enclosure. **Contact company for approval of meter packs prior to letting bids and installing equipment.** For multifamily installations, reference the ESG, see Figure 5-F, page 67.
2. Meter packs provided, installed, and maintained by customer.
3. Refer to the ESG, pages 48-55 for connector/conductor responsibility in meter pack.
4. When utilizing meter packs to serve Secondary Service customers, lever-operated bypass mechanisms are required for each individual meter socket.
5. If 7 or more meters are able to be installed, a service disconnect must be used on the line side of the meter pack. Check with city for additional requirements.
6. All meter packs must be ringless.
7. For service lateral installation refer to the ESG and see 400.02, page 34. The service raceway shall not contain any conduit or other open connections.
8. The use of flexible metallic conduit, liquid tight flexible metallic conduit, and liquid tight flexible non-metallic conduit for service entrance raceway is prohibited. The service raceway may not contain any conduit or other open connections.
9. Schedule 40 PVC is required for company owned underground service lateral raceways. **Rigid steel, IMC, or EMT is not allowed.**
10. Meter packs with meter stacks up to 5 meters tall will be permitted under certain conditions. Maximum mounting height is 72" to the center of the top meter socket. For meter stacks that have 5 vertical positions, a permanent hard surface extending a minimum of 24" in front of the meter pack and the width of the meter pack is required. Contact company for details.
11. **It is the customer's responsibility to determine local code requirements concerning meter packs with main switches or main circuit breakers prior to installing equipment.**
12. Each socket must be clearly and permanently marked as indicated in 500.11, refer to the ESG, page 47. Apartment or Location placards shall be mounted on meter pack adjacent to the tenant breaker, as an alternate mounting position. Screws and rivets are not allowed to attach placards.

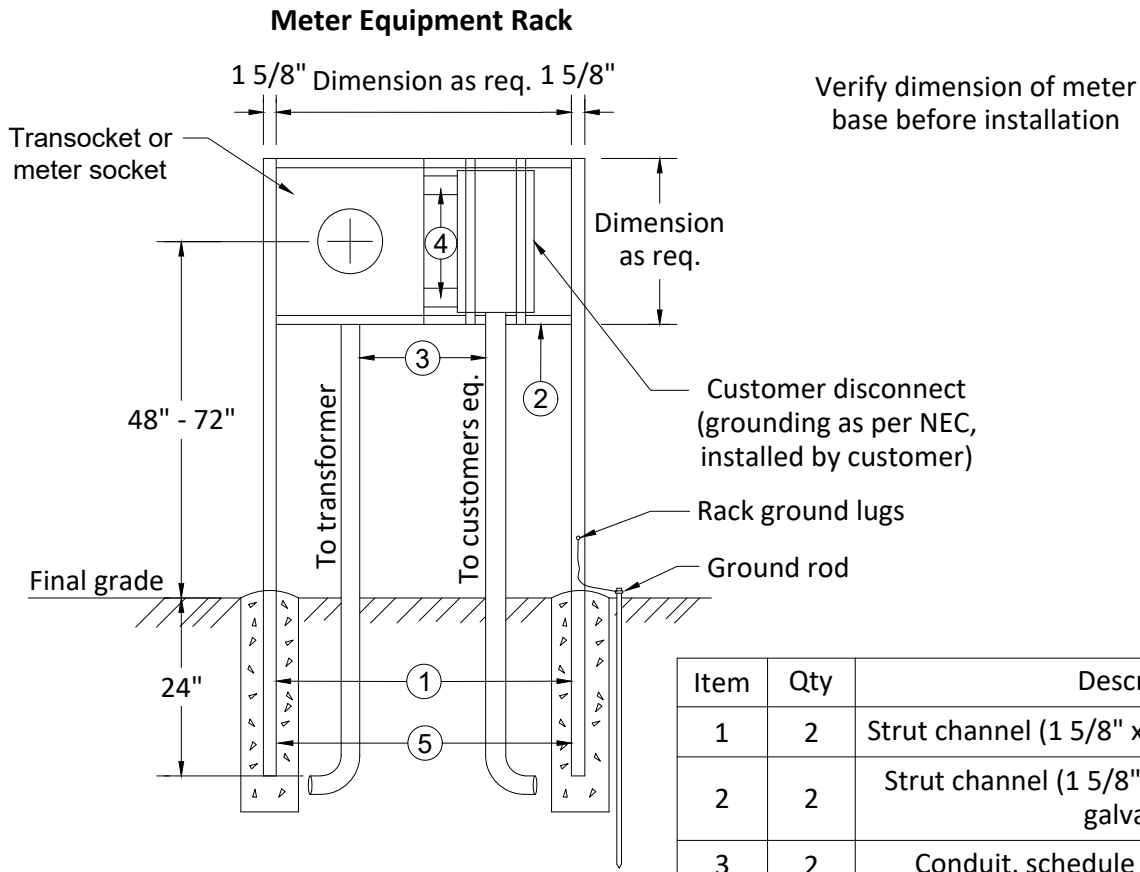


TYPICAL METER INSTALLATIONS
(CONT.)

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UNDERGROUND SERVICE, METER RACK

FIGURE 4-E



Item	Qty	Description
1	2	Strut channel (1 5/8" x 1 5/8" x 8'), galvanized
2	2	Strut channel (1 5/8" x 1 5/8" x 1/8" x 36"), galvanized
3	2	Conduit, schedule 80 PVC, as required
4	1	Conduit, nipple, as required (lowered for meter socket - upper for transocket)
5		Concrete, as required

Notes:

1. Company owned service lateral conductors are installed by company and line-side (top) connections made up by company. Customer service conductors are installed and connected in socket by customer.
2. Meter socket, rack and conduit/risers provided, installed and maintained by customer. A 4" minimum clearance from the disconnect switch operating-lever is required. Reference the ESG, see Table 5-C, pages 58-61 for list of approved meter sockets.
3. Service lateral or source conductors provided and installed as per 400.02, refer to the ESG, page 34. The service raceway to transformer (source) may not contain any conduit or other open connections.
4. A 4' clearance is required from meter side of meter rack assembly to any obstruction or structure.
5. Customer service equipment may be installed on the meter rack assembly in accordance with all applicable codes. In unincorporated areas, contact company representative for details.
6. Customer provides, installs and maintains the ground rod conductor, #6 copper minimum and connection to a ground rod. Company reserves the right to refuse installation of service contingent upon observing an unsafe customer connection.
7. Alternate design- customer shall obtain company approval of any alternate design prior to installation. A meter pedestal is an acceptable alternate design. Contact company representative for details.



**TYPICAL METER INSTALLATIONS
(CONT.)**

DDS-4 UG DETAIL SHEET 58 OF 58