Section S22

Underground Conduit Standard

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For Conduit Inspections

Call 407-933-7777 Extension 6604

Underground Conduit Installation Standards

1.0. General Notes:

Per the policies of the Kissimmee Utility Authority, all underground distribution systems shall be installed in gray Schedule 40 PVC, gray Schedule 80 PVC, gray HDPE, gray restrained-joint, and/or galvanized rigid steel conduit. Every installation must comply with the National Electric Safety Code (NESC), latest edition. The complete conduit system shall be furnished and installed by the owner/developer of the project.

2.0. Conduit System Guidelines:

2.1. It is the responsibility of the owner/developer to inform the Kissimmee Utility Authority Distribution Engineering Division of the service main breaker size being installed or any special load requirements for both residential type and commercial type projects.

2.2. For all three-phase residential services and single-phase residential services greater than 200 amps, the conduit size shall be at least 3 inches in diameter. It is the responsibility of the owner/developer to contact KUA for conduit size.

2.3. For all commercial services, it is the responsibility of the owner/developer to furnish and install the service conductor and conduit, including all apartments and condo structures regardless of size.

2.4. No conduit shall be installed inside of structural walls or structural foundation, nor under building structures. No meter service stub-ups shall be installed in structural footers or walls.

2.5. There shall be no more than a total of 360 degree bends in a run. There shall not be any back to back conduit bends.

2.6. KUA requires 18” separation vertically and horizontally from all other underground utility systems. In the event that NESC or other applicable standards require more spacing of facilities, the conduit system must be adhered to for such installation.

3.0. Installation Guidelines: The guidelines in which the owner/developer shall adhere to are listed herein.

3.1. There shall not be any concrete around conduits beneath any pad mount equipment.

3.2. When the Contractor pulls in the secondary service wire into the pad mount transformer, the wire extending out of the conduit must be of sufficient length to connect to the transformer bus conductor bars. KUA will not splice conductors installed by the contractor so that it will reach the transformer bus or service cables.

3.3. All electric primary voltage conduits must be brushed out with a wire mandrel, cleaning type mandrel or a short rubber slug mandrel to clean out the conduit. Then, a 2500 lbs. flat woven polyester pull tape (that contains measured distances) shall be pulled into the conduit with a proving mandrel of the proper size for said conduit size. The proving mandrel must be no more than 10% less than the 4” or 6” conduit inner diameter.

3.4. All secondary voltage conduits (except house services) shall have pull string installed.

3.5. All secondary voltage service conduits shall be stubbed out from the running line (KUA power lines running parallel to the roadside property lines) a distance of at least five (5) feet. These stub ups must be used when extending the conduit system to the individual meter service location.

3.6. All conduit stub-markers shall extend 24" vertically above finished grade. The flat woven pull tape shall be secured to all primary and secondary conduit stub-ups. Secure marking tape from the end of the conduit stub out to the top of the conduit stub-marker. Secondary service stubs are not required to have pull tape.

3.7. Conduits located in transformers and secondary junction boxes shall be even with the top of the concrete pads when the customer is required to install cable. Otherwise, extend conduits 24" above the top of the concrete pad and duct tape them together. The electrical contractor will make all conduit adjustments before the low voltage conductors are installed.

3.8. The bottom of all transformer pads and junction box pads and/or sites shall be leveled at grade to fit the proposed equipment. Before KUA installs any electric infrastructure, the developer must sign a final grade sheet that states that the equipment is at the proper grade, including any conduit in swells going to the meter service location.

3.9. All conduit shall be installed in accordance with the Kissimmee Utility Authority's conduit layout plan for said owner/developer project. It is the responsibility of the owner/developer to install all conduit, 1250 lbs. flat woven polyester pull tape, and concrete pads as called forth on the conduit layout plans.

3.10. All conduits installed for KUA future primary and secondary conductors must have traceable material installed, exposed at origin for contact point.

3.11. Property corners and grade stakes shall be installed by a registered land surveyor. A final stake shall be installed at each equipment location. These stakes shall remain for the life of the construction project. On commercial projects, surveying of curbing and sidewalks must also be marked for field reference before any conduit is placed in the field.

3.12. The completed conduit system will be inspected by KUA. When all the conduit system installation requirements are met, the owner/developer shall request an inspection. A representative of the installation contractor is required to be at the site during the inspection. The inspection must be requested 24 hours in advance. For arranging a conduit inspection, call 407-933-7777, extension 6604.

3.13 The trench may be back-filled prior to the KUA conduit inspection. The KUA inspector will make ample tests to determine if the installation is correct. The KUA inspector has the authority of requesting the conduit to be uncovered if he/she deems it necessary and to require additional survey stakes be placed to verify that the conduit system has been placed in the proper location.

3.14. The tops of all 4" and 6" galvanized rigid steel conduit bends must be 12" below final grade and must extend 3 feet with gray Schedule 40 PVC conduit. Note that this requirement doesn't apply for riser pole construction.

3.15. There shall be no more than two (2) conduit runs on a riser pole.

3.16. Galvanized Rigid Steel long sweep conduit bends must be installed and used for all 4" and 6" conduit system. All other conduit systems can use standard sweep Schedule 40 90 degree per runs under 300 feet elbows and long sweep 90 degree elbows for runs over 300 feet.

3.17. For multi-service buildings, all services must be accessible by KUA vehicles. No back yard meter service locations allowed on any townhome, condo structures, or apartment buildings.

3.18. All conduits to be added to KUA electric equipment after such equipment has already been installed, whether energized or not, shall be supervised by qualified KUA individuals capable of accessing energized equipment. No new conduit shall be pushed into energized electric equipment.

3.19. Prior to installing conduit stubs, it is the responsibility of the contractor to notify engineering and/or conduit inspector of the number of conduits and the conduit size in which he intends to place in any three phase equipment. Any special requirements related to secondary bar size must be indicated upfront.

3.20. All conduit located in public or private roadways shall be a minimum of 42" below final road grade.

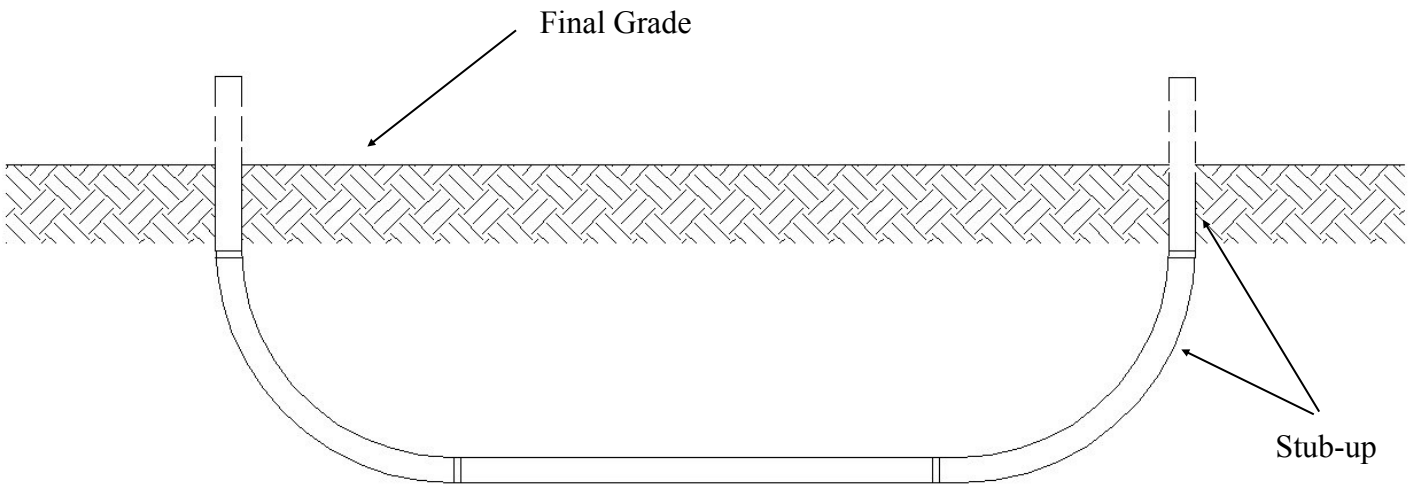
3.21. All secondary conduit located on private property shall be a minimum of 24" below curb or final grade (whichever is lower) unless otherwise specified.

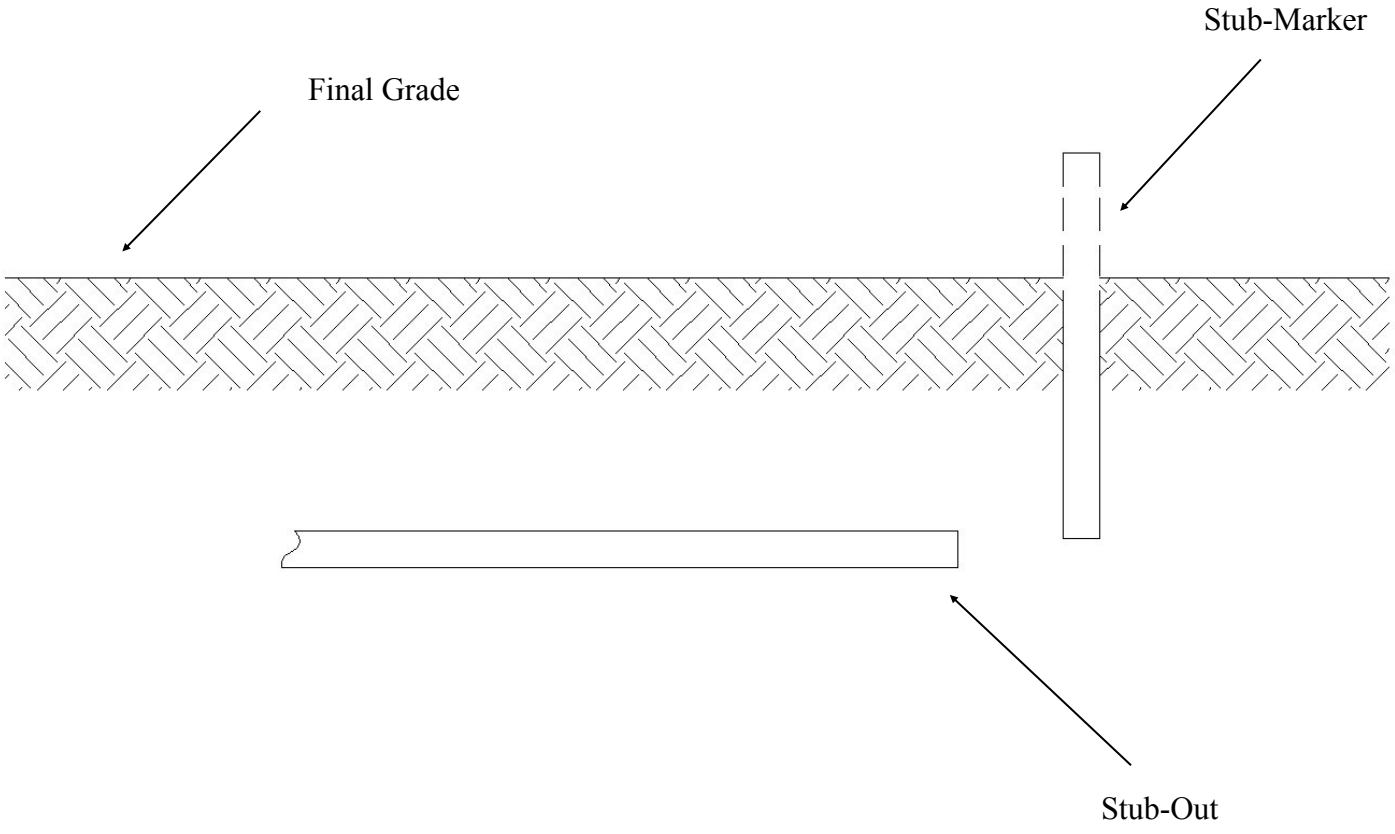
3.22. All primary conduit located on private property shall be a minimum of 36" below curb or final grade, (whichever is lower) unless otherwise specified.

3.23. Where erosion is an issue and the KUA's equipment grade is lower than the existing grade is that will eventually be brought down when the house pad is built, 4 feet of silk fence will need to be place 3 feet behind transformer and/or 2 feet of sod will need to be installed around KUA's equipment pad.

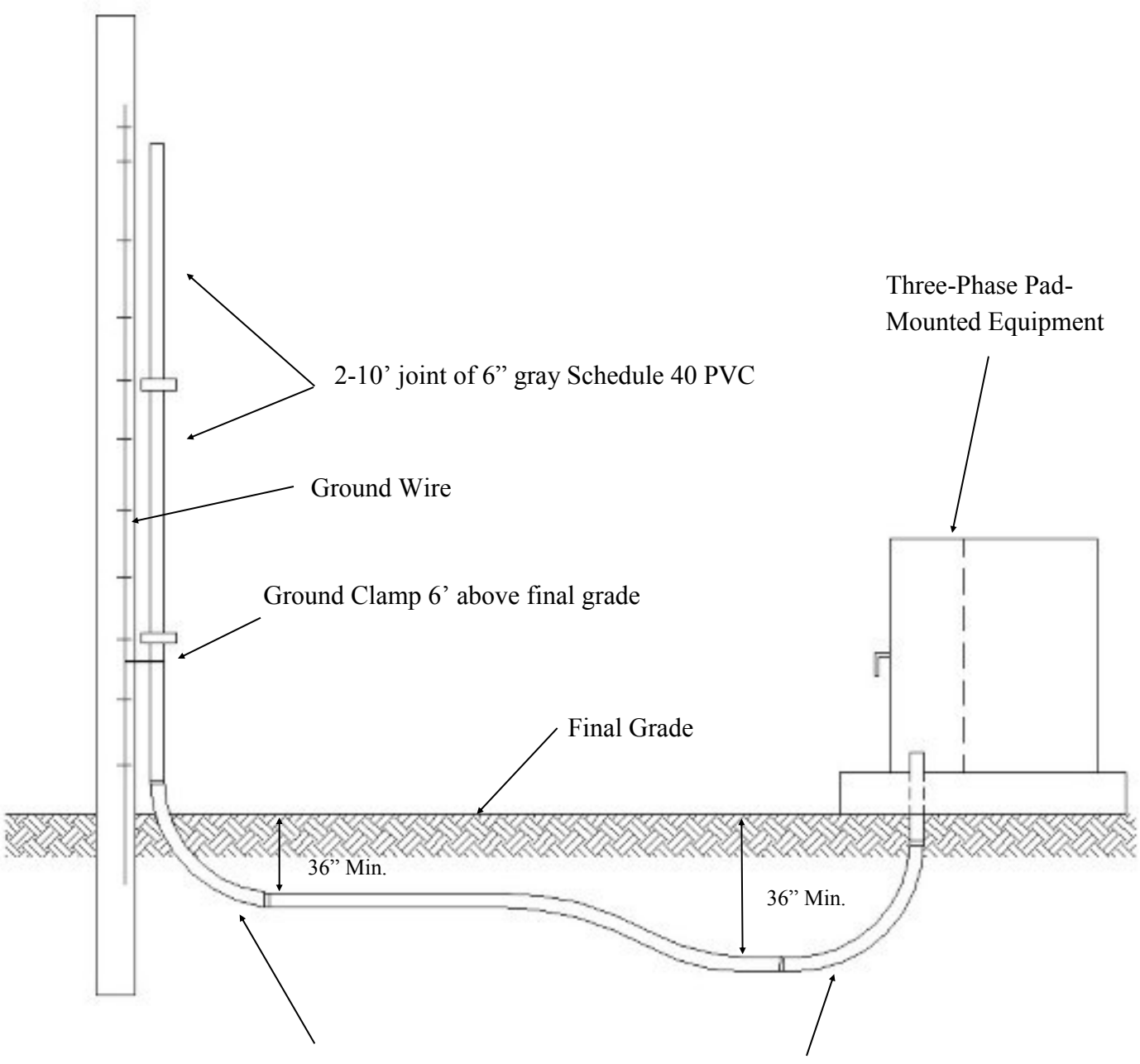
3.24. No tree vegetation shall be planted within 20 feet of KUA's overhead power lines.

4.0. **DISCLAIMER:** KUA makes no representation or warranty to the accuracy of the base map as in the conduit crossing plan and/or conduit layout plan that is provided to the developer for a particular project. The land base has been compiled from the most accurate sources available. The electric facilities shown are approximate & for KUA's own use & may not be suitable for others. KUA assumes no responsibility or liability to others in the use of such plans and/or document. The base maps are a graphic representation only & are not intended to be a legal or survey document.

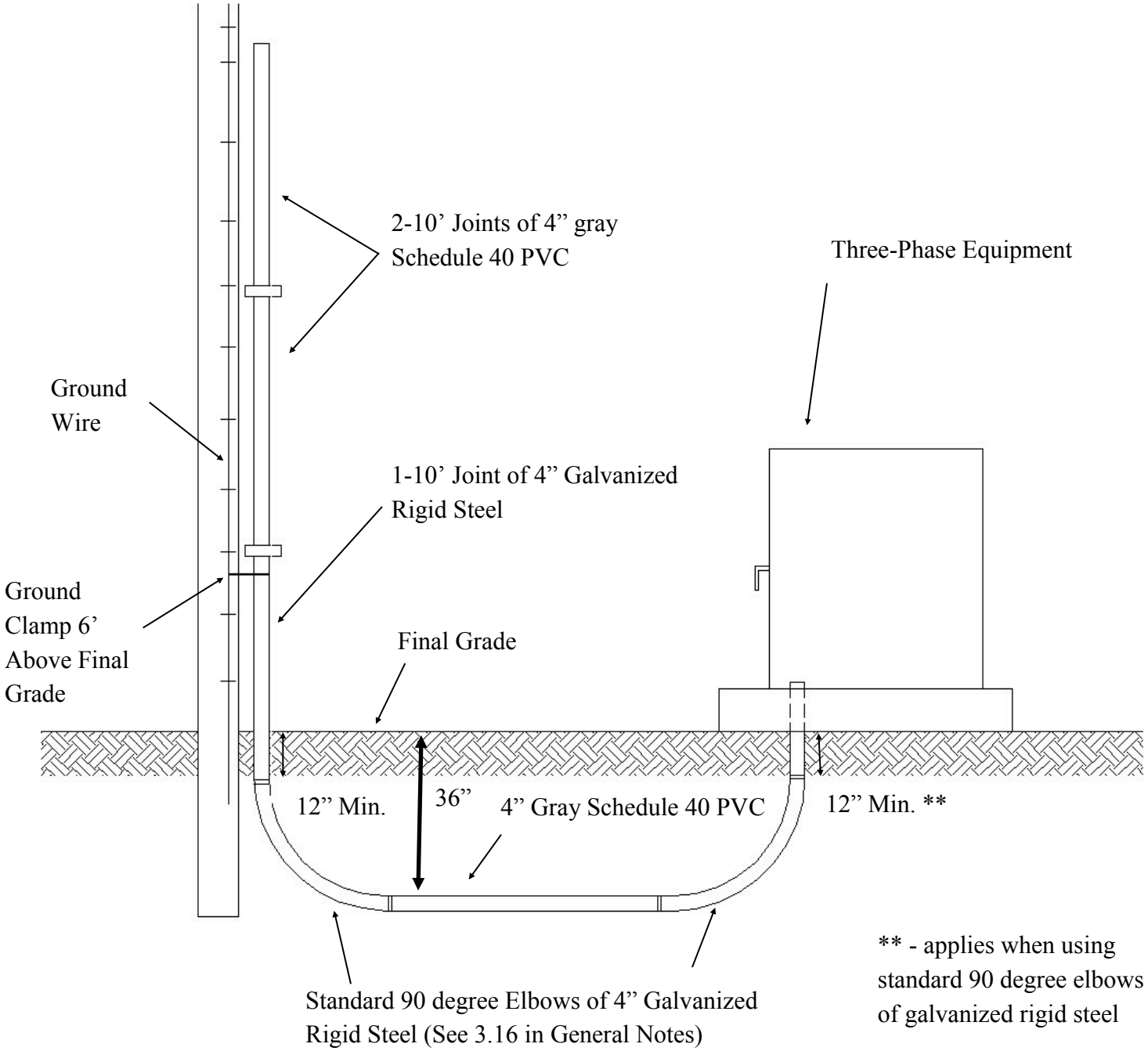

Final Grade
Stub-up


Stub-Marker
Final Grade
Stub-Out

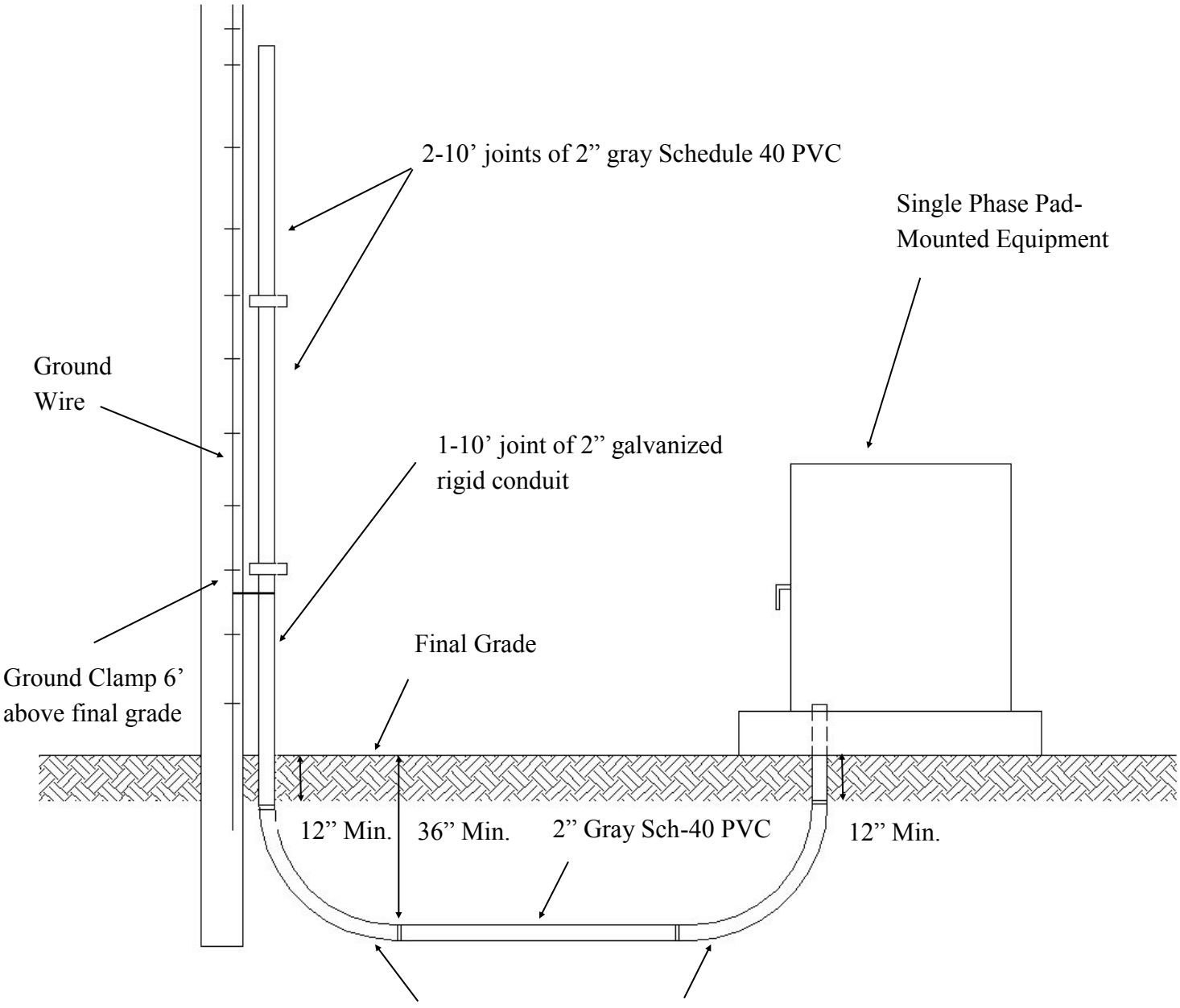
Note: All riser pole conduit shall be supplied by the owner/developer and must be on the job site. The owner/ developer shall install the bottom joint of galvanized rigid steel conduit and KUA will install the top two (2) joints. The bottom joint of conduit and 90 degree elbow shall be installed by the developer after KUA installs the riser pole. The developer must also supply six (6) two hole rigid steel straps (2 straps per 10 ft. joint). Ground clamp will be provided and installed by KUA. Refer to General Notes of this document regarding conduit depths.

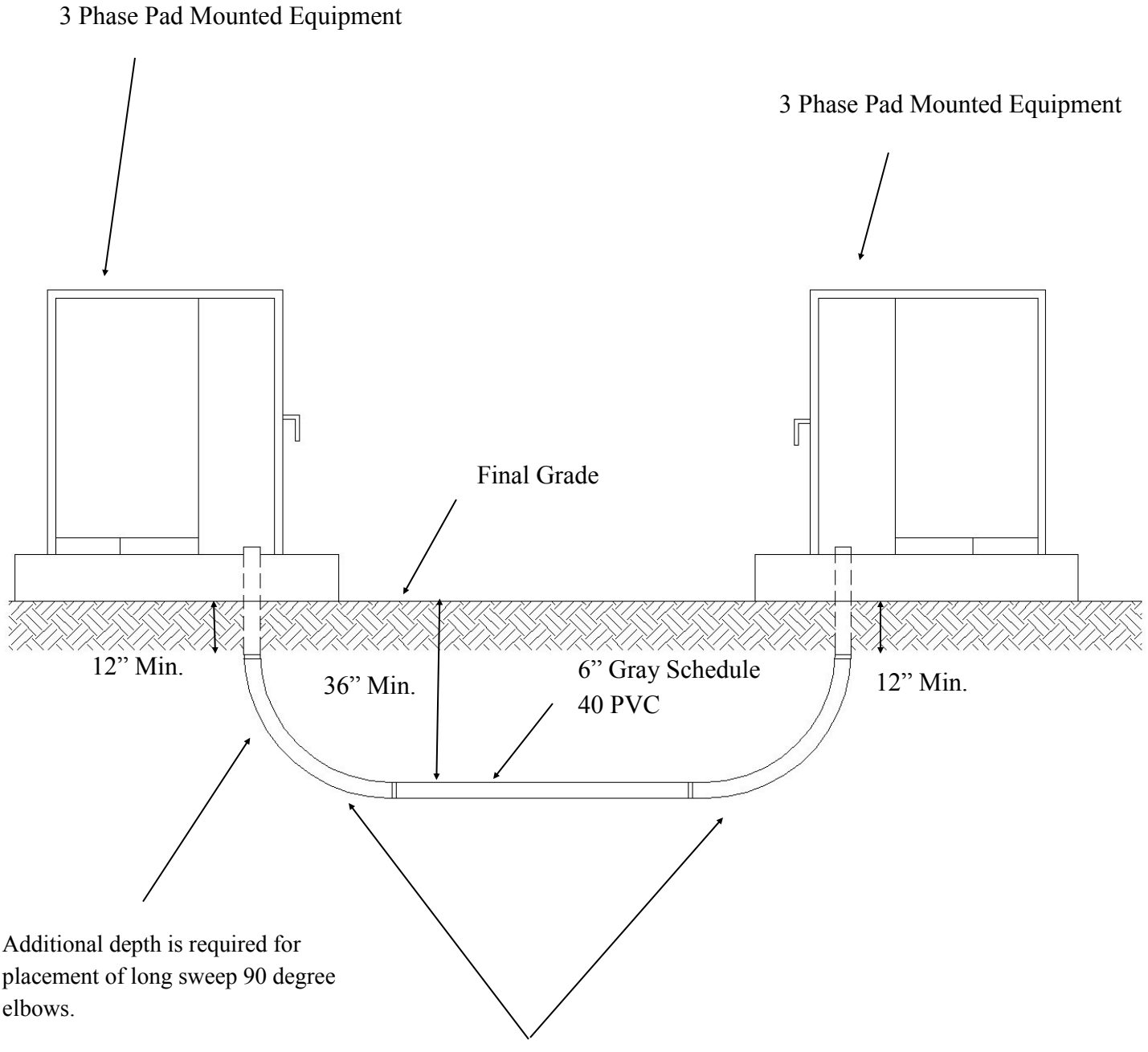


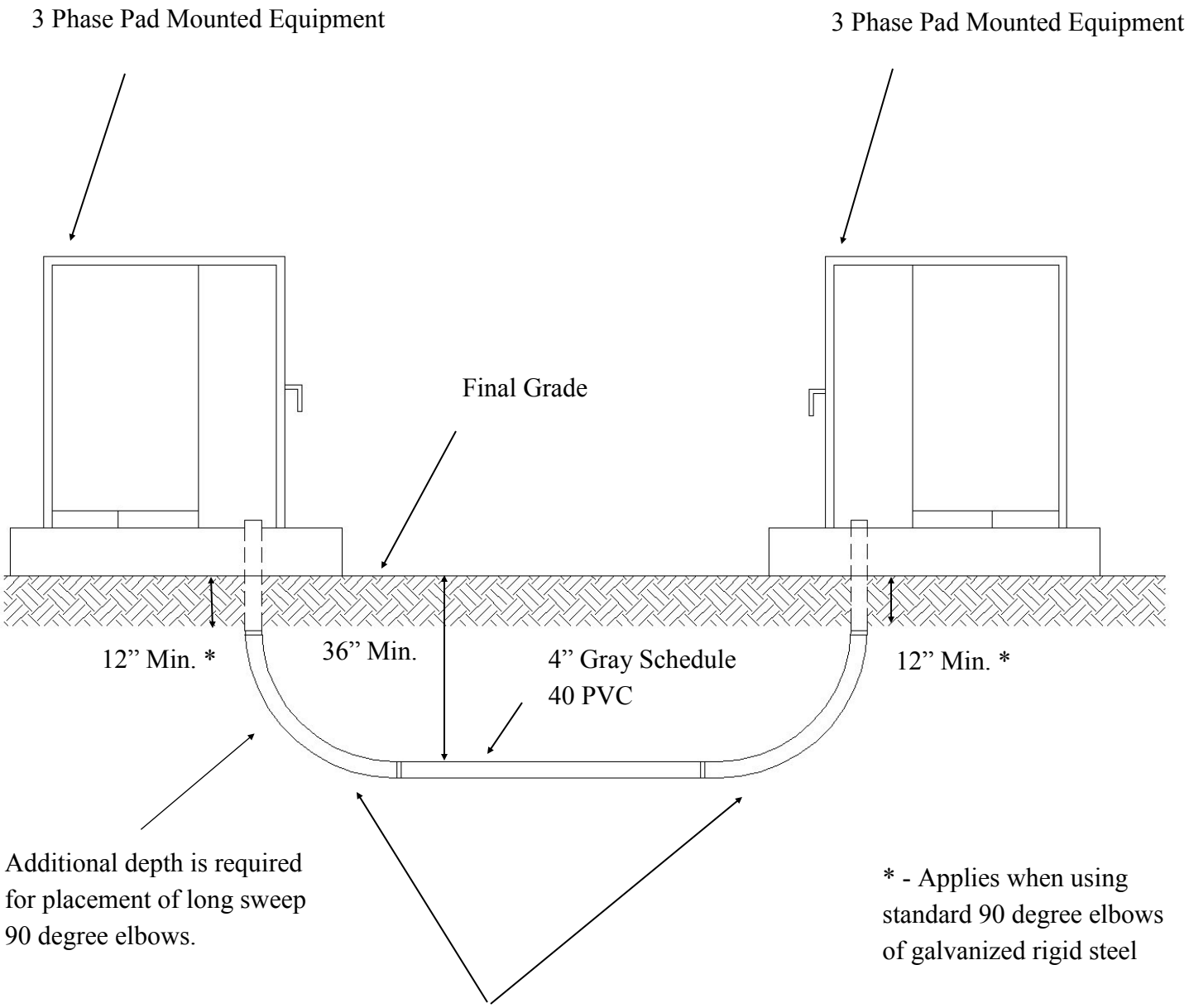
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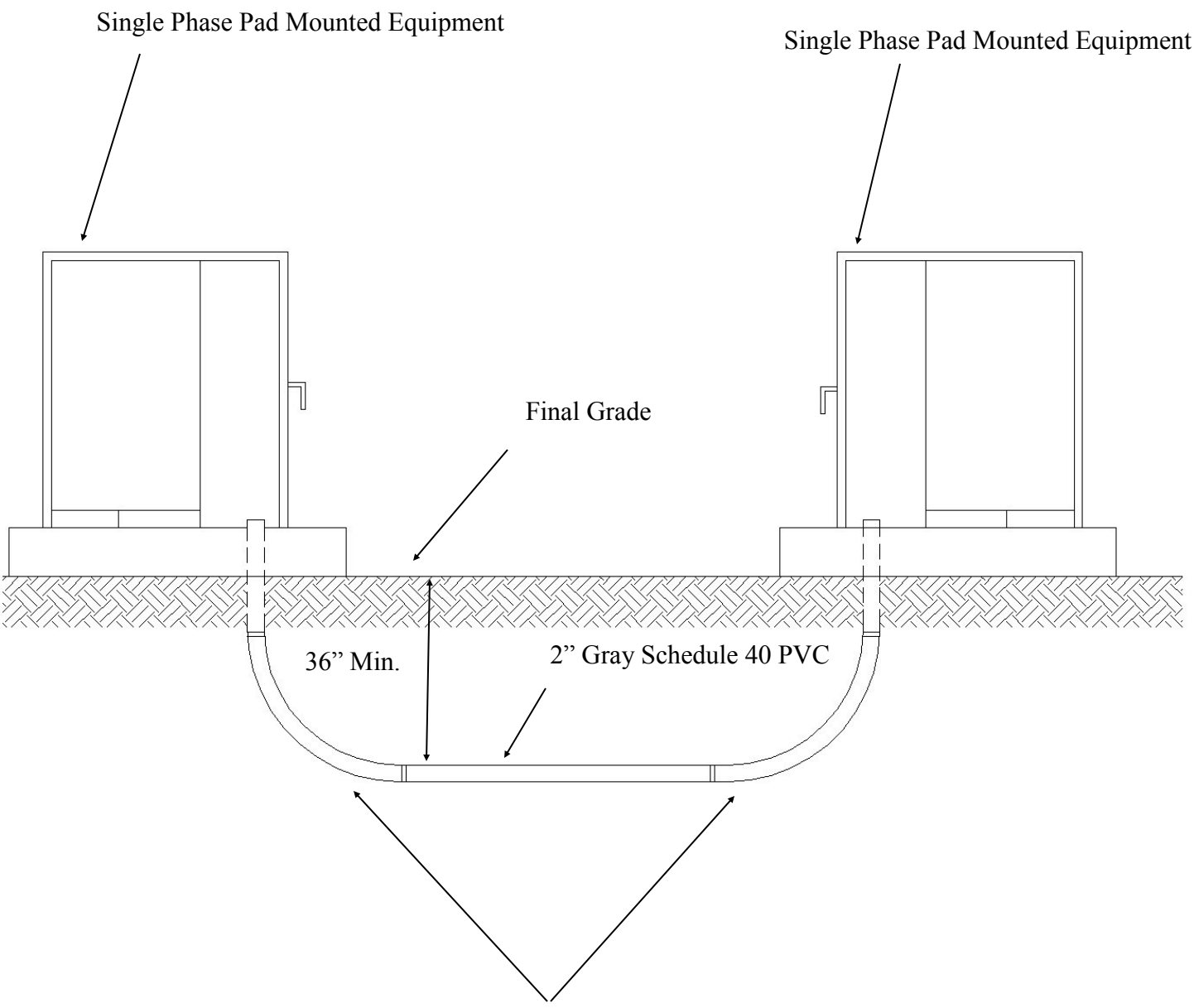


Note: All riser pole conduit shall be supplied by the owner/developer and must be on the job site. The owner/ developer shall install the bottom joint of galvanized rigid steel conduit and KUA will install the top two (2) joints. The bottom joint of conduit and 90 degree elbow shall be installed by the developer after KUA installs the riser pole. The developer must also supply six (6) two hole rigid steel straps (2 straps per 10 ft. joint). Ground clamp will be provided and installed by KUA. Refer to General Notes of this document regarding conduit depths.

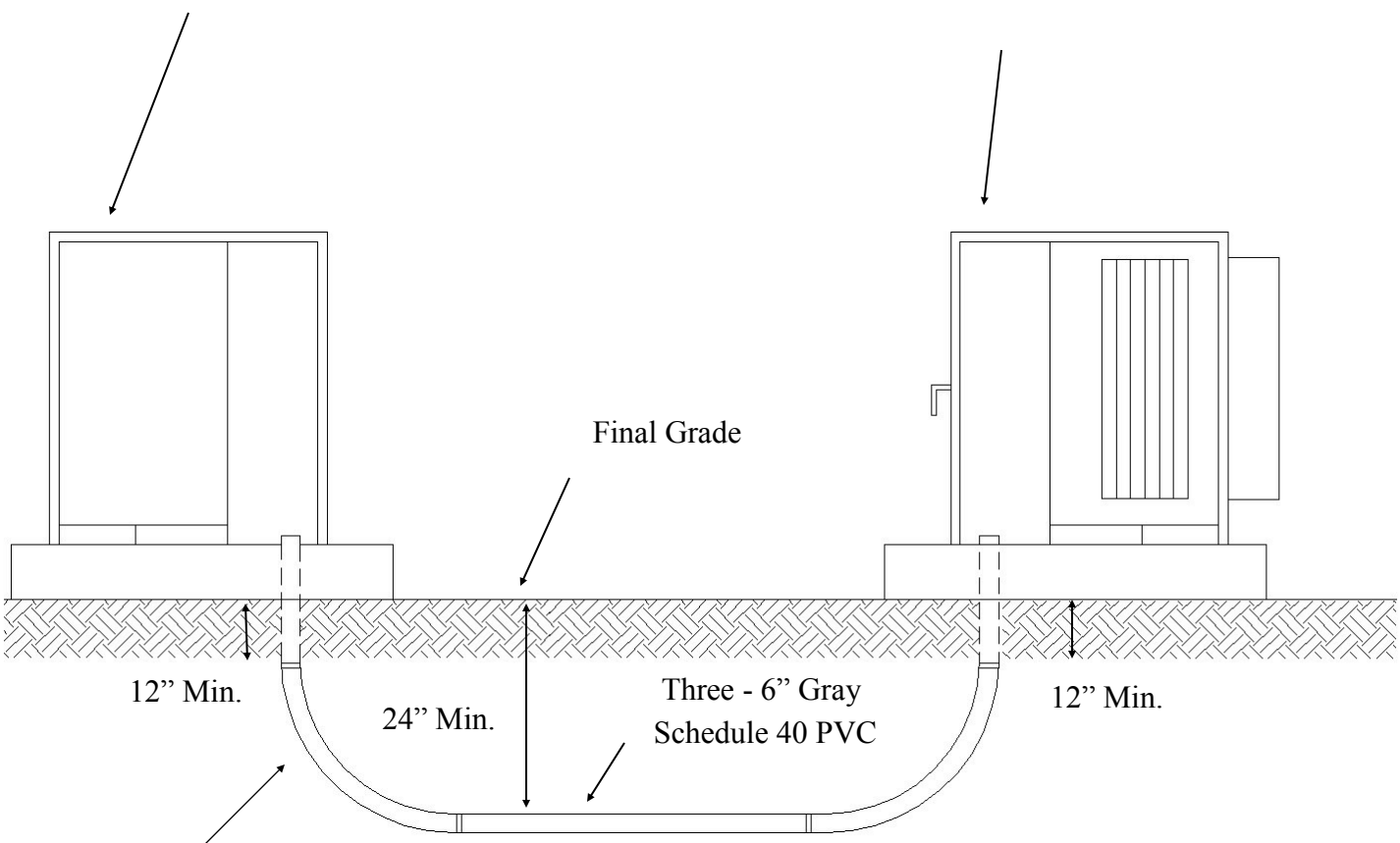



3 Phase Pad Mounted Equipment
3 Phase Pad Mounted Equipment
Final Grade
12" Min.
36" Min.
6" Gray Schedule 40 PVC
12" Min.
Additional depth is required for placement of long sweep 90 degree elbows.
Standard 90 Degree Elbow of 6" Galvanized Rigid Steel


3 Phase Pad Mounted Equipment
3 Phase Pad Mounted Equipment
Final Grade
12" Min. *
36" Min.
4" Gray Schedule 40 PVC
12" Min. *
Additional depth is required for placement of long sweep 90 degree elbows.
* - Applies when using standard 90 degree elbows of galvanized rigid steel
Standard 90 Degree Elbow of 4" Galvanized Rigid Steel (See 3.16 in General Notes)



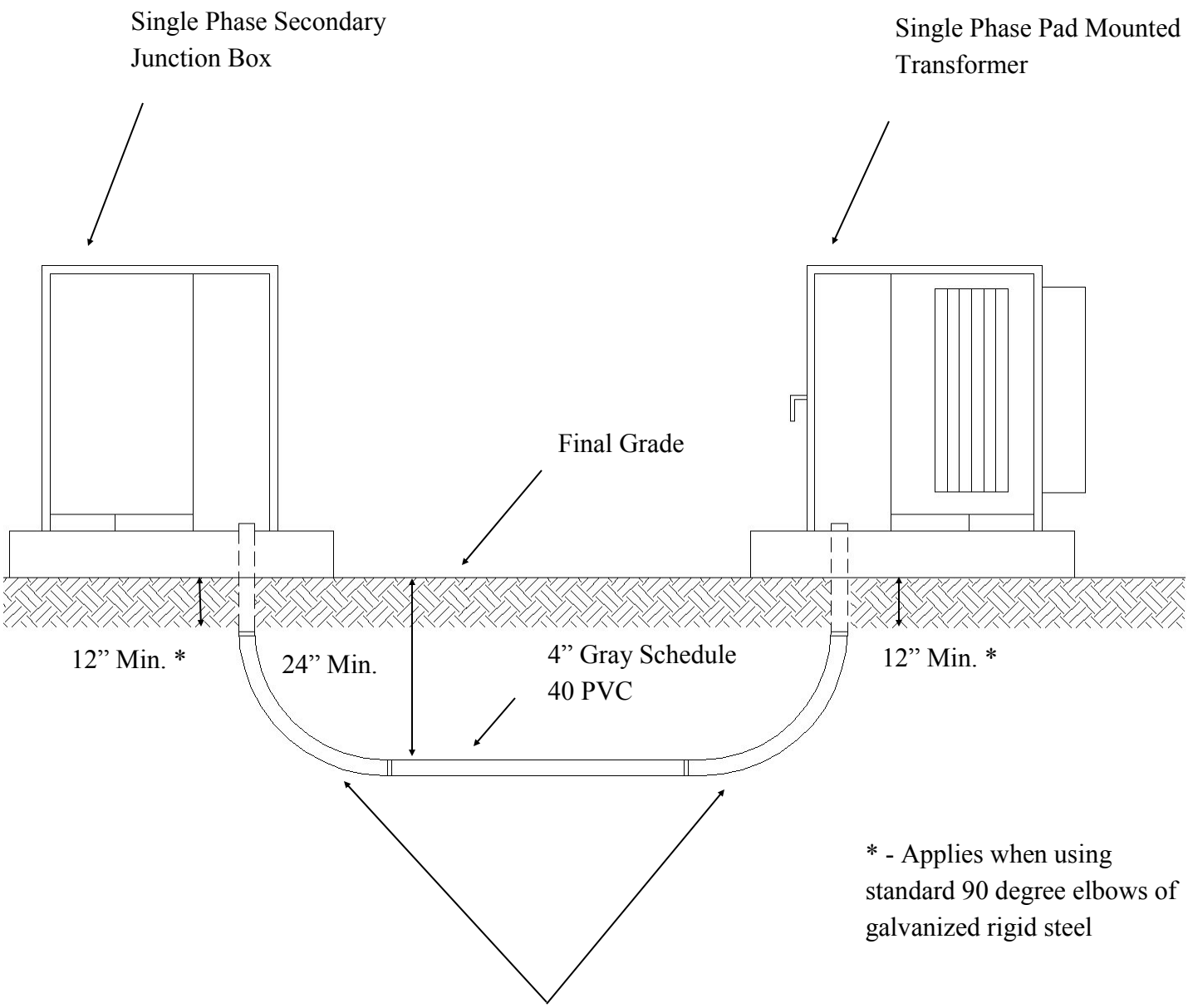
Standard or Long Sweep 90 Degree Elbows of 2" Gray Schedule 40 PVC (See 3.16 in General Notes)

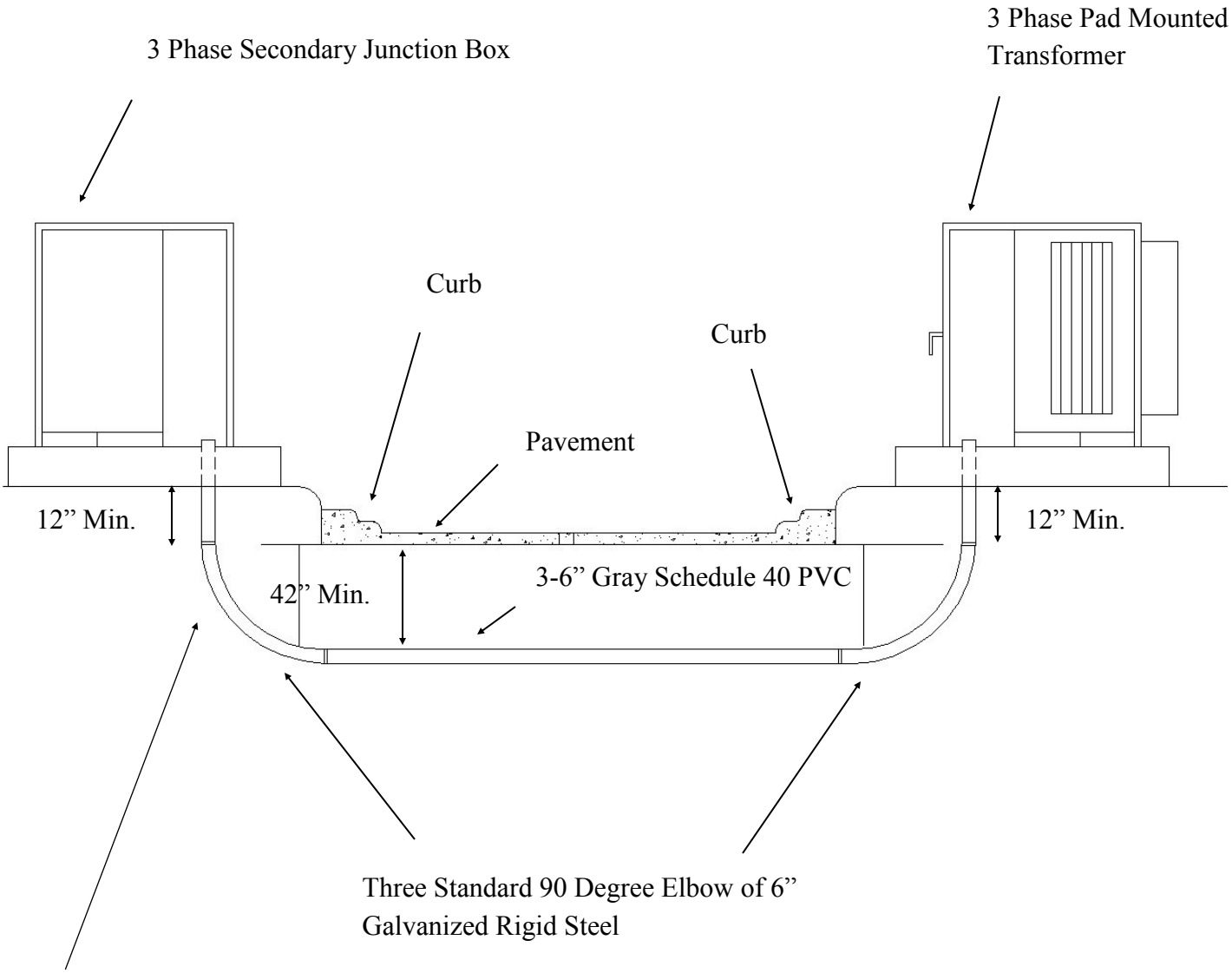


Additional depth is required for placement of long sweep 90 degree elbows.

Coordinate with KUA before installing this application as additional requirements may be required depending on project conditions.

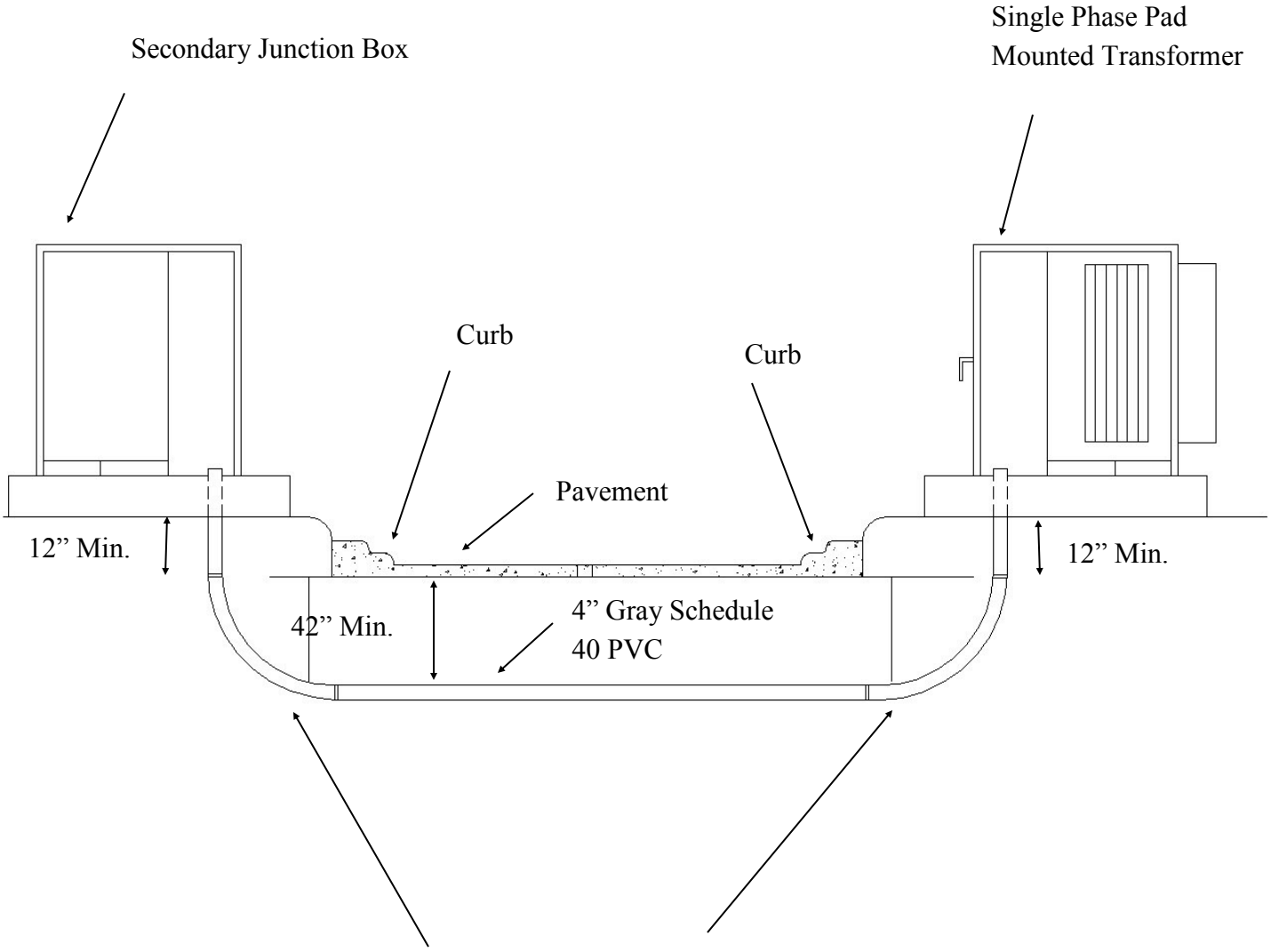
Three Standard 90 Degree Gray Schedule 40 Elbows


Single Phase Secondary Junction Box
Single Phase Pad Mounted Transformer
Final Grade
12" Min. *
24" Min.
4" Gray Schedule 40 PVC
12" Min. *
* - Applies when using standard 90 degree elbows of galvanized rigid steel
Standard 90 Degree Elbows of 4" Galvanized Rigid Steel (See 3.16 in General Notes



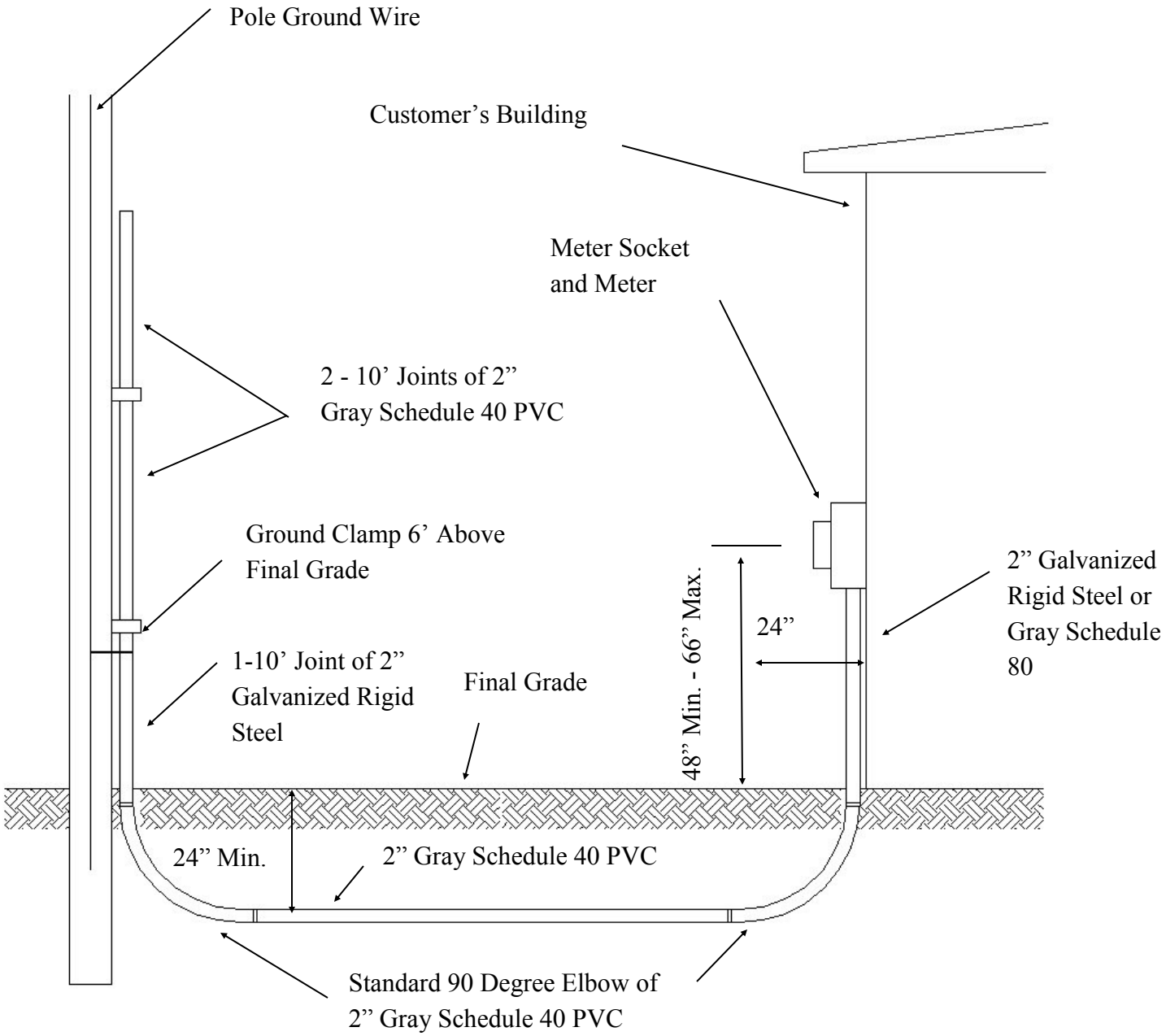
Additional depth is required for placement of long sweep 90 degree elbows.

Coordinate with KUA before installing this application as additional requirements may be required depending on project conditions.

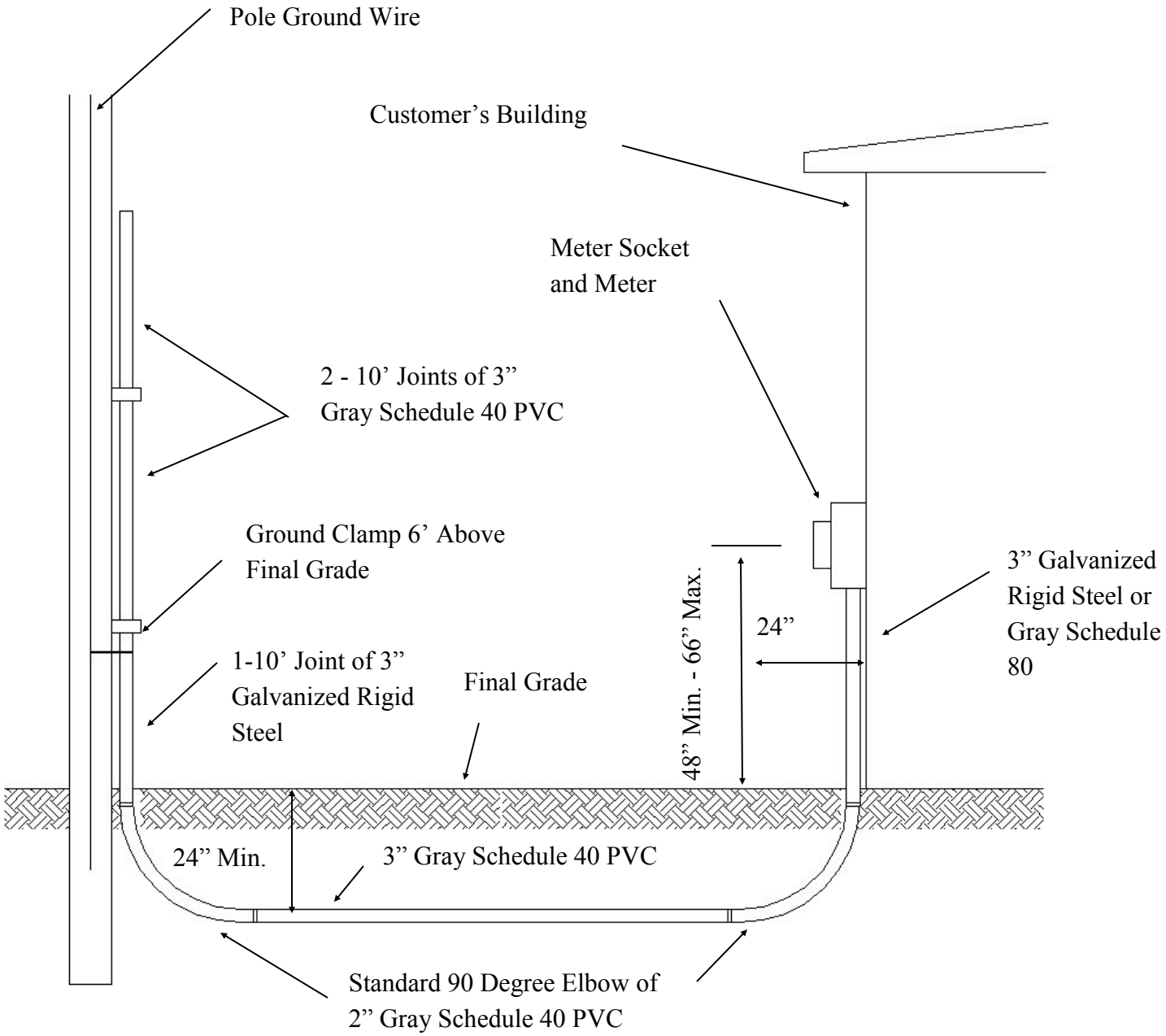


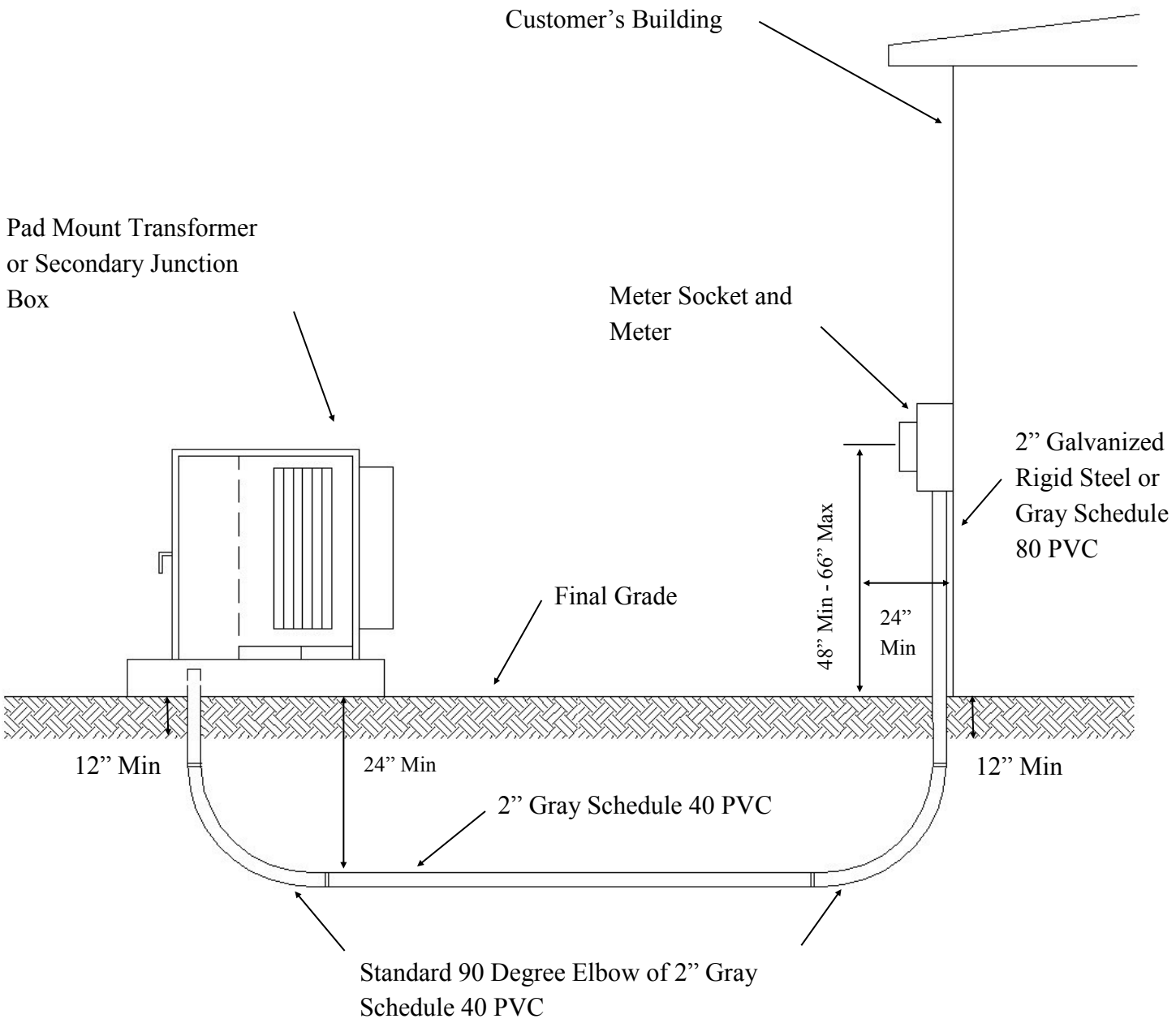
Standard 90 degree Elbow of 4" Galvanized Rigid Steel (See 3.16 in General Notes)

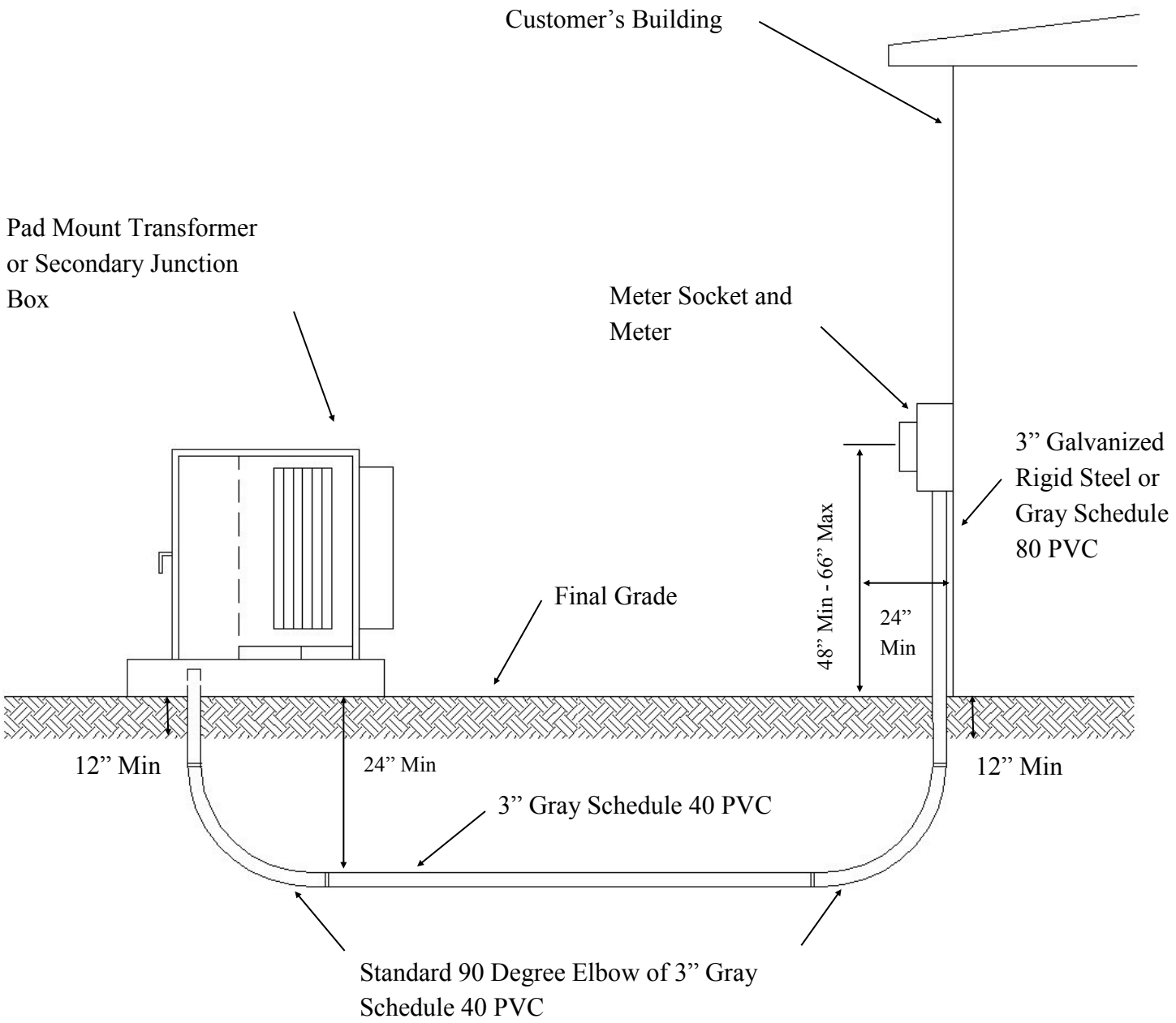
Note: All riser pole conduit shall be supplied by the owner/developer and must be on the job site. The owner/ developer shall install the bottom joint of galvanized rigid steel conduit and KUA will install the top two (2) joints. The bottom joint of conduit and 90 degree elbow shall be installed by the developer after KUA installs the riser pole. The developer must also supply six (6) two hole rigid steel straps (2 straps per 10 ft. joint). Ground clamp will be provided and installed by KUA. Refer to General Notes of this document regarding conduit depths.



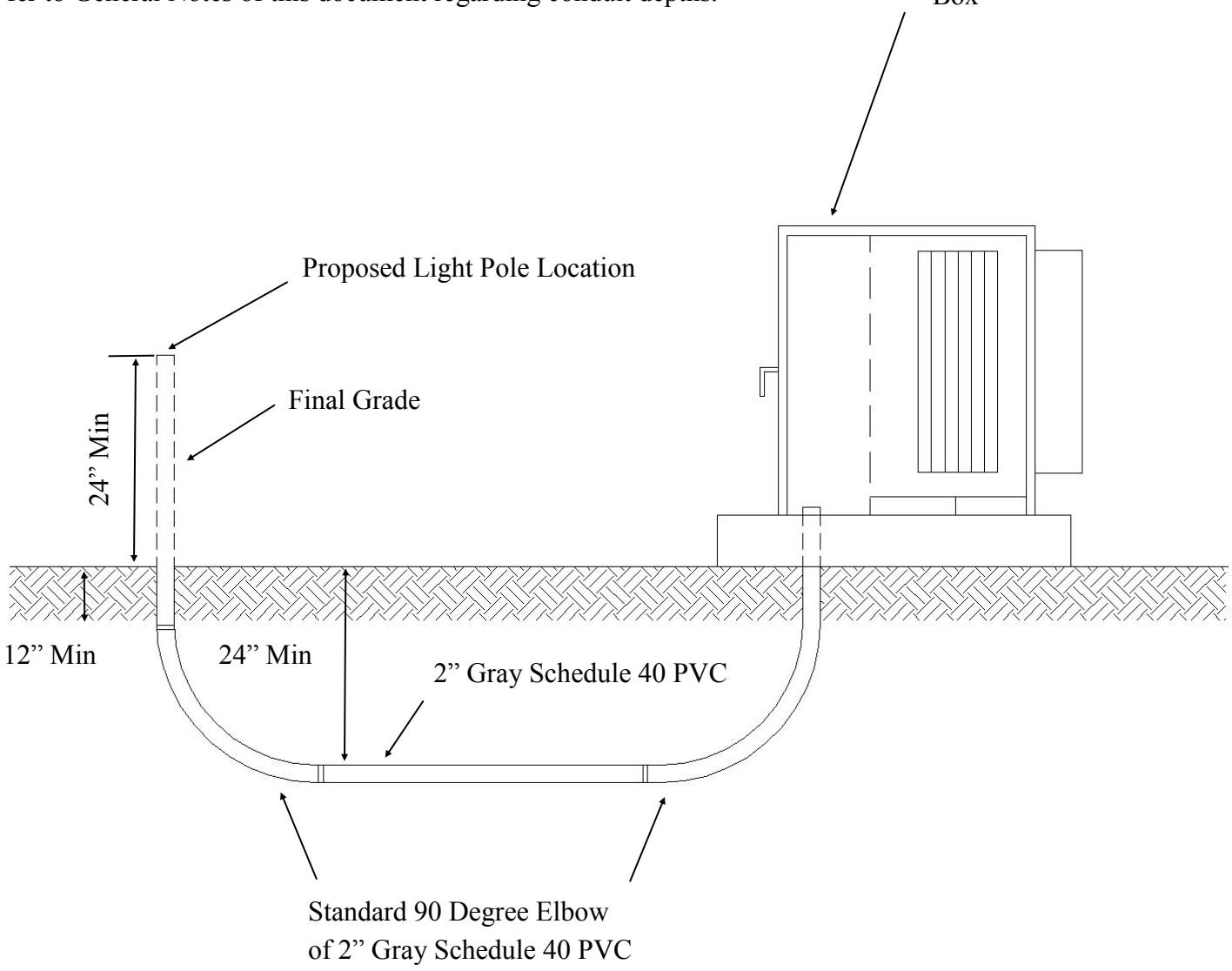
Note: All riser pole conduit shall be supplied by the owner/developer and must be on the job site. The owner/ developer shall install the bottom joint of galvanized rigid steel conduit and KUA will install the top two (2) joints. The bottom joint of conduit and 90 degree elbow shall be installed by the developer after KUA installs the riser pole. The developer must also supply six (6) two hole rigid steel straps (2 straps per 10 ft. joint). Ground clamp will be provided and installed by KUA. Refer to General Notes of this document regarding conduit depths.

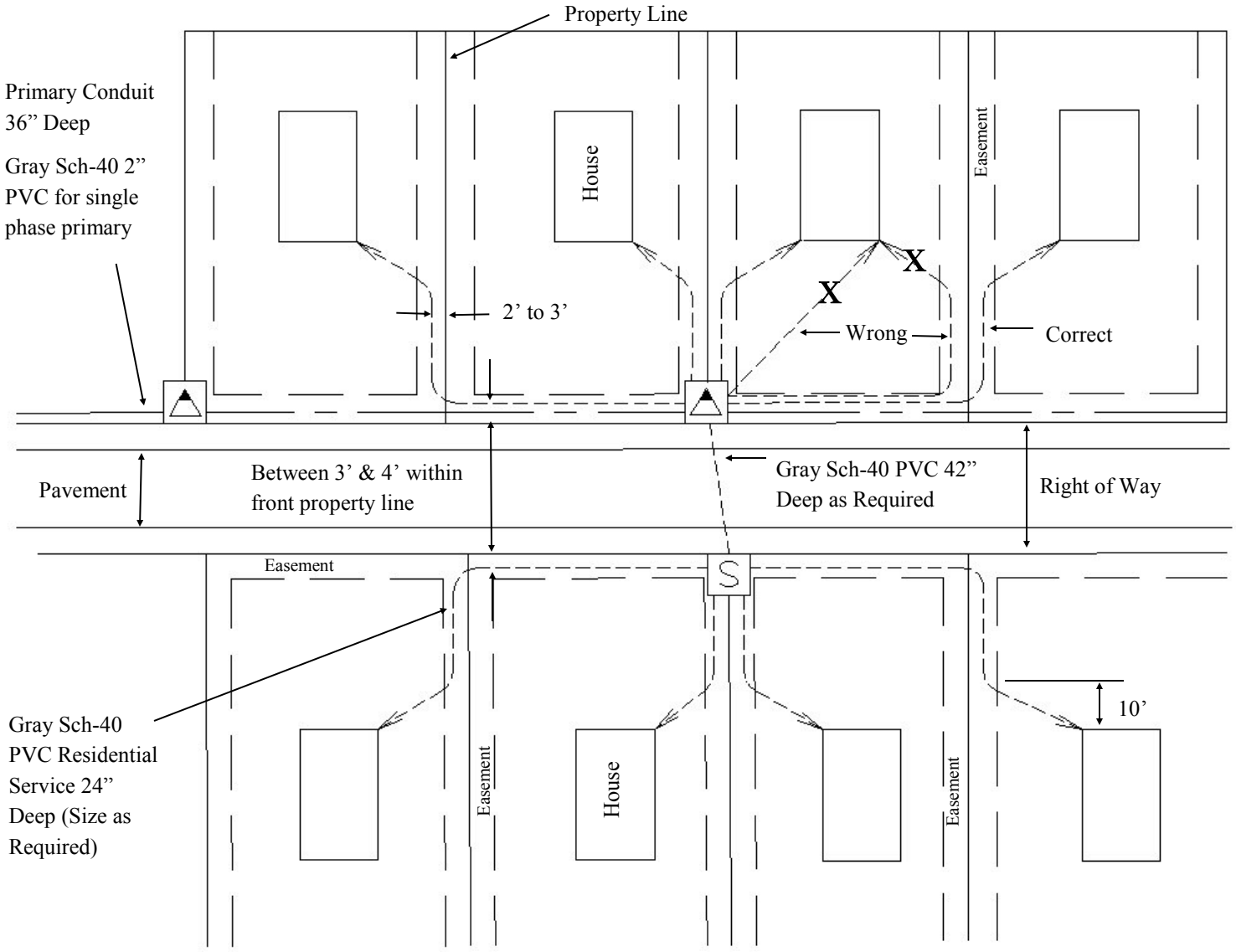



Customer's Building
Pad Mount Transformer or Secondary Junction Box
Meter Socket and Meter
2" Galvanized Rigid Steel or Gray Schedule 80 PVC
48" Min - 66" Max
24" Min
Final Grade
12" Min
24" Min
12" Min
2" Gray Schedule 40 PVC
Standard 90 Degree Elbow of 2" Gray Schedule 40 PVC


Customer's Building
Pad Mount Transformer or Secondary Junction Box
Meter Socket and Meter
3" Galvanized Rigid Steel or Gray Schedule 80 PVC
Final Grade
48" Min - 66" Max
24" Min
12" Min
24" Min
12" Min
3" Gray Schedule 40 PVC
Standard 90 Degree Elbow of 3" Gray Schedule 40 PVC

Note that all area lighting conduit must be 2" Schedule 40 Gray PVC. Conduit runs within the right of way shall be installed deeper per requirements of Osceola County or the City of Kissimmee. Refer to General Notes of this document regarding conduit depths.

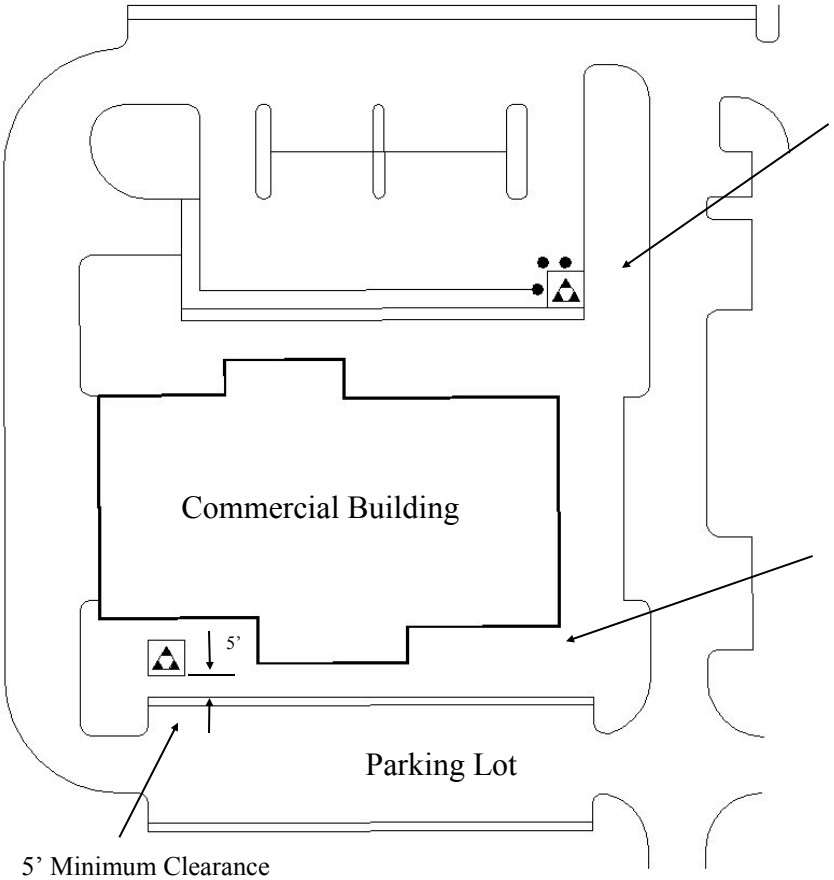




Conduit Location in Regards to Utility:

The typical utility easement that KUA request from the owner/developer shall be ten (10) feet on the roadside of the property & five (5) on the sides of the property; Seven and a half (7.5) feet on the rear of the property may also be required. KUA uses the utility easements for building the electric infrastructure to the property for electric service.

1. All conduits must be installed along the lot lines within the right of ways or plotted utility easements. All transformers & junction boxes shall be centered on the side lot line.
2. Conduit that encroaches on private property outside of easements & dedicated right of ways shall be relocated by the owner/ contractor/developer. All relocation work along with lowering conduits shall be paid by the owner/contractor/developer.
3. Conduits shall remain in the easement until 10 feet in front of the building. The conduits can then angle over out of the easement to the service location.
4. All service locations shall be installed per KUA's project layout. If a line extension contract is required for installing transformers & junction boxes, the line extension cost shall be paid by the owner/contractor/developer of the project.



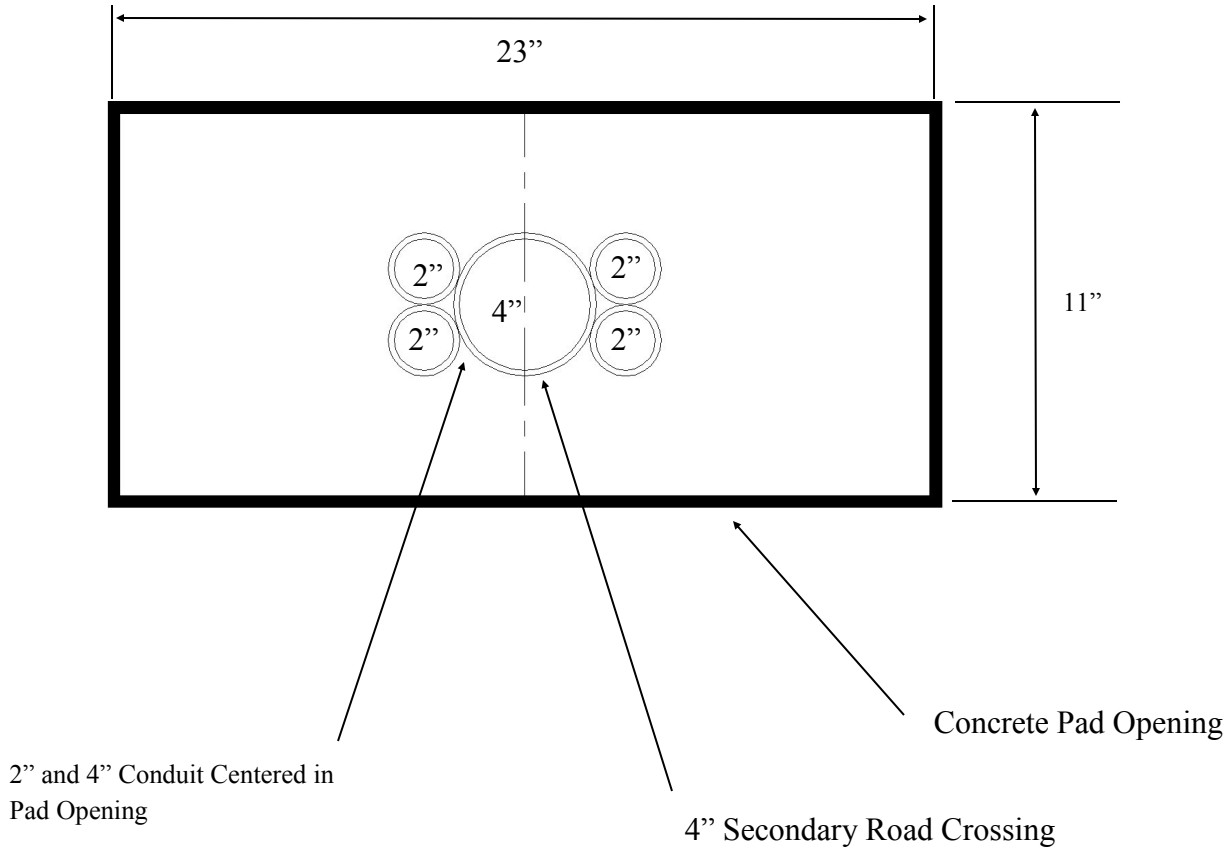
When transformer is located in pavement, 6" iron pipes must be installed. (See Note 1)

Per NESC, the spacing between the pad mounted transformer and any building structures must be at least 5 feet.

Protection of Transformers and Junction Boxes: The transformer and/or junction box shall be protected by the following means:

1. Six-inch iron pipe guards buried 4 feet below finished grade with 12" of concrete around the pipe and the pipe poured full of concrete and rounded on top. These pipes must be placed on all traffic bearing sides of the transformer and/or junction box with 4' extended vertically above grade. KUA's representative will determine the exact number and location of the pipe guards.
2. A minimum distance of 5 feet from the back edge of the parking curbs to any portion of the transformer and /or junction box. The back of transformer shall have at least 5 ft. horizontal clearance and no obstructed vertical clearance.
3. The transformer and/or junction boxes will not be located in any location that cannot be easily accessed by KUA vehicles for maintenance purposes.

Secondary Junction Box



Conduit sizes may vary with design. If conduit number and size are different than shown, please contact KUA’s conduit inspector.

Typical For:

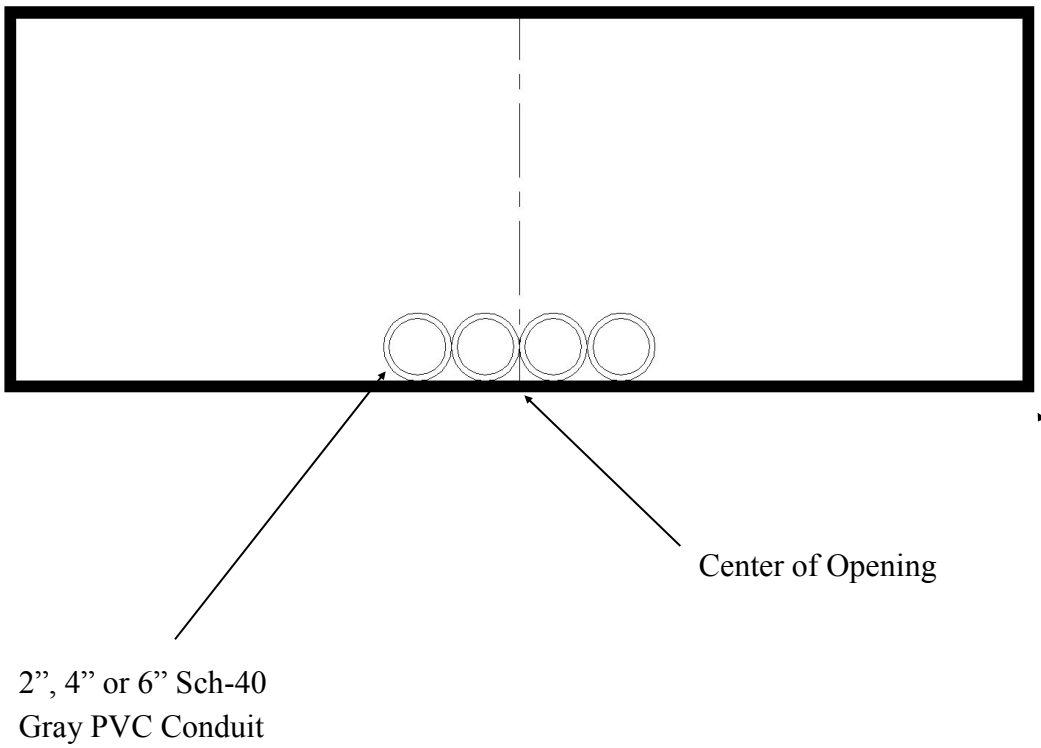
Single Phase Primary Junction Box (Type 3)

Three Phase Primary Junction Box (Type 4)

Three Phase Primary Fused Junction Box (Type 6 or Type 6A)

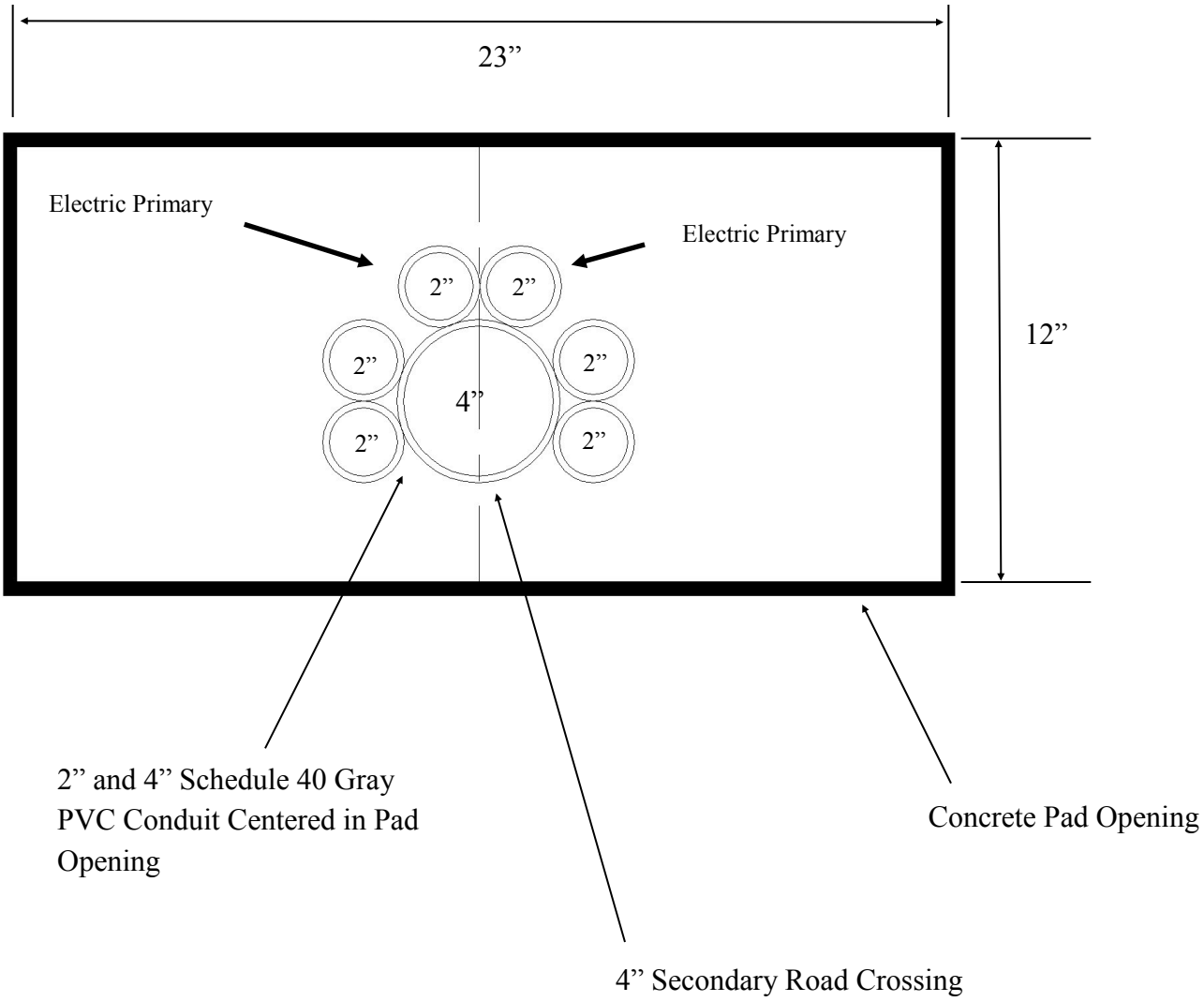
Three Phase Primary Fused Junction Box (Type 7 or Type 7A)

Three Phase Primary Metering Junction Box (Type 12)



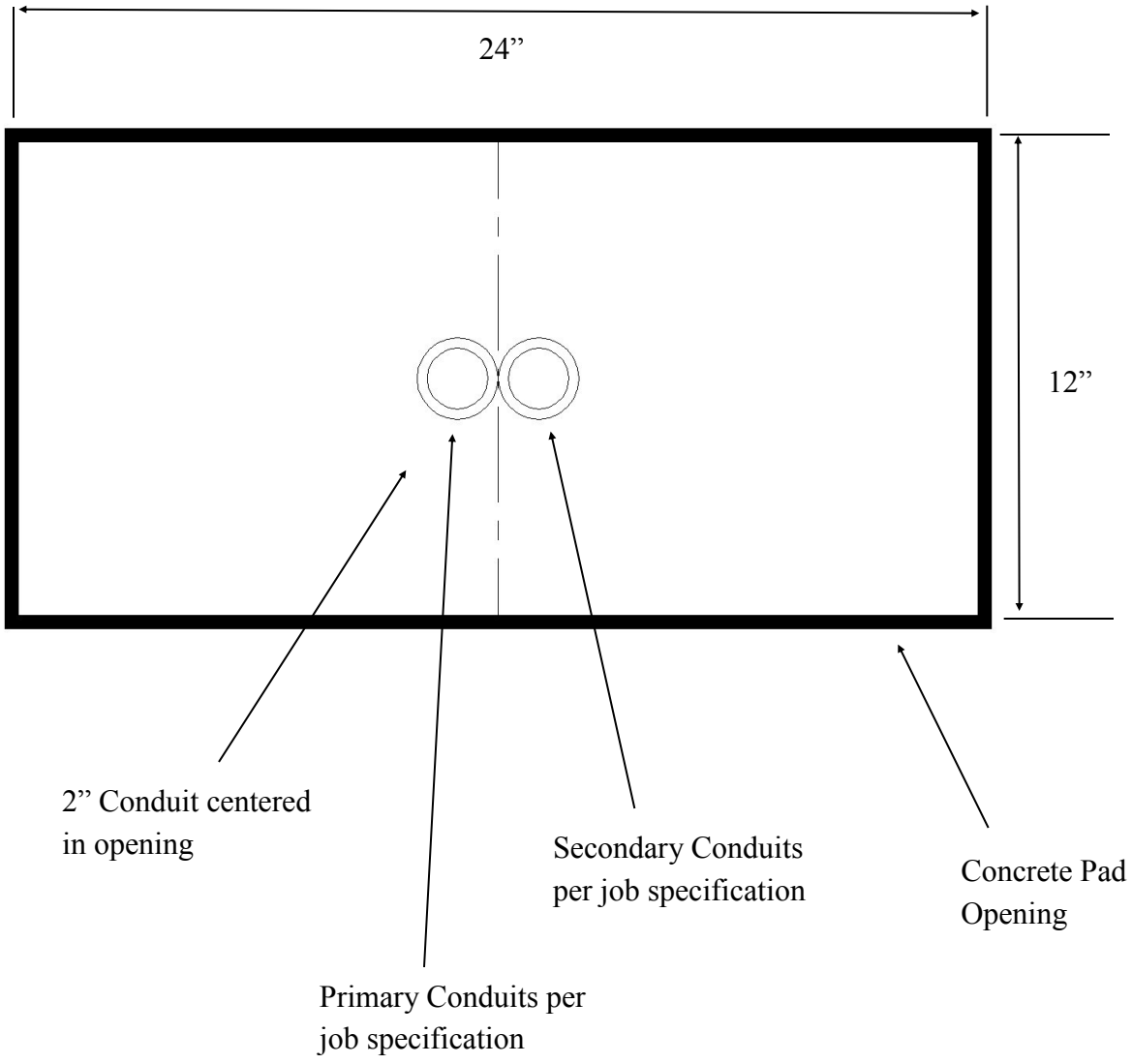
Conduit sizes may vary with design. If conduit number and size are different than as shown, please contact KUA's Conduit Inspector.

Single Phase Pad Mount Transformer (25 to 100 KVA)



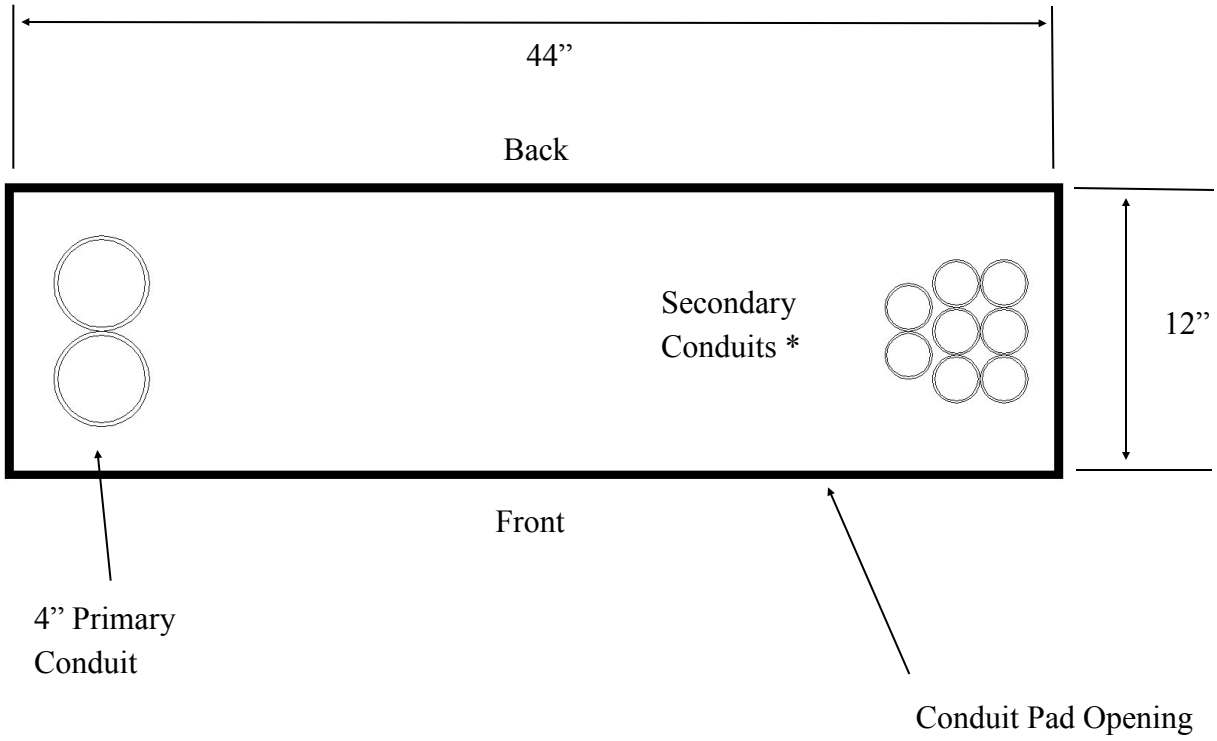
Conduit sizes may vary with design. If conduit number and size are different than as shown, please contact KUA’s conduit inspector.

Single Phase Pad Mount Transformer (167 KVA or 250 KVA)



Conduit sizes may vary with design. If conduit number and size are different than as shown, please contact KUA’s conduit inspector.

75 - 112 - 150 - 225 - 300 - 500 KVA Three Phase Pad Mount Transformer



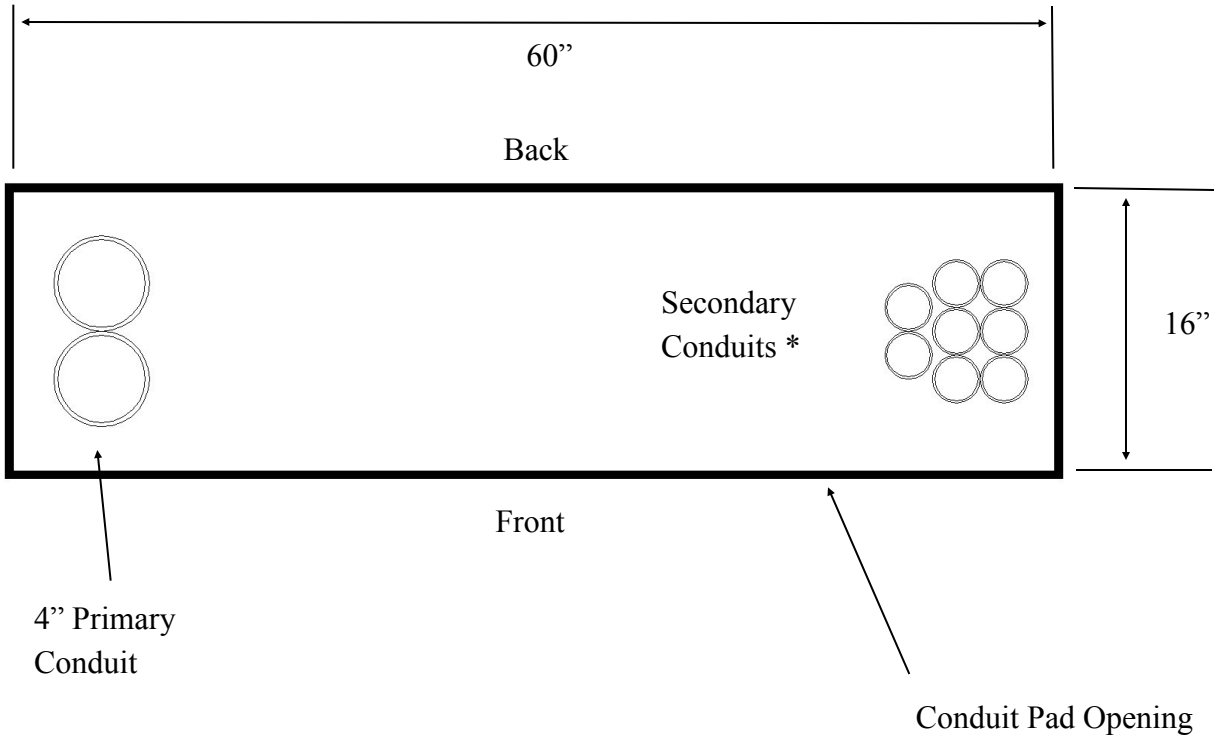
* - Maximum Conduit per job specification

8 - 4” Schedule 40 Gray PVC Conduits

5 - 6” Schedule 40 Gray PVC Conduits

Conduit sizes may vary with design. If conduit number and size are different than as shown, please contact KUA’s conduit inspector.

750 - 2500 KVA Three Phase Pad Mount Transformer

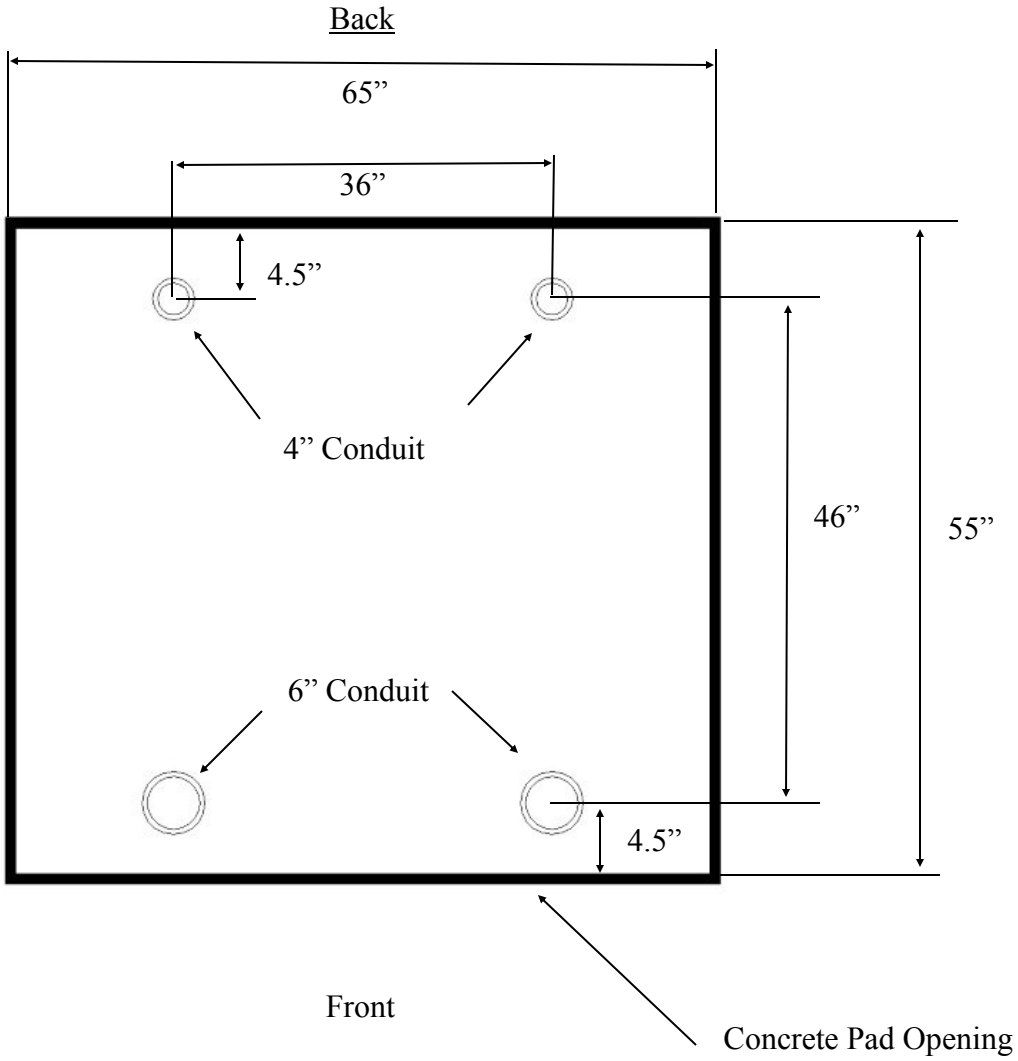


* - Maximum Conduit per job specification

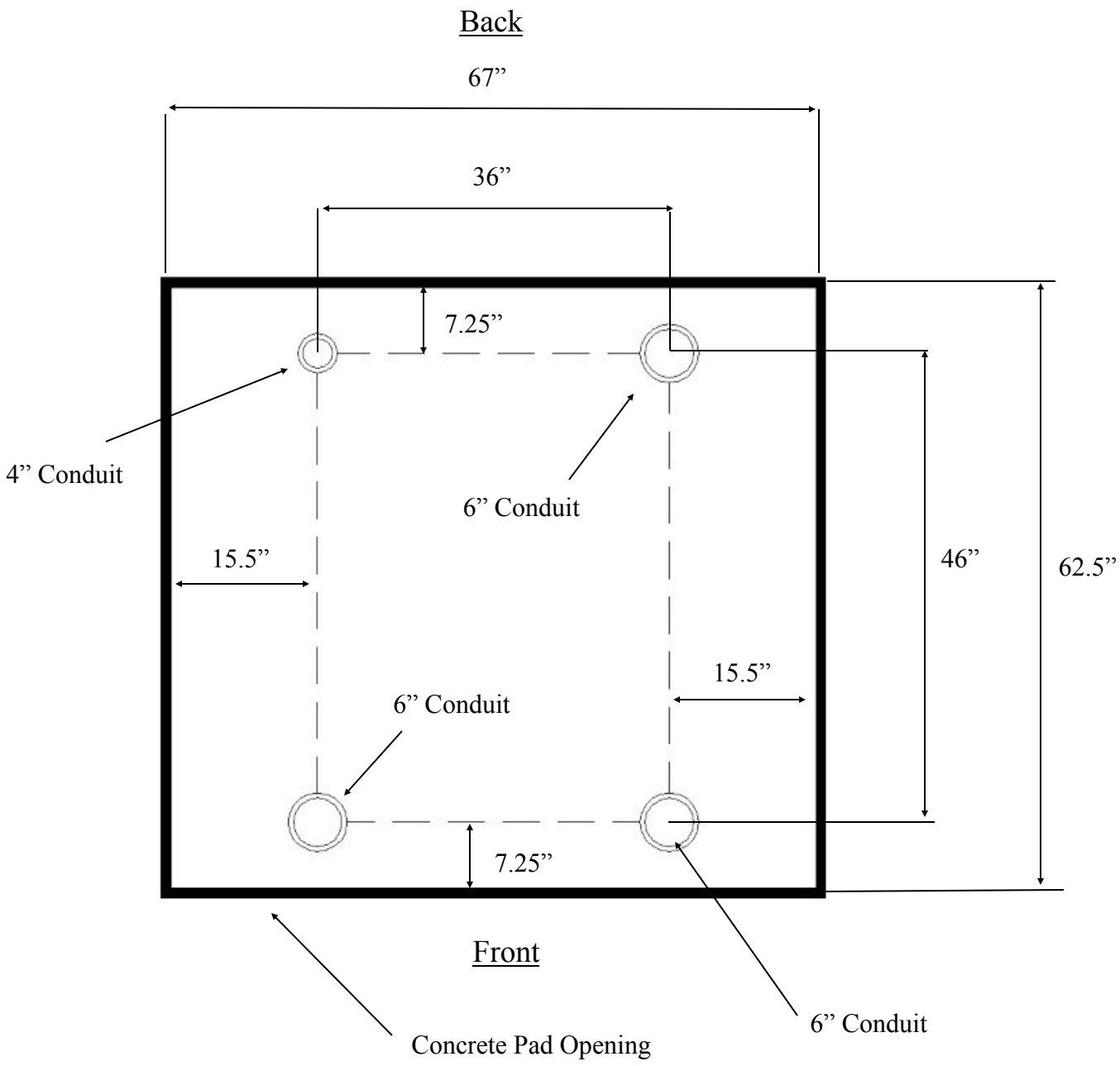
8 - 4” Schedule 40 Gray PVC Conduits

5 - 6” Schedule 40 Gray PVC Conduits

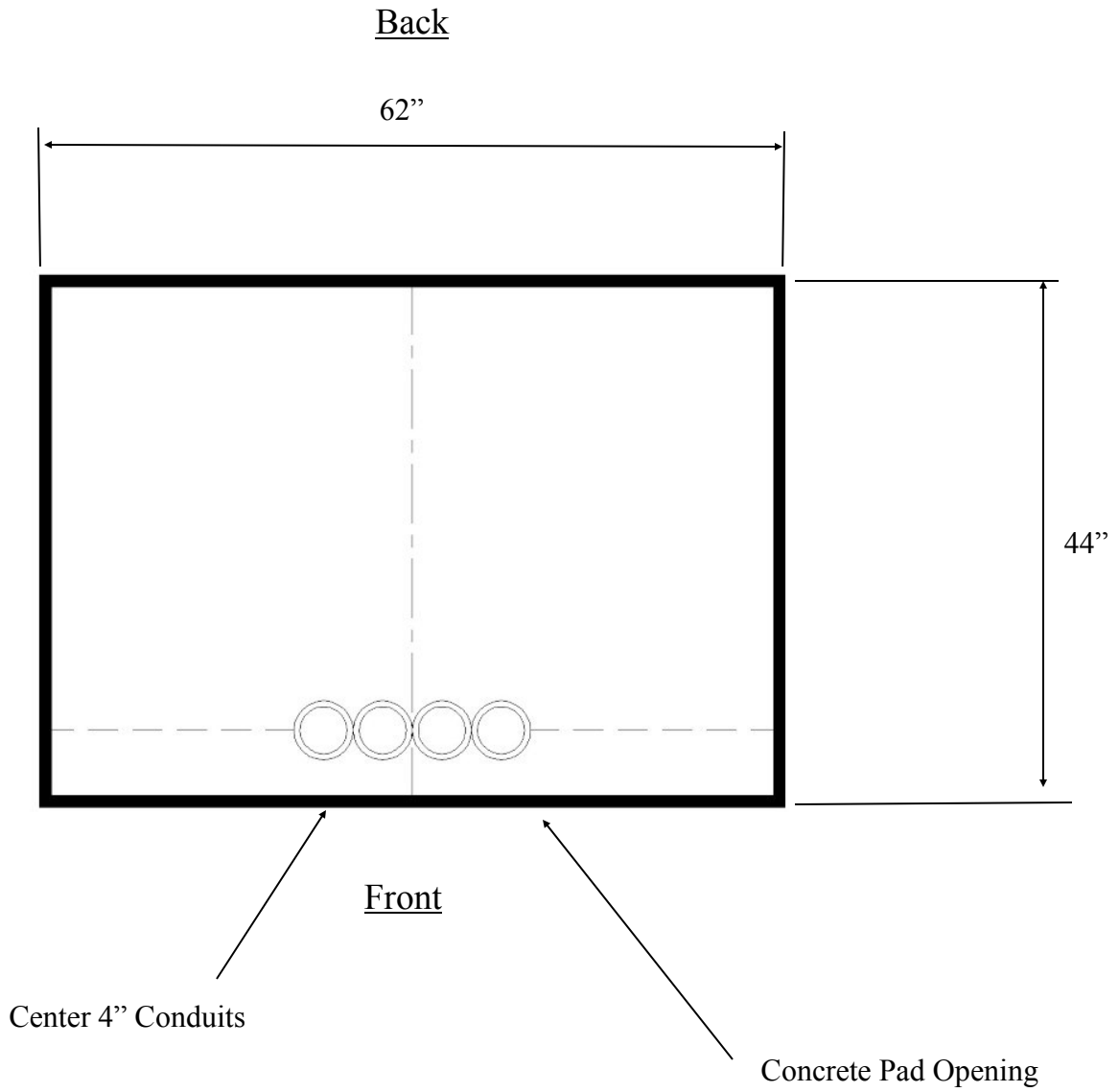
Conduit sizes may vary with design. If conduit number and size are different than as shown, please contact KUA’s conduit inspector.



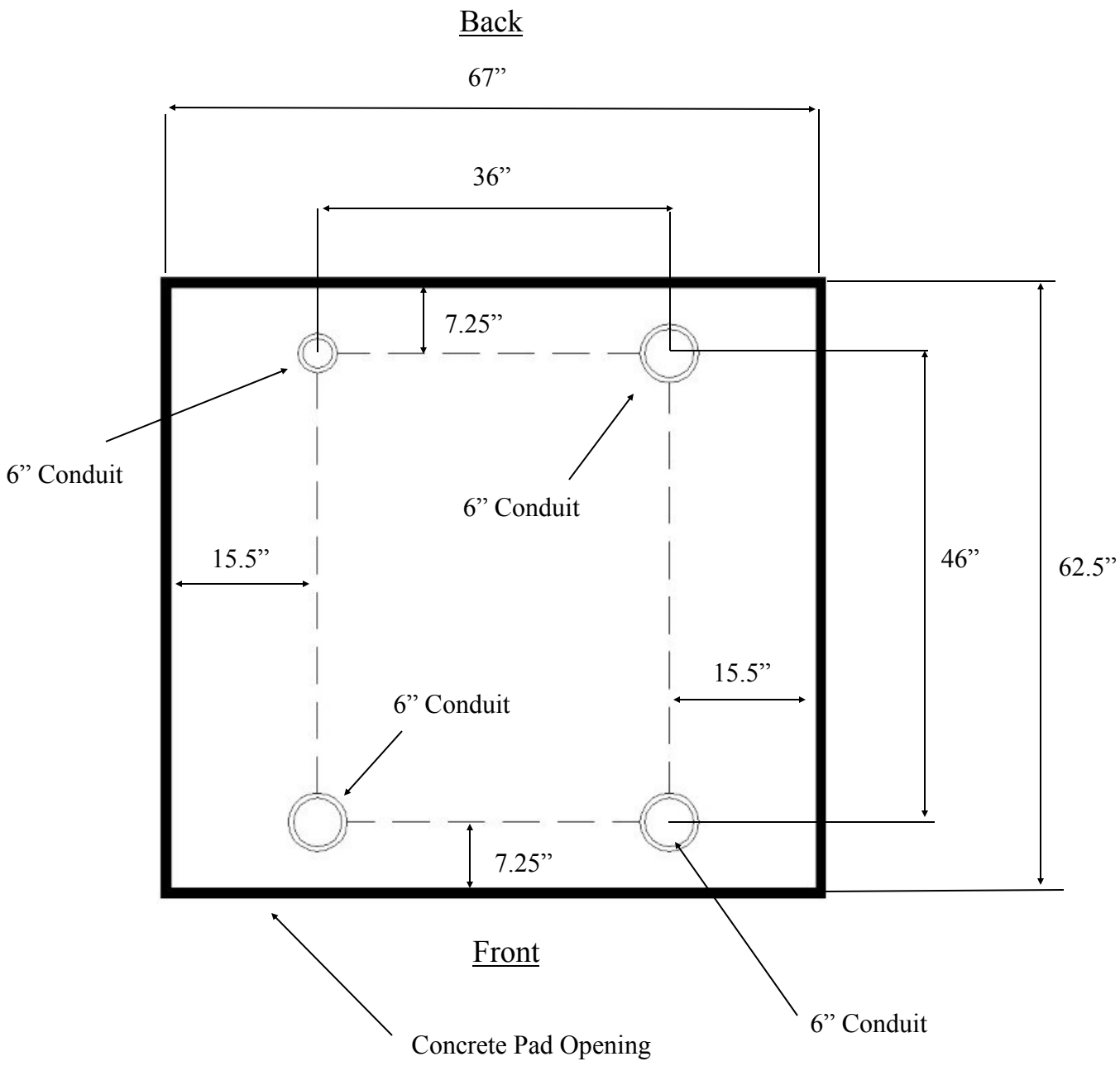
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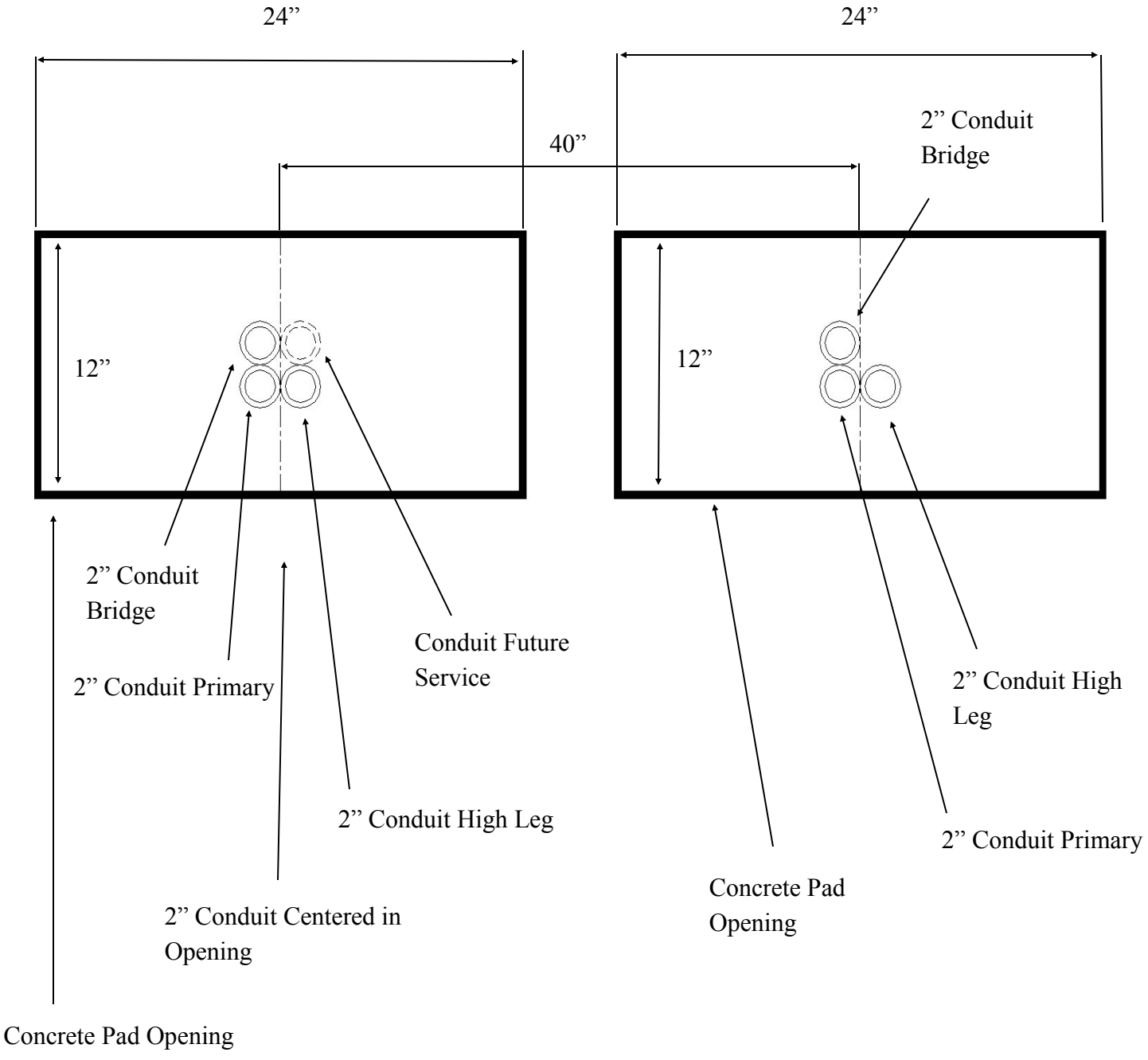
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24”
24”
40”
2” Conduit Bridge
12”
12”
2” Conduit Bridge
2” Conduit Primary
Conduit Future Service
2” Conduit High Leg
2” Conduit Centered in Opening
Concrete Pad Opening
Concrete Pad Opening
2” Conduit High Leg
2” Conduit Primary