Safety Codes, Permits & Inspections
Electrical Discipline

New Underground Service Installation Guide for New Single Family Homes

Revised May 2023

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Executive Summary

To enhance customer service and ensure safe and quality installations of utility services, the City of Edmonton has collaborated with The Canadian Home Builders Association (CHBA), ATCO, EPCOR, the Inspections Group and Edmonton-based Underground Contractors to produce a standardized installation guide.

The purpose of this guide is to provide samples of best practice installations to contractors and homebuilders which meet a high standard of installations and the applicable codes for New Underground Services.

The Effective date of Installation of utility services for New Single Family Homes, Semi-detached, and Row Housing is **May 1, 2023.**

Installation Guidelines

1: Identification of Finished Grade

Finished Grade shall be identified where the services leave the building. A minimum of four grade markings at the electrical and gas utilities are required: at the front and back corners, and at each riser.

- Under no circumstance shall power be less than 1.0 M below finished grade.
- Under no circumstances, shall gas be less than 0.6 below finished grade.

2: Gas and Electrical Riser Location & Dimensions

For single-family dwellings, the gas riser shall be installed closest to the street-side at no less than 0.30 m and no more than 2.50 m from the front corner of either the house or front attached garage, whichever is closest to the street. The front corner of the home shall be the reference point for single-family dwellings (zero lot line properties) and multi-family homes (semi-detached housing). The placement and method of gas line installation will be determined at ATCO's discretion.

The electrical riser will be installed furthest away from the street. The service conduit sleeve shall have an inside diameter of 100 mm and 600 mm long with 300 mm above finished grade and 300 mm below finished grade.

3: Water and Vent Clearance

ATCO: No vents or sources of water shall be installed within 1.20 m on either side (horizontal, not diagonal displacement) from the centre gas riser, including above the meter set. This allows for ATCO's minimum clearance requirements (of 1.00m)

to be met in all scenarios. For further information, contact ATCO for clearance requirements.

EPCOR: The builder should avoid the installation of appliance exhaust vents (furnace, hot water tanks, etc.) within 1.20 m on either side (horizontal, not diagonal displacement) from the center of the electrical meter.

4: Gas and Electrical Service Separation

Gas and Electrical service will run in the same trench with minimum 300 mm separation (horizontal or vertical) from electrical if in the horizontal (staked) plane, terminating as required at the municipal connection and at the consumer meter locations respectively.

5A: Electrical Conduit Depth and Anchoring – Primary Method

The electrical conduit shall be in 63 mm rigid PVC conduit from the meter and run directly against the foundation wall and on top of the footing.

Unique situations will be reviewed and will require approval prior to installation. The depth of the conduit must be minimum 1.00m or it will be required to go off the footing to achieve 1.00m.

The conduit shall run along the foundation wall and be secured to the building with rigid two-hole 63mm steel straps secured to the foundation until it reaches the street side end of the building. If the conduit is on top of the footing, then the use of a one-hole strap will be permitted. The anchoring method for the straps shall be 6.4 mm minimum anchor bolts to ensure that the conduit is securely held in place during and after backfilling, compaction, and settlement. Power actuated fasteners are not approved for this installation. If you are using tapcon or similar type screws, they must be a minimum of 1.5 inches in length.

There shall be 1 two-hole rigid steel strap on the vertical below the bell fitting on the 90° bend and 1 one-hole rigid steel strap on the horizontal just after the 90° bend.

There must be 1 one-hole rigid steel strap within 150 mm of the corner of the building foundation and every 1.8 m on the horizontal between these 2 straps. The inside diameter of the service conduit sleeve shall be 100 mm and 600 mm long with 300 mm above grade and 300 mm below grade.

Where the gas crosses the electrical service at the gas riser, 300mm of separation shall be maintained by using a minimum of three filled sandbags between the gas and electrical. These materials will be left by the builder/excavator.

With ICF foundations, use longer anchor bolts along both the vertical and the horizontal.

5B: Electrical Conduit Depth and Anchoring – Secondary Method

To be applied if the Primary Method is not possible.

The electrical conduit shall be in 63 mm rigid PVC conduit from the meter and run at a minimum depth of 1.00 m from the top of conduit to finished grade. The electrical conduit may run on the top of the footing provided that it is no less than 1.00 m to finished grade.

The conduit shall run along the foundation and be secured to the building with rigid two-hole 63mm steel straps secured to the foundation until it reaches the street side end of the building. If the conduit is on top of the footing, then the use of a one-hole strap will be permitted. The anchoring method for the straps shall be 6.4 mm minimum anchor bolts to ensure that the conduit is securely held in place during and after backfilling, compaction, and settlement. Power actuated fasteners are not approved for this installation.

There shall be 1 two-hole rigid steel strap on the vertical below the bell fitting on the 90° bend and 1 two-hole rigid steel strap on the horizontal just after the 90° bend.

There must be 1 two-hole rigid steel strap within 150 mm of the corner of the building foundation and every 1.8 m on the horizontal between these 2 straps. The inside diameter of the service conduit sleeve shall be 100 mm and 600 mm long with 300 mm above grade and 300 mm below grade.

With ICF foundations, use longer anchor bolts along both the vertical and the horizontal.

6: Trench Requirement

The trench will be brought to the level of the rigid PVC pipe after the PVC pipe leaves the building. No sand will be required for the electrical installation, but the marking tape is required midway between the conduit and finished grade. The marking tape shall remain visible at the electrical riser and the municipal connections upon service inspection.

The trench must be free of any construction debris prior to backfill with safe access in the trench that meets OHS requirements. The service box must be completely removed.

If using the secondary method: Place 300 mm of suitable fill where a crossing occurs

7: Extension of Electrical Conduit from Foundation

From the street-side point where the electrical service leaves the foundation, continue with rigid PVC pipe. Bends in the duct due to piles or other barriers are acceptable, but only if they are required. The duct shall terminate at 1.50 m to 3.00 m from the main gas line, while maintaining a maximum of 2-90° bends or a total of 180°.

No additional strapping is required after it leaves the foundation wall. The ducting will be allowed to cross under the driveway if required but shall not end underneath the driveway. There shall be no cable splices in the conduit. If there is a fault, a new cable shall be pulled in. The conduit shall have a bell collar on rigid PVC pipe and be sealed at the supply end with duct seal and covered with 300 mm of sand with the location staked. Any areas where the service cable will be directly buried, backfill with 300mm of soft sand.

8: Meter Base and Cable Termination

The contractor is to terminate the underground cable inside the meter base as shown below in Figures 8, 9 & 10. When doing so, the following requirements shall be adhered to:

- All conductors are to be tucked to the side of the enclosure and run to the top of the meter enclosure prior to coming down to the termination points.
- The neutral conductor shall be either equipped with a white insulated sleeve or taped white for its entirety within the enclosure.
- The jacket of the conductor shall be trimmed as close as possible to the connector while still extending through.
- iv. The load side conductor length shall be kept to a minimum, but allowing enough length of the conductor to terminate in a neat and orderly fashion.

The meter base shall be rated for 200A as per the EPCOR Customer Connection Guide (400 mm x 280 mm x 100mm). A correctly sized mast clamp will be required below the meter base.

A 100 A meter combo disconnect will be allowed for 100 A services.

9: Site Inspections

These installations require site inspection after the electrical is completed for the electrical conduit only. Backfill shall not be completed prior to a successful electrical inspection (receipt of green sticker). The builder will be responsible for providing soft sand, stakes, and sandbags for separation between gas and electrical.

Electrical inspections will consist of an inspection of the conduit, wire, finished grade for electrical riser and the installation as we have defined it in the primary or secondary methods.

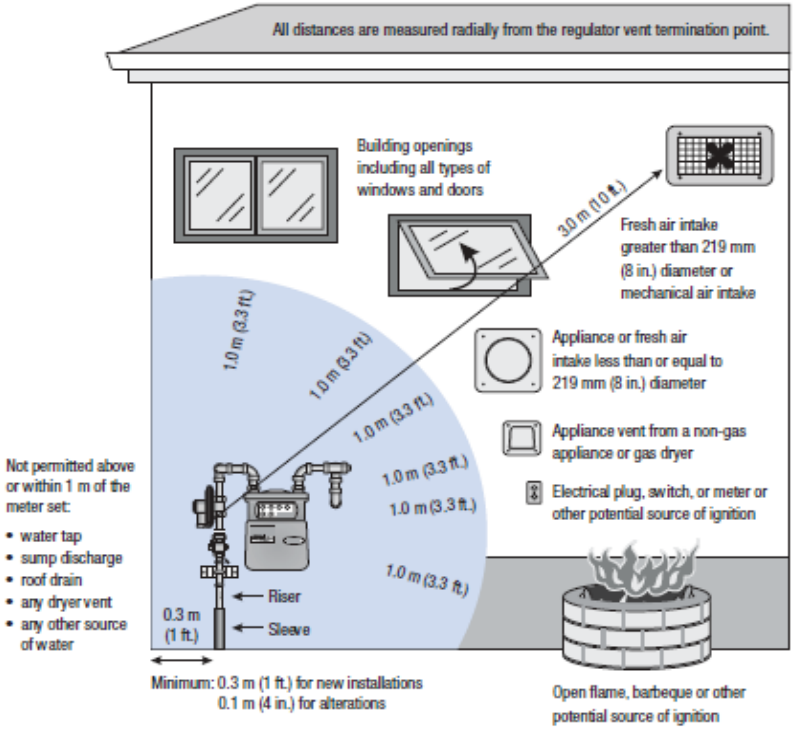
There will be no requirement for the power and gas riser to maintain a minimum distance of 1.20m separation. Instead, the need for the builder to meet the requirements outlined by ATCO in the following diagram will be required. This pre-existing 1.0m requirement from the service regulator vent to a source of ignition (including vents/exhausts/water sources, etc.) ensures CSA B149 Gas Code and relevant Electrical Code are met. Should the builder not be able to maintain these minimum clearances, the builder may be subject to:

- failed final inspection by the City of Edmonton, or
- gas meters being locked off by ATCO

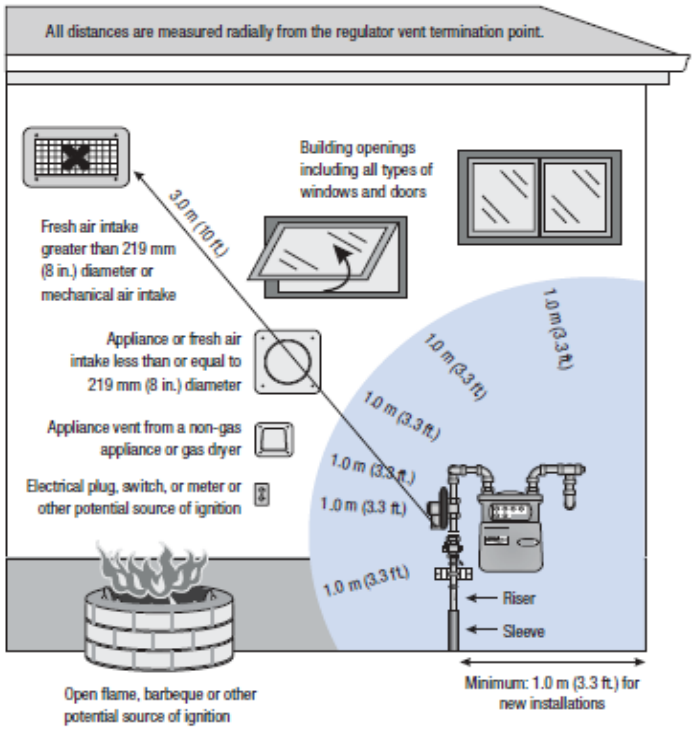
Site Inspection Diagrams

Typical Right Hand Side Installation

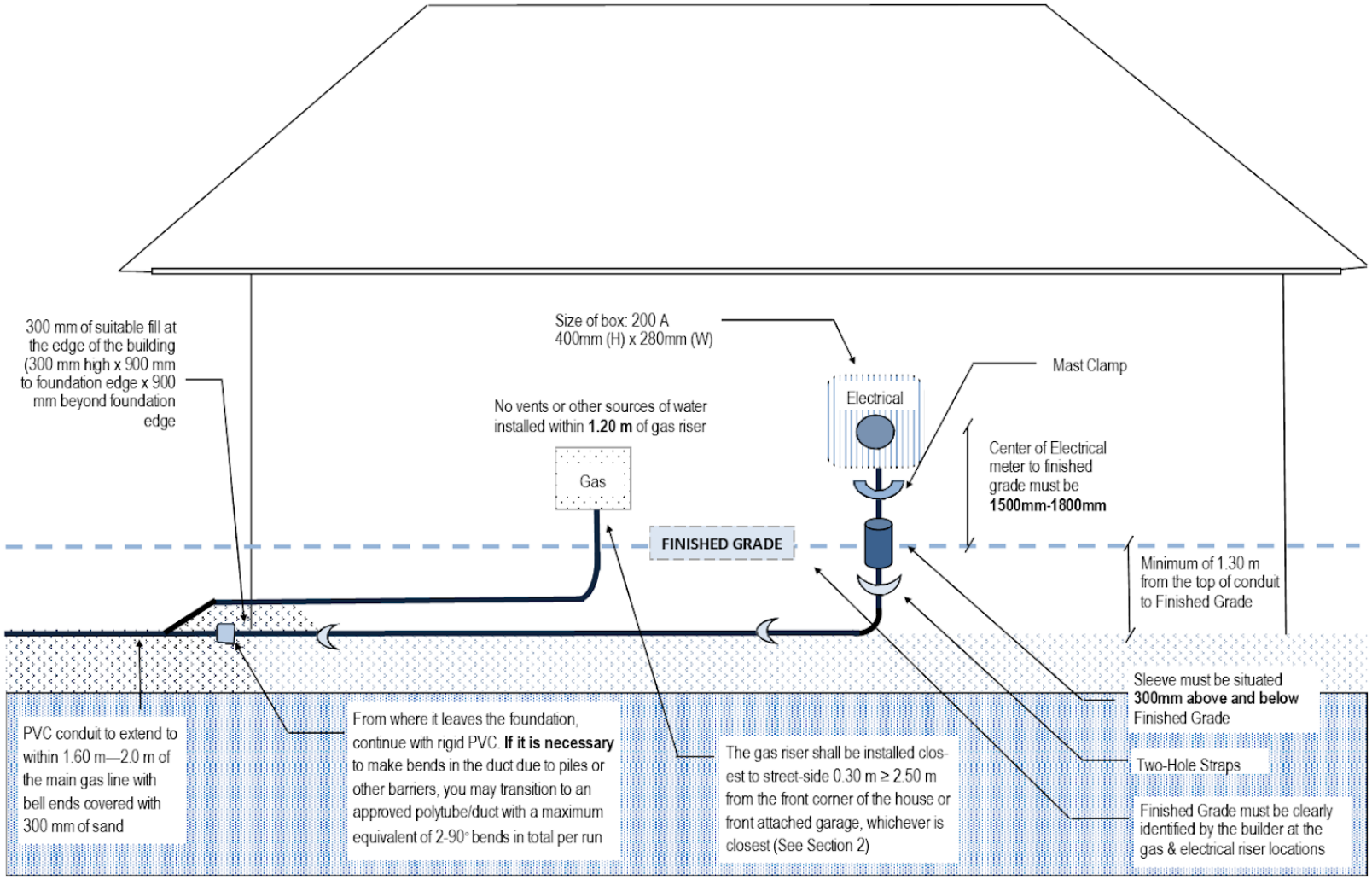
Minimum clearance requirements from the service regulator vent (measured in any direction)



Typical Left Hand Side Installation



Installation Diagram for New Underground Services



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Sample Installations: Primary Method

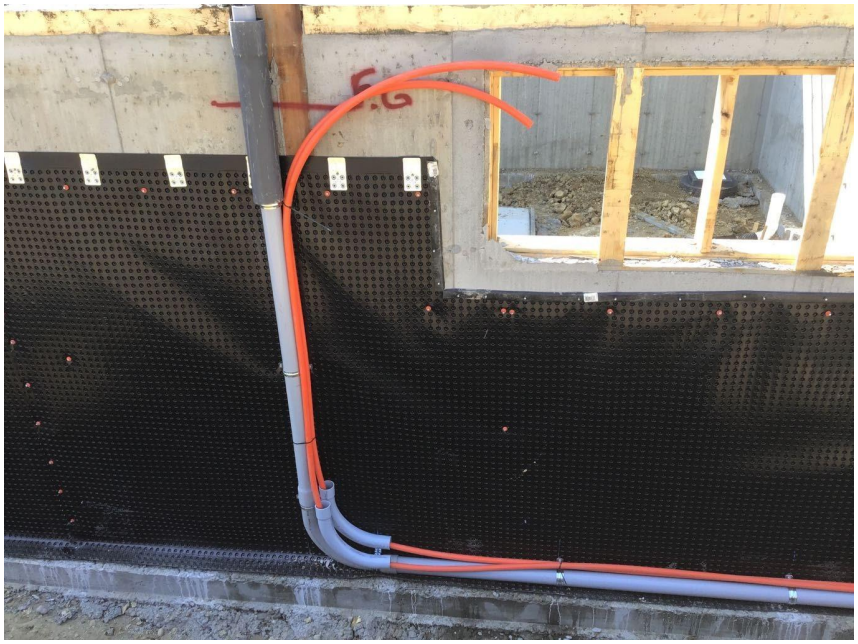

Figure 1 | Sample of Primary Method: Clear view of the pipes and strapping placement.

Figure 2 | Sample of Primary Method: The horizontal conduit will have priority and will be installed tightly to the footing.

Sample Installations: Secondary Method

Figure 3 | Sample of Secondary Method: The conduit is correctly backfilled as it leaves the foundation

Figure 4 | Sample of Secondary Method: Top view of the conduit as it leaves the trench

Figure 5 | Typical installation using Secondary Method

Figure 6 | Rainwater leads must go around the electrical conduit

Figure 7 | Typical installation using Secondary Method

Fig. 8, 9 & 10: Meter Base and Cable Terminations

Figure 8 | Alternative Meter Base Configuration

Figure 9 | Alternative Meter Base Configuration

Figure 10 | Alternative Meter Base Configuration

NEW UNDERGROUND SERVICE INSTALLATION
Quick Reference

1	Finished grade is clearly identified by builder on foundation wall where the services leave the building	
	A minimum of 4 grade markings at the electrical and gas utilities are required, at the front and back and at each riser.	
2	Gas Riser will be installed closest to street side 0.30 m ≥ 2.50 m from the front corner of the house or front attached garage (whichever is closest)	
	Electrical riser installed furthest away from the street.	
	Electrical conduit installed closest to foundation throughout run	
	Placement and method of gas line installation is up to ATCO's discretion	
	Crossover with gas line occurs at the edge of the building	
3	No vents or sources of water within 1.20 m on either side of gas riser and above meter (horizontally, not diagonally)	
4	If gas and electrical are running in the same trench, the gas line must retain a minimum of 300 mm separation from electrical	
5	Determine if the installation will be the Primary Method or Secondary Method	
5A Primary Method:	Electrical installed in 63 mm rigid PVC conduit at 1.00m minimum from the top of the conduit to finished grade	
	Conduit runs along foundation until it reaches street side at the end of the building or garage and is secured to the foundation with rigid two-hole straps	
	1 two-hole 63mm rigid steel strap on the vertical below the bell fitting on the 90° bend	
	1 two-hole 63mm rigid steel strap horizontal just after the 90° bend	
	1 two-hole 63mm rigid strap every 1000 mm on the horizontal between these 2 straps and 1 two-hole 63mm rigid steel strap within 150 mm of corner of the building foundation	
	The service conduit sleeve shall be inside diameter of 100 mm (4") and 600mm long with 300mm above grade and 300mm below grade	
	IFC foundations must use 20 mm (3/4") pressure treated plywood secured with longer anchor bolts	
5B Secondary Method:	The Secondary method is the same as the Primary Method, however, the electrical conduit is not required to be laid on the footing. It shall be installed at the depth of not less than 1.00m to finished grade.	
6	Backfill brought to the level of the rigid PVC	
	No sand will be required for the electrical installation, but marking tape is required midway between conduit and finished grade	
	Marking tape visible at electrical riser and municipal connections	
	300mm of suitable fill shall be placed over electrical at the edge of the building (300 mm high x 900 mm to foundation edge X 900 mm beyond foundation edge).	
	Soft sand shall be placed at the gas riser and at the bell-hole	
7	Continue with rigid PVC from street-side point where electrical service leaves the foundation, terminate 1.50 m ≥ 2.00 m from the main gas line	
	Conduit requires a bell collar on rigid PVC sealed at the supply end with duct seal and covered in 300 mm of sand	
	Service Conduit sleeve inside diameter is 100 mm, lengthened to 600 mm	
	Conduit is 300 mm above finished grade and 300 mm below finished grade	
8	50 mm of extra cable left above the top of the meter box coiled inside	
	Meter base is 200 A, Size of box: 400mm (H) x 280mm (W) x 100mm (D)	
	All installations must be run with 63 mm conduit	
	Mast clamp is required below the meter base	
9	Site inspections after electrical is completed and are for the electrical conduit and cable only	
	Backfill is completed after electrical inspection has received a green sticker	
	Conduit shall not terminate beneath a driveway or a sidewalk or have any splices in the conduit	
	Provision of soft sand, stakes, and sandbags for separation between gas and electrical	