Technical Guidelines for Primary Services

These guidelines are for property owners, developers, consultants, etc. (**Customer**) to use when coordinating a new or upgraded electrical service to a property (**Service**). They must be used in conjunction with the Conditions of Service for Enova Power Corp. (**Enova**), Enova's Metering Specifications, Enova' Service Connection Process for Commercial Services, the Ontario Building Code (OBC), the Ontario Electrical Safety Code (OESC) and all other applicable regulations.

1. General

1.1 Contact Enova's Engineering Department prior to starting design to determine specific servicing requirements and service configuration type.

1.2 A site will generally require a primary service if the service size exceeds 400A at 347/600V or 600A at 120/208V, unless permitted otherwise by Enova.

1.3 Customer to follow Enova specified design timelines and document submission requirements as per the Enova's *Service Connection Process for Commercial Services* document.

1.4 All materials, labour and trucking costs associated with the installation, relocation, removal, etc. of Enova-owned infrastructure for the purpose of the Service is 100% chargeable to the Customer, with the exception of transformation when supplied by Enova.

1.5 In most cases, Enova will provide and own transformer(s) and high voltage cables and the Customer will supply and install all required hydro civil work that may be required within the property. Refer to Appendix for installation details.

1.6 Enova may require multiple transformers and/or high voltage duct banks and/or switchgear on the property to provide a looped configuration of the Service if installation requires more than one transformer or if the property is located within an underground distribution area. This will minimize power outages and aid scheduled maintenance. Refer to Enova Conditions of Service for more details.

2. Typical Infrastructure Required

2.1 Underground high voltage duct bank(s), from a point of supply/supplies from Enova's distribution system to the transformer(s) and/or switchgear unit(s);

2.2 Pad-mounted transformer(s) located on the Customer's property complete with bollards, or electrical equipment vault room in the building containing transformers;

2.3 Pad-mounted or submersible switchgear unit(s) complete with bollards located on Customer's property, or electrical equipment vault room in the building containing switchgear unit(s);

2.4 An underground low voltage duct bank from the pad-mounted transformer(s) to the building(s);

2.5 Overhead infrastructure such as overhead primary conductors, load breaks, hydro poles, polemounted transformer(s), primary metering units and outdoor-rated enclosures for metering and SCADA equipment;

2.6 An electrical room in the building containing low voltage distribution, metering equipment and if required SCADA equipment.

3. Customer Owned Transformer Requirements

3.1 Where the Customer wishes to supply, install, and own their own transformer(s) the following shall apply:

3.1.1 Provide Enova with Customer owned transformer specifications, installation details including grounding, and a complete protection co-ordination study to Enova for review and approval.

3.1.2 Transformers 1500 kVA and larger on 13.8kV and 27.6kV systems shall have delta connected primary windings.

3.1.3 The Customer installed transformer(s) must meet CSA Standard C802.1 latest revision for energy efficiency.

4. Customer Owned High Voltage Substation Requirements

4.1 Where the Customer installs their own high voltage substation the following shall apply:

4.1.1 For aggregate Customer owned transformer capacity greater than 3MVA for 13.8 kV and 6 MVA for 27.6 kV at the point of demarcation, circuit breakers shall be used at the Customer's first protective device. Fuses are permitted at the Customers first protective device for aggregate transformer capacity 3 MVA and less for 13.8 kV and 6 MVA or less for 27.6 kV.

4.1.2 Where a high voltage consumer service uses a combination of overhead and underground installations, fuses may be permitted at the Customer's first overcurrent device when pole mounted in lieu of 4.1.1 provided system coordination is achieved through downstream protective devices.

4.1.3 Circuit breakers shall have separate protection relays capable of phase and ground protections. Enova will provide upstream distribution system protection settings to the Customer to ensure proper distribution system coordination. The Customer shall be responsible for carrying out a TCC study and propose settings that coordinate with Enova's upstream equipment. Enova must review and approve the Customers TCC settings prior to service energization.

4.1.4 When a non-withdrawable type circuit breaker is used as the Customer's first protective device, it shall be preceded by an upstream 3-pole loadbreak switch.

4.1.5 The Compartment for a withdrawable circuit breaker shall have grounding provisions.

4.1.6 Where Enova owns the incoming feeder cables, the Customer substation shall be located outside or inside a building at grade level with direct outside access for equipment and personnel entry into the room containing the substation. The construction of the room and working space requirements shall conform to the latest revisions of the OESC and the OBC.

4.1.7 Enova owned incoming feeders shall terminate in a separate cable termination compartment. The cable termination compartment shall allow 1.2m of clearance between where Enova's cables enter the compartment to the termination lugs within the compartment.

4.1.8 Enova cables shall not run in free air inside the electrical room. The Customers ducts containing Enova's cables shall terminate directly at the incoming cable compartment.

4.1.9 Viewing windows shall be provided to permit the observation of all switchblades and incoming cable terminations with the access doors closed.

4.1.10 If the Customer wishes to install lightning arresters, they shall be located on the load side of the first protective device.

4.1.11 Primary metering (if applicable) shall be located on the load side of the Customers first protective device. Refer to Enova's Metering Specification for primary metering details.

4.1.12 The Customer shall submit to Enova the shop drawings for the substation for review and approval prior to ordering.

4.1.13 Early consultation with Enova is required to determine a projects demarcation point in accordance with Enova’s Conditions of Service.

5. Easement Requirements

5.1 Generally, Enova requires easement(s) for Enova owned high voltage infrastructure on private property. The easements are to be free of any structures, architectural features, underground utilities, tree roots, etc. The Customer shall provide easement(s) per the following unless a deviation or larger easement is required by Enova:

5.1.1 A minimum of 3.0m wide easement over an underground high-voltage duct bank with the duct bank centered in the easement;

5.1.2 6.2m x 6.8m easement for the installation of an outdoor 3 phase pad-mounted transformer with the transformer foundation centered in the easement;

5.1.3 5.6m x 5.1m easement for the installation of an outdoor 1 phase pad-mounted transformer with the transformer foundation centered in the easement;

5.1.4 7.0m x 7.0m easement for the installation of an outdoor switchgear unit with the switch foundation centered in the easement;

5.1.5 Easement over entirety of electrical equipment vault rooms that contain Enova infrastructure;

5.1.6 Easement over guy anchors from Enova hydro poles as determined by Enova.

6. Clearance Requirements from Distribution Pole Lines

7.1 A building, or any other structure, shall not be constructed within 5 meters (measured radially) of a high voltage conductor owned by Enova, or 6m (measured horizontally), from the center line of an overhead distribution system pole line owned by Enova (OBC 3.1.19 and OESC 75-708). Refer to Enova's standard 02-101A1 for details. Permanent structures within the Restricted Zone surrounding overhead lines are prohibited. When planning building construction, Customer should consider additional space required for construction (i.e. skyjacks, scaffolding, etc.), and maintenance (i.e. window cleaning).

7.2 An object (crane, similar hoisting device, backhoe, power shovel or other vehicle or equipment) shall not be brought closer than 3 meters to an energized overhead conductor owned by Enova (O.Reg 213/91 – Section 188).

7.3 Enova will not provide nor permit a third party contractor to cover-up and/or provide isolation of its energized overhead conductors that lie along a construction site (O.Reg 213/91 – Section 189).

7. Space Requirements

7.1 A minimum of 3 meters of clear space is required on the access side of a pad-mounted transformer, submersible switchgear, transformer room, or switchgear room. A minimum of 1 meter on the non-access side and/or switchgear unit is required free and clear of any obstructions for operational purposes. No curbs are permitted within 1m of a transformer or switchgear foundation. No concrete is permitted above a transformer or switchgear ground grid.

7.2 Pad mount transformers and switchgear owned by Enova shall be a minimum of 3m away from a building or any other Customer owned structure including neighboring buildings.

7.3 A minimum of 1 meter in front of Enova-owned metering equipment with a minimum ceiling height of 2.1m is required for working space inside the electrical room. Refer to Enova's Metering Specifications for additional requirements.

7.4 Where adequate land area cannot be provided for a pad-mounted transformer and where required by Enova, the Customer shall provide Enova with an electrical equipment vault room and/or switchgear room at grade level accessible directly from outside. There shall be no building overhang in front of the doors on the exterior of the building for Enova's truck mounted crane to lift the transformers and/or switchgear into the equipment vault unless a deviation has been allowed by Enova. Refer to Enova's Vault Room Standards in Appendices for requirements.

7.5 To access pad-mounted transformer(s) or electrical equipment vault room(s), the Customer shall provide Enova with a maintained road that is minimum 4.0m wide, with a minimum 15m turning radius, clear of any obstructions and capable of sustaining a maximum load of 25,000 kg to access the transformer(s),

switchgear unit(s) or vault room(s). Any canopy or other parts of the building above the access driveway must be minimum 5.0 m above roadway. An 8.5m wide space is required for truck outriggers at the transformer location. Furthermore, an extra 2.5m is required between the transformer and the truck to accommodate minimum swing of the truck mounted crane

7.6 Any canopy or building overhang directly above an Enova owned transformer or switchgear must be a minimum of 11m above these structures. Where a building overhang encroaches on Enova's transformer or switchgear easements, seek direction from Enova. In general, no building overhangs are permitted with an encroachment into Enova's easement greater than 1m from the edge of the easement unless otherwise agreed to by Enova.

8. Access Requirements

8.1 The Customer must provide or arrange free, safe and unobstructed access to any authorized representative of Enova for the purpose of Enova equipment maintenance, inspection, replacement etc.

8.2 The Customer shall be responsible for supplying Enova with a key for the premises if required to access Enova-owned equipment. Enova may request that the lock be keyed to Enova specifications.

8.3 Meter rooms, for multi-unit metering, shall be accessible to Enova via an outside lockable door at grade level unless otherwise agreed to by Enova. Refer to Enova's Metering Specification document for further details.

9. Installation Details

9.1. The Customer shall provide the required infrastructure in a location compliant with this document and approved by Enova, installed as per the following standards:

9.2 3-Phase Padmount Transformer Installations:

9.2.1 Refer to Enova Standard 12-300A1 for the Brooklin Concrete Products Ltd. BCP-104SW transformer vault.

9.2.2 Refer to Enova Standard 12-300A2 for the Brooklin Concrete Products Ltd. BCP-104SW transformer vault grounding installation requirements.

9.3 Transformer Vault Room Installations:

9.3.1 Refer to Enova Standards 12-350A1 to 12-350A4 for installation requirements.

9.4 Switchgear Room Installations:

9.4.1 Refer to Enova Standards 12-370A1 and 12-370A2 for installation requirements.

9.5 Vista Switchgear Vault Installations:

9.5.1 Refer to Enova Standard 12-311A10 for Acton Precast Vista switchgear vault installation requirements

9.5.2 Refer to Enova Standard 12-311A11 for Acton Precast Vista switchgear vault grounding installation requirements

9.6 Duct Bank Installations:

9.6.1 Refer to Enova Standard 12-404A1 for 200A Concrete Encased Duct Structures

9.6.2 Refer to Enova Standard 12-404A2 for 600A Concrete Encased Duct Structures

9.7 Metering Installations:

9.7.1 Refer to the latest edition of the Enova Metering Specifications and the site specific metering standards listed in the ‘Offer to Connect’ documentation for installation requirements.

9.7.2 If the site is fed from a Customer owned distribution transformer the Customer must make provisions for bulk metering to accommodate a check meter.

Appendices:

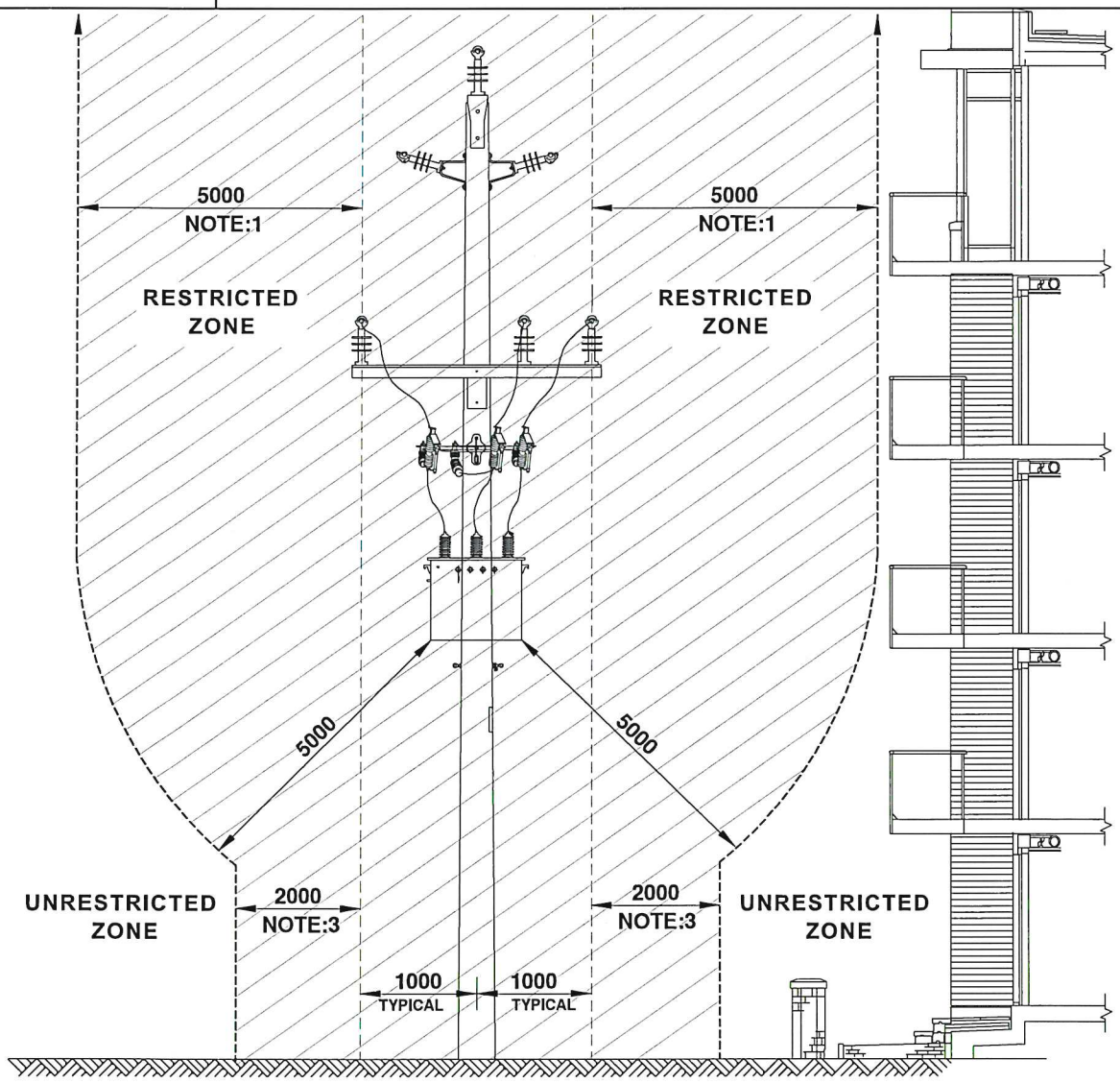
- 02-101A1 – Clearances to Adjacent Structures 8.32kV - 27.6kV
- 12-300A1 – Custom BCP-104SW 3 Phase Transformer Vault
- 12-300A2 – Custom BCP-104SW Vault and Ground Grid Installation Details
- 12-311A10 – Acton Precast 110”x121” Vault for Vista Switchgear
- 12-311A11 – Acton Precast 110”x121” Vault and Ground Grid Installation Details
- 12-350A1 – Transformer Vault Room Requirements
- 12-350A2 – Transformer Vault Room – Layout (Transformers up to 300kVA)
- 12-350A3 – Transformer Vault Room – Layout (Transformers greater than 300kVA)
- 12-350A4 – Transformer Vault Room – Secondary Transition Bus Details
- 12-370A1 – Vista Vault Room – Room Layout
- 12-370A2 – Vista Vault Room – Construction Details
- 12-400A1 – Typical Bollard Installation and Grounding Detail
- 12-404A1 – Typical Concrete Encased Duct Structures 200A
- 12-404A2 – Typical Concrete Encased Duct Structures 600A

Note:

Any standards provided by Enova are the sole property of Enova Power Corp. and are provided for information purposes only. The standards may be used in preparation of construction plans and specifications concerning Enova owned equipment only. No other use is authorized without prior written consent of Enova.

DATE:	SCALE:	REV.	DWG. NO.
2025.06.02	NTS	0	02-101A1

TITLE: **CLEARANCES TO ADJACENT STRUCTURES 8.32KV-27.6KV**



NOTES:

1. NO PERMANENT BUILDING OR STRUCTURE SHALL BE PLACED WITHIN 5000mm MEASURED RADIALLY FROM ANY PRIMARY VOLTAGE (>750V) CONDUCTOR OR EQUIPMENT, MEASURED FROM THE CLOSEST PRIMARY CONDUCTOR (AT REST) TO THE CLOSEST POINT OF THE BUILDING OR STRUCTURE.
2. A MINIMUM HORIZONTAL SEPARATION OF 1500mm FROM THE BUILDING OR STRUCTURE TO THE SECONDARY CONDUCTOR (<750V) SHALL BE MAINTAINED, UNLESS THE SECONDARY CONDUCTORS CONNECT SUPPLY TO THE BUILDING'S ELECTRICAL SYSTEM.
3. NO PERMANENT BUILDING OR STRUCTURE SHALL BE PLACED OR CONSTRUCTED WITHIN 2000mm HORIZONTAL SEPARATION FROM THE OUTERMOST OVERHEAD PRIMARY CONDUCTOR (AT REST).
4. ZERO VOLTAGE SUPPORT WIRES (I.E. SPAN GUYS) MAY CROSS OVER THE CUSTOMER'S STRUCTURE AND SHALL MAINTAIN AT LEAST 2500mm VERTICAL CLEARACNE TO THE CLOSEST PART OVER THE BUILDING STRUCTURE.
5. CONTACT ENOVA TO DETERMINE SPECIFIC CLEARANCES APPLICABLE TO YOUR PROJECT.
6. CALCULATED CLEARANCES ARE BASED ON CONDUCTORS AT MAXIMUM SWING POSITION, CSA C22.3 NO. 1–20 TABLE 12, OBC 3.1.19, & OHSA.

LICENSED PROFESSIONAL ENGINEER
C.V. FILIMON
100042010
Sept 24, 2025
PROVINCE OF ONTARIO

**ALL DIMENSIONS IN mm UNLESS OTHERWISE NOTED.

REV.	DESCRIPTION	DATE	INITIALS
1			
2			

Certificate of Approval

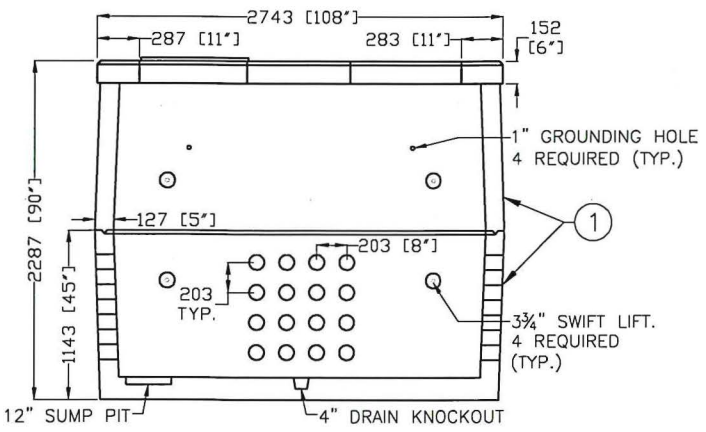
The installation work covered by this document meets the safety requirements of Section 4 of Regulation 22/04

CARMEN FILIMON — Name
SEPT 24, 2025 — Date
P.ENG. — Signature/& Professional Designation

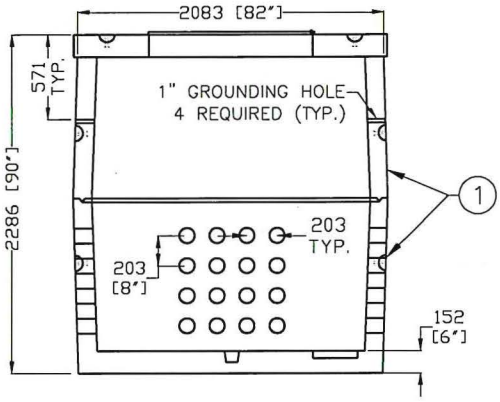
DATE:	SCALE:	REV.	DWG. NO.
2025-01-31	NTS	3	12-300A1

TITLE: **CUSTOM BCP104SW 3 PHASE TRANSFORMER VAULT**

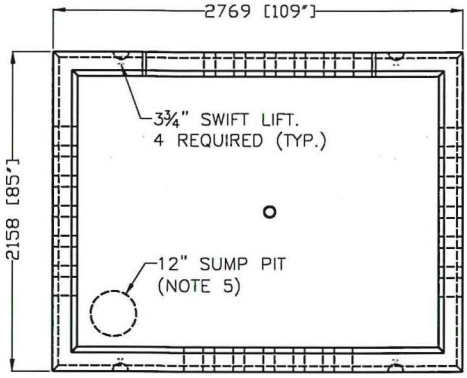
FRONT VIEW



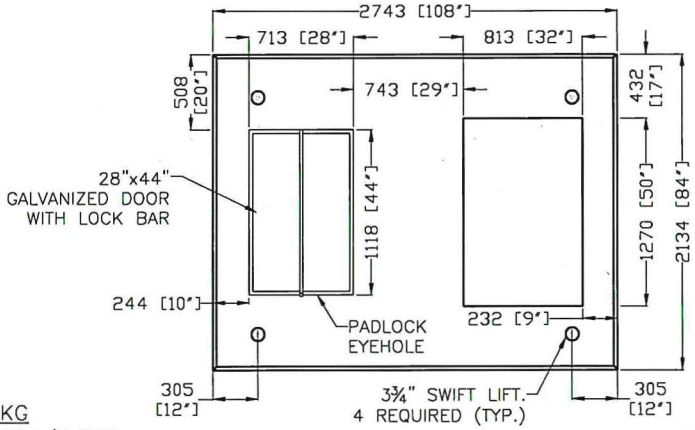
SIDE VIEW



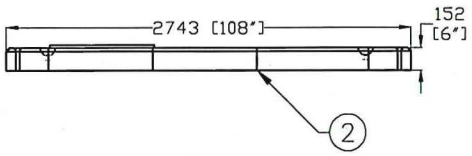
TOP VIEW



LID TOP VIEW



LID FRONT VIEW



CONCRETE:
35MPa/5000PSI
AIR ENTRAINMENT: 5–8%

REINFORCEMENT:
STEEL TO CSA CAN A23.1/A23.3.
G30.18 Fy=400MPa

WEIGHT: LBS/KG

BOTTOM:	10,291/4,668
MIDDLE:	6,237/2829
TOP:	3,307/1,500
TOTAL:	19,835/8,997

MAX EQUIPMENT WEIGHT:
29,244LBS/13,256KG

GENERAL NOTES:

1. CABLE ENTRY OPENINGS–PVC SEALS FOR MAX. 4" I.D. DUCT.
2. DELIVERY IS MADE BY CRANE–EQUIPPED TRUCKS, EXCAVATION MUST BE READY, SAFE AND ACCESSIBLE FOR UNLOADING FROM THE REAR OF THE TRUCK.
3. MIN OVERHEAD CLEARANCE OF 18FT (5.5m) IS REQUIRED.
4. ALL UNITS MUST BE HANDLED WITH PROPER LIFTING EQUIPMENT. (I.E. SPREADER BAR).
5. SUMP PUMP PIT TO BE UNDER THE GALVANIZED DOOR SIDE.
6. LID TO BE ROTATED AND INSTALLED AS PER THE ENOVA DRAWING.
7. WATER PRESSURE WAS NOT CONSIDERED IN THE STRUCTURAL DESIGN. REPORT WATER TABLE DURING CONSTRUCTION.
8. PLACE BACKFILL SIMULTANEOUSLY AROUND THE VAULT TO AVOID UNBALANCE LATERAL EARTH PRESSURES.
9. BACKFILL SHOULD BE UNIFORMLY COMPACTED TO A MINIMUM OF 98% MATERIALS SPMDD.
10. UNITS WILL BE SEALED WITH BUTYL TAPE AT THE JOINTS.

**ALL DIMENSIONS IN mm UNLESS OTHERWISE NOTED.

LICENSED PROFESSIONAL ENGINEER
C.V. FILIMON
100042010
May 06/25
PROVINCE OF ONTARIO

REV.	DESCRIPTION	DATE	INITIALS
1	UPDATED CUSTOM VAULT TO 3 PIECE BCP104SW.	2018-07-05	MS
2	UPDATED BRANDING	2023-05-26	AF
3	UPDATED VAULT DIMENSIONS & NOTES	2025-01-31	BM

Certificate of Approval

The installation work covered by this document meets the safety requirements of Section 4 of Regulation 22/04

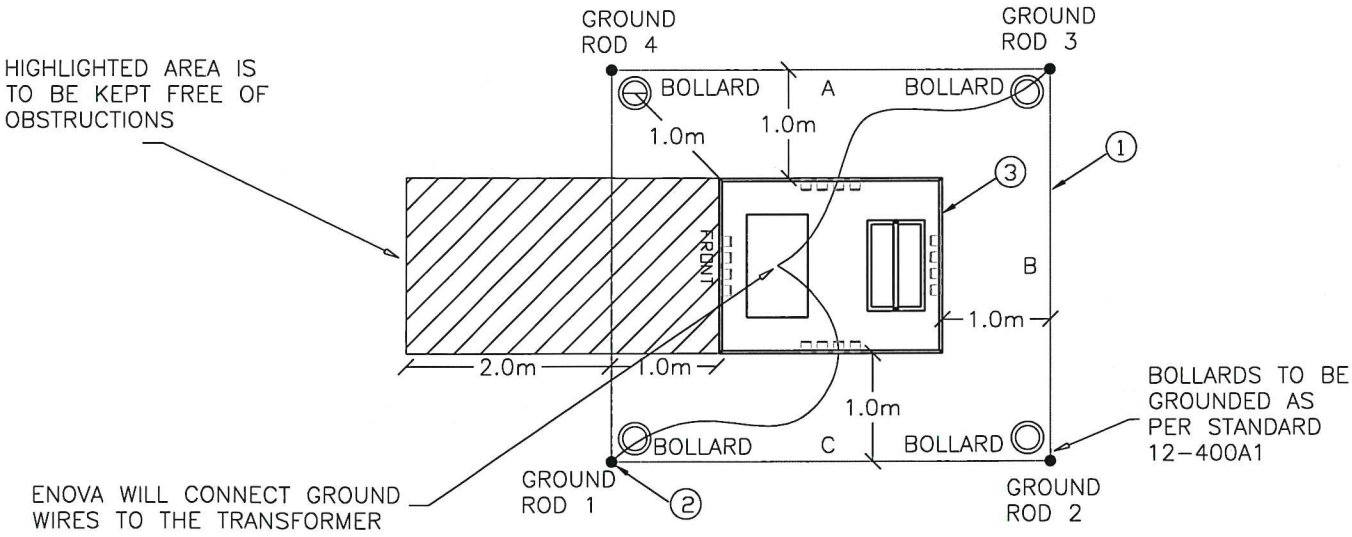
CARMEN FILIMON — Name
MAY 06, 2025 — Date
P.ENG. — Signature & Professional Designation

STANDARD **12-300A1**

Material List			
Item	Quantity	Description	JDE Part #
1	1	2 piece Foundation, Concrete BCP104SW	38V 029 039
2	1	BCP104SW Concrete Top	

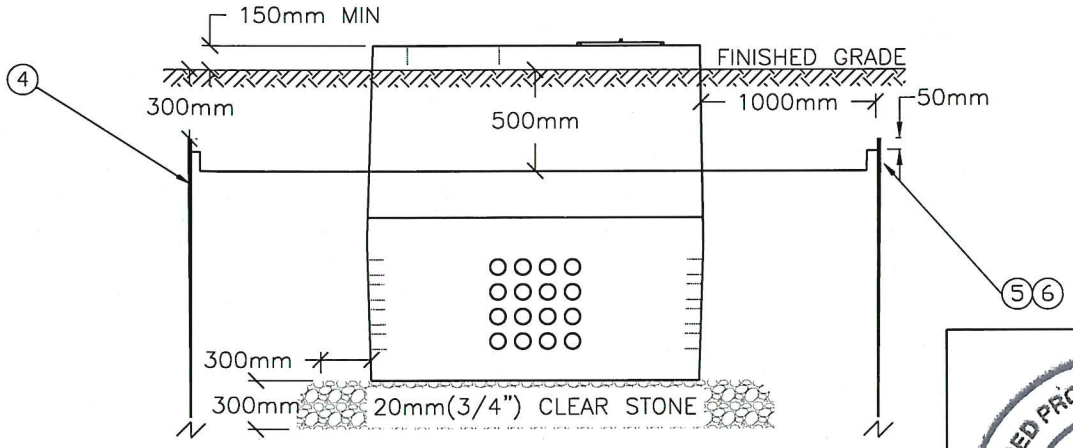
DATE:	SCALE:	REV.	DWG. NO.
2025-02-14	NTS	2	12-300A2

TITLE: **CUSTOM BCP104SW VAULT AND GROUND GRID INSTALLATION DETAILS**



BOLLARDS ARE TO BE INSTALLED ONLY IF THEY ARE REQUIRED TO PROTECT ENOVA EQUIPMENT FROM VEHICLE TRAFFIC. BOLLARD PLACEMENT SHOULD NOT INTERFERE WITH OPERATION, MAINTENANCE OR REPLACEMENT OF ENOVA EQUIPMENT.

ADDITIONAL BOLLARDS AT LOCATIONS A, B, C MAY BE REQUIRED FOR HIGH TRAFFIC AREAS



CUSTOMER TO INSTALL GROUNDING GRID PER ENOVA AND ESA STANDARDS:

1. FEED GROUNDING WIRE FROM INSIDE VAULT THROUGH LIFTING HOLE TO FASTEN TO GROUND ROD #1 WITH AMP TAP.
2. FASTEN GROUNDING WIRE TO GROUND RODS #2, #3 AND #4 WITH AMP TAPS MAINTAINING 500mm DEPTH FOR GROUNDING WIRE.
3. FASTEN GROUNDING WIRE TO GROUNDING WIRE AT GROUND ROD #1.
4. FEED GROUNDING WIRE FROM INSIDE VAULT THROUGH LIFTING HOLE TO FASTEN TO GROUND ROD #3 WITH AMP TAP.

LICENSED PROFESSIONAL ENGINEER
C.V. FILIMON
100042010
May 12/25
PROVINCE OF ONTARIO

*– DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE INDICATED

REV.	DESCRIPTION	DATE	INITIALS
1	UPDATED BRANDING.	2023/05/26	A.F.
2	UPDATED BRANDING.	2025/02/14	BM

Certificate of Approval

The installation work covered by this document meets the safety requirements of Section 4 of Regulation 22/04

CARMEN FILIMON — Name

MAY 12, 2025 — Date

P.ENG. — Signature & Professional Designation

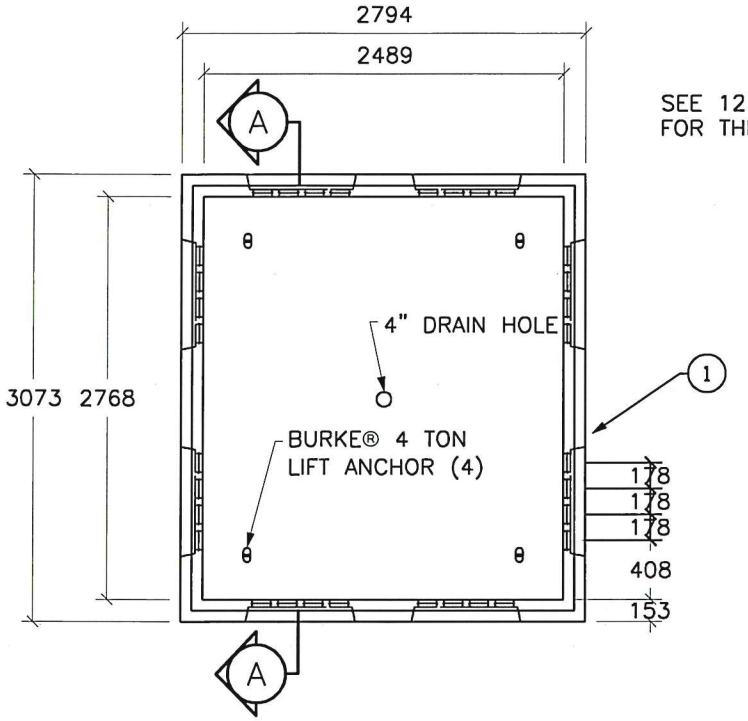
STANDARD **12-300A2**

Material List			
Item	Quantity	Description	JDE Part #
1	28m	Conductor 2/O Bare Strand Copper	38W 088 002
2	1	Connector, C Type 2/O - 2/O Copper	38G 067 027
3	1	Foundation Concrete BCP104SW	38V 029 039
4	5	Ground Rod, Copper Clad 3/4" x 10'	38G 067 030
5	5	Copper Tap Wedge Blue 350-2/0*	38C 070 044
6	5	Cartridge Blue Tap*	38C 070 001

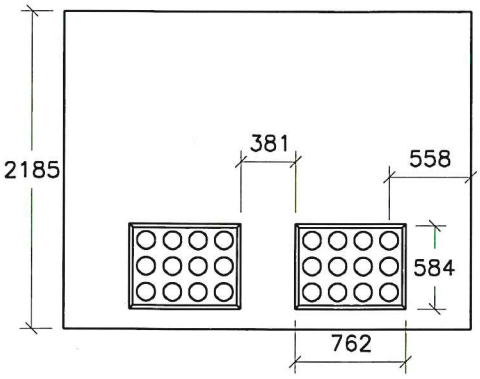
*CONSULT WITH ENOVA FOR ALTERNATE GROUND ROD CONNECTORS APPROVAL

ENOVA POWER CORP.	DATE: 2025.12.19	SCALE: AS NOTED	REV. 1	DWG. NO. SHEET 1 OF 1 12-311A10
	TITLE: ACTON PRECAST 110"X121" VAULT FOR VISTA SWITCHGEAR			

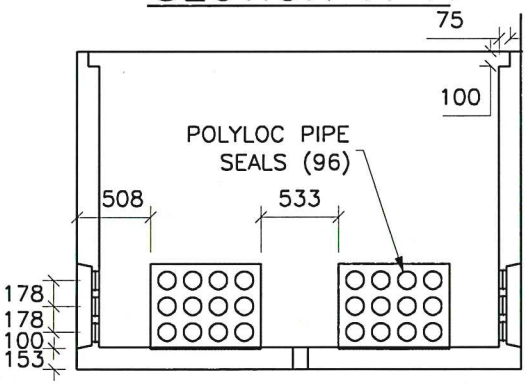
PLAN VIEW



FRONT VIEW



SECTION A–A



NOTES:
1. CONCRETE 32 Mpa MIN. AIR–7%
2. REINFORCING: 15m @12" c/c b.w.
3. FINISH: STEEL FORM SMOOTH
4. APPROX. WEIGHT: 11794kg
5. DELIVERY IS MADE BY CRANE EQUIPPED TRUCKS.
   EXCAVATION MUST BE READY AND ACCESSIBLE FROM THE TRUCK.
6. MINIMUM OVERHEAD CLEARANCE OF 18FT FOR DELIVERY IS REQUIRED.



*– DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE INDICATED

REV.	DESCRIPTION	YY.MM.DD	INITIALS
1	REBRANDED TO ENOVA TEMPLATE	25.12.19	KL

Certificate of Approval

The installation work covered by this document meets the safety requirements of Section 4 of Regulation 22/04

Shawn Wang — Name

Dec. 29, 2025 — Date

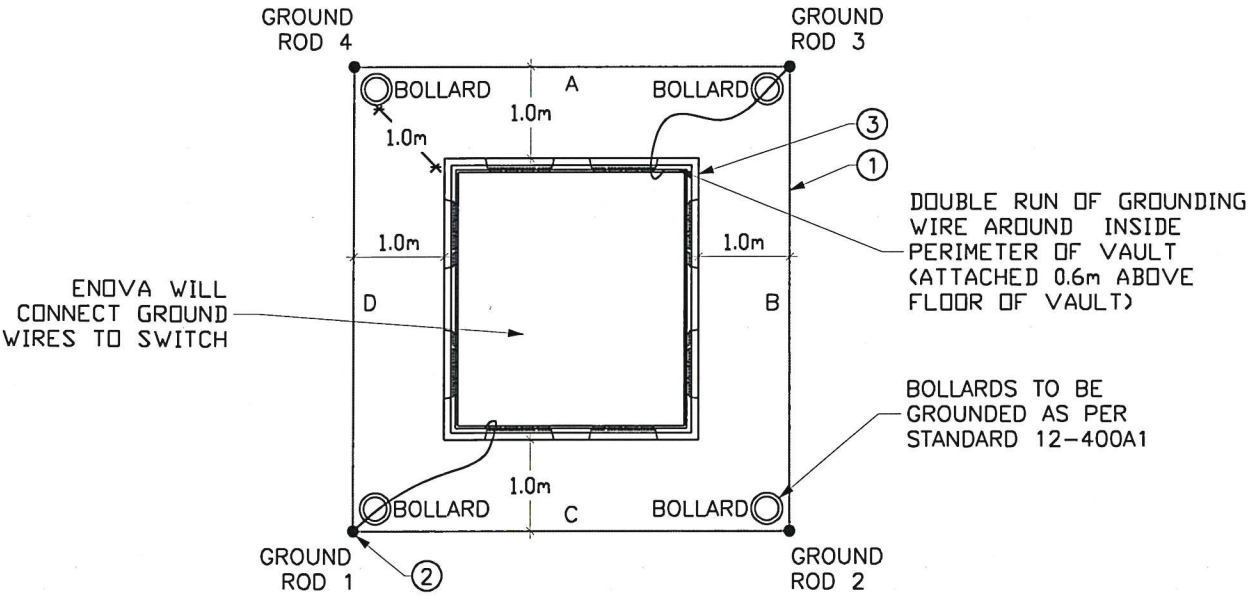
P.Eng. — Signature & Professional Designation

STANDARD **12-311A10**

Material List			
Item	Quantity	Description	JDE Part #
1	1	Vault for Vista Switchgear (121" x 110")	38V029064
2	1	Vista Lid (121" x 110")	38V029040
3	1	Lock, 2" Shank Abus	38L052005

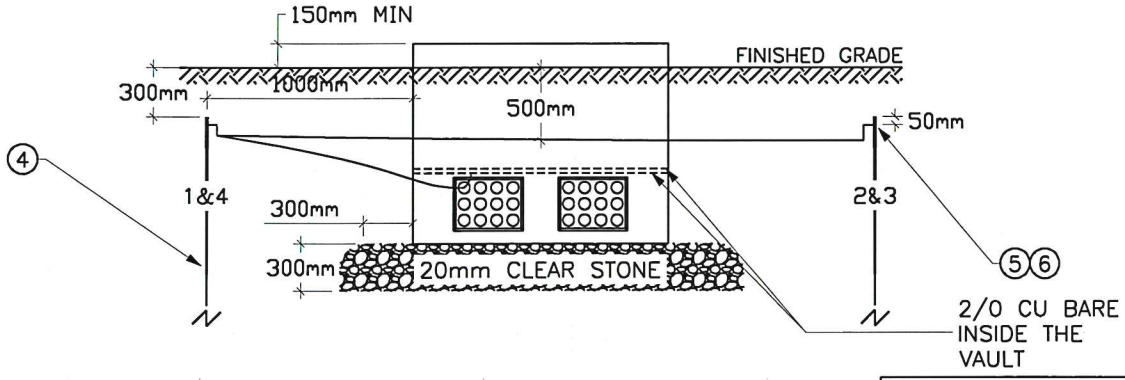
ENOVA POWER CORP.	DATE: 2025.12.19	SCALE: AS NOTED	REV. 1	DWG. NO. SHEET 1 OF 1 12-311A11

TITLE: **ACTON PRECAST 110" X 121" VAULT AND GROUND GRID INSTALLATION DETAIL**



BOLLARDS ARE TO BE INSTALLED ONLY IF THEY ARE REQUIRED TO PROTECT WNH EQUIPMENT FROM VEHICLE TRAFFIC. BOLLARD PLACEMENT SHOULD NOT INTERFERE WITH OPERATION, MAINTENANCE OR REPLACEMENT OF WNH EQUIPMENT.

** ADDITIONAL BOLLARDS AT LOCATIONS A, B, C, D MAY BE REQUIRED FOR HIGH TRAFFIC AREAS.



CUSTOMER TO INSTALL GROUNDING GRID PER WNH AND ESA STANDARDS:
ALSO SEE 12-311A6 FOR ADDITIONAL GROUNDING INFORMATION.

1. FEED GROUNDING WIRE FROM INSIDE VAULT THROUGH SPARE PIPE OPENING TO FASTEN TO GROUND ROD #1 WITH AMP TAP.
2. FASTEN GROUNDING WIRE TO GROUND RODS #2, #3 AND #4 WITH AMP TAPS MAINTAINING 500mm DEPTH FOR GROUNDING WIRE.
3. FASTEN GROUNDING WIRE TO GROUNDING WIRE AT GROUND ROD #1.
4. FEED GROUNDING WIRE FROM INSIDE VAULT THROUGH SPARE PIPE OPENING TO FASTEN TO GROUND ROD #3 WITH AMP TAP.
5. FOR ADDITIONAL VISTA GROUNDING INFORMATION REFER TO STANDARD 12-311A12.
6. INJECT SEALANT INTO THE LIFTING HOLES AND DUCT PENETRATIONS UPON COMPLETION OF THE GROUND WIRE AND CONDUIT INSTALLATION.

LICENSED PROFESSIONAL ENGINEER
X WANG
100089939
Dec. 29. 2025
PROVINCE OF ONTARIO

*- DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE INDICATED

REV.	DESCRIPTION	DATE	INITIALS
1	REBRANDED TO ENOVA TEMPLATE	25.12.19	KL

Certificate of Approval

The installation work covered by this document meets the safety requirements of Section 4 of Regulation 22/04

Shawn Wang — Name

Dec. 29. 2025 — Date

P. Eng — Signature & Professional Designation

STANDARD 12-311A11

Material List			
Item	Quantity	Description	JDE Part #
1	30m	Conductor 2/O Bare Strand Copper (Outside The Vault)	38W088002
2	2	Connector, C Type 2/O - 2/O Copper	38G067027
3	1	Acton Precast 110 x 121 Vault	38V029064
4	4	Ground Rod, Copper Clad 75mm x 3048mm	38G067030
5	4	Tap Wedge Blue 350 - 2/O	38C070044
6	4	Cartridge Blue Tap	38C070001

Additional Miscellaneous Parts (Not Depicted)			
Item	Quantity	Description	JDE Part #
7	20	2/O CU 2 Hole Lug NEMA	38C062036
8	54m	Conductor 2/0 Bare Strand Copper Inside The Vault	38W088002

DATE:	SCALE:	REV.	DWG. NO.
2026-02-24	NTS	3	12-350A1

TITLE: **TRANSFORMER VAULT ROOM - CONSTRUCTION DETAILS**

THE CUSTOMER SHALL PROVIDE AT THEIR COST THE ITEMS LISTED BELOW IN COMPLIANCE WITH THE LATEST EDITIONS OF THE NATIONAL BUILDING CODE, ONTARIO BUILDING CODE (OBC), ONTARIO ELECTRICAL SAFETY CODE (OESC), NFPA80; ENOVA POWER CORP. (ENOVA) CONDITIONS OF SERVICE AND SITE SPECIFIC REQUIREMENTS LISTED IN ENOVA'S OFFER TO CONNECT (OTC).

1. ACCESSIBILITY:
   - 1.1. ACCESSIBILITY MUST BE AT GRADE ON GROUND FLOOR WITH DIRECT OUTSIDE ACCESS AT ALL HOURS.
   - 1.2. MUST BE ACCESSIBLE BY ENOVA LINE TRUCKS OVER A HARD SURFACE SUCH AS CONCRETE, ASPHALT, CRUSHED STONE OR OTHER ENOVA APPROVED MATERIAL.
   - 1.3. THE VAULT ROOM SHALL NOT BE USED FOR STORAGE OR CONTAIN EQUIPMENT FOREIGN TO THE ELECTRICAL INSTALLATION.

2. VAULT WALLS, ROOF AND FLOORS:
   - 2.1. WALLS, ROOF AND FLOORS TO BE REINFORCED CONCRETE WITH MINIMUM OF 0.15m THICKNESS.
   - 2.2. CONCRETE FLOORS SHALL BE LIQUID TIGHT.
   - 2.3. VAULT MUST BE THOROUGHLY CLEANED PRIOR TO INSTALLATION OF GROUNDING AND OTHER WIRING.
   - 2.4. WALLS AND CEILING TO BE BARE CONCRETE OR PARGED FINISHED WITH A LIGHT GREY SURE-TRED RESILCRETE PAINT.
   - 2.5. A COVERED OIL SUMP PIT SHALL BE PROVIDED CAPABLE OF HOLDING 800L OF OIL. SUMP PIT SHALL BE CONNECTED BY A 50mm DRAIN/TRAP TO A 100mm FLOOR DRAIN. SUMP PIT CAN BE REMOTE FROM TRANSFORMER ROOM.

3. INCOMING PRIMARY AND SECONDARY DUCTS:
   - 3.1. THE PRIMARY AND SECONDARY SHALL BE LOCATED IN OPPOSITE DIAGONAL CORNERS OF THE VAULT ROOM WHERE PRACTICAL. **LAYOUT OF ROOM TO BE CONFIRMED WITH ENOVA PRIOR TO CONSTRUCTION.**
   - 3.2. DUCTS TO BE INSTALLED WITH BELL END FITTINGS 0.15m ABOVE FINISHED FLOOR.
   - 3.3. ROOMS SHALL BE COMPLETE WITH A SECONDARY TRANSITION BUS (SEE 12-350A4) OR, IF APPROVED BY ENOVA, CUSTOMER SECONDARY DUCTS/CABLE OPTION SHALL BE ALLOWED INSIDE THE VAULT ROOM. IF CUSTOMER SECONDARY CABLE IS APPROVED, CUSTOMER SHALL PROVIDE 11.0m OF SECONDARY CABLE PER RUN INSIDE VAULT ROOM WITH LUGS FOR ENOVA TO TERMINATE AND CONNECT TO TRANSFORMER.

4. VENTILATION:
   - 4.1. OPENINGS TO BE FROM AN OUTDOOR AREA BY NATURAL VENTILATION WITHOUT THE USE OF DUCTS AND BE SIZED ACCORDING TO THE OBC SECTION 3.6.2.7 ($0.002m^2$/kVA MINIMUM FOR THE COMBINED NET AREA OF INLET AND OUTLET OPENINGS)
   - 4.2. HEIGHT TO WIDTH RATIO MUST NOT EXCEED 3:2.
   - 4.3. THE BOTTOM OF THE AIR INTAKE VENT IS TO BE LOCATED AT A MINIMUM OF 0.45m AND A MAXIMUM OF 1.0m ABOVE OUTSIDE GRADE.
   - 4.4. AIR EXHAUST VENT IS TO BE LOCATED AS CLOSE AS POSSIBLE TO VAULT CEILING.
   - 4.5. IF THE AIR INTAKE AND THE AIR EXHAUST ARE LOCATED ON THE SAME WALL THEY SHALL BE SEPARATED IN DIAGONAL ALIGNMENT ON THE WALL.
   - 4.6. OPENINGS SHALL BE EQUIPPED WITH LOUVRES AND A BIRD SCREEN WITH A MINIMUM 1/2" MESH AND HAVE 60mm SPACING. ORIENT LOUVRES TO DEFLECT AWAY ANY PRECIPITATION.
   - 4.7. ALL MATERIALS TO BE 16 ga. GALVINIZED STEEL.

5. FIRE DOORS:
   - 5.1. TWO CLASS 'A' 3 HOUR RATED FIRE DOORS WITH MIN. DIMENSIONS OF 1.0m x 3.0m PER DOOR.
   - 5.2. DOORS COMPLETE WITH A 10" TAMPER PROOF PAD BOLT CAPABLE OF ACCEPTING A 5/16" ENOVA PADLOCK, A HASP AND TANG ARRANGEMENT, AND A HEAVY DUTY LOCKING PASSAGE KNOBSET (KNOBSET SUPPLIED BY ENOVA).
   - 5.3. TO PREVENT REMOVAL OF DOORS EXTERNALLY, DOOR PINS ARE TO BE WELDED TO HINGE UNLESS DOOR PINS HAVE SET SCREW LOCKS AND HINGE PLATES THAT ARE CONCEALED OR WELDED.

6. FIRE PROTECTION AND ALARM:
   - 6.1. 3 HOUR FIRE RATED CONSTRUCTION IS REQUIRED OF ALL VAULTS, INCLUDING AIRWAYS.
   - 6.2. A CEILING MOUNTED SMOKE DETECTOR IS REQUIRED TO ACTUATE THE BUILDING FIRE ALARM SYSTEM IN CASE OF A FIRE.

7. GROUNDING:
   - 7.1. CUSTOMER TO SUPPLY AND INSTALL FOUR 3/4" x 10' GROUND RODS IN THE FOUR CORNERS OF THE VAULT ROOM, PROTRUDING NO MORE THAN 300mm ABOVE GRADE.
   - 7.2. CUSTOMER TO CONNECT DOORS AND LOUVRES TO THE GROUND LOOP USING #2/0 EXTRA FLEX STRANDED COPPER FOR THE DOORS AND MIN. #4 STRANDED COPPER FOR THE LOUVRES.
   - 7.3. REMOTE GROUNDING GRIDS (IF APPLICABLE) TO BE APPROVED BY ESA, STAMPED BY A P.ENG AND SUBMITTED TO ENOVA FOR REVIEW.

8. ACCESSORIES:
   - 8.1. SUPPLY/INSTALL TWO LIGHTS AND A 15A RECEPTACLE. **CONFIRM LOCATIONS WITH ENOVA PRIOR TO INSTALLATION**. LIGHTING SHALL PROVIDE 500 LUX AT FLOOR LEVEL.
   - 8.2. SUPPLY AND INSTALL PULLING EYES CAPABLE OF SUPPORTING 2500KG IN THE CEILING AT A POINT 0.6m FROM VAULT WALL, CENTERED ON THE DOORWAY AND ROTATED TOWARDS PRIMARY DUCTS.

LICENSED PROFESSIONAL ENGINEER
S.W
X. WANG
100089939
Feb. 24 2026
PROVINCE OF ONTARIO

REV.	DESCRIPTION	DATE	INITIALS
2	UPDATED NOTES	2025/02/14	B.M.
3	ADDED 500 LUX LIGHTING LEVEL	2026/02/24	B.M.

Certificate of Approval

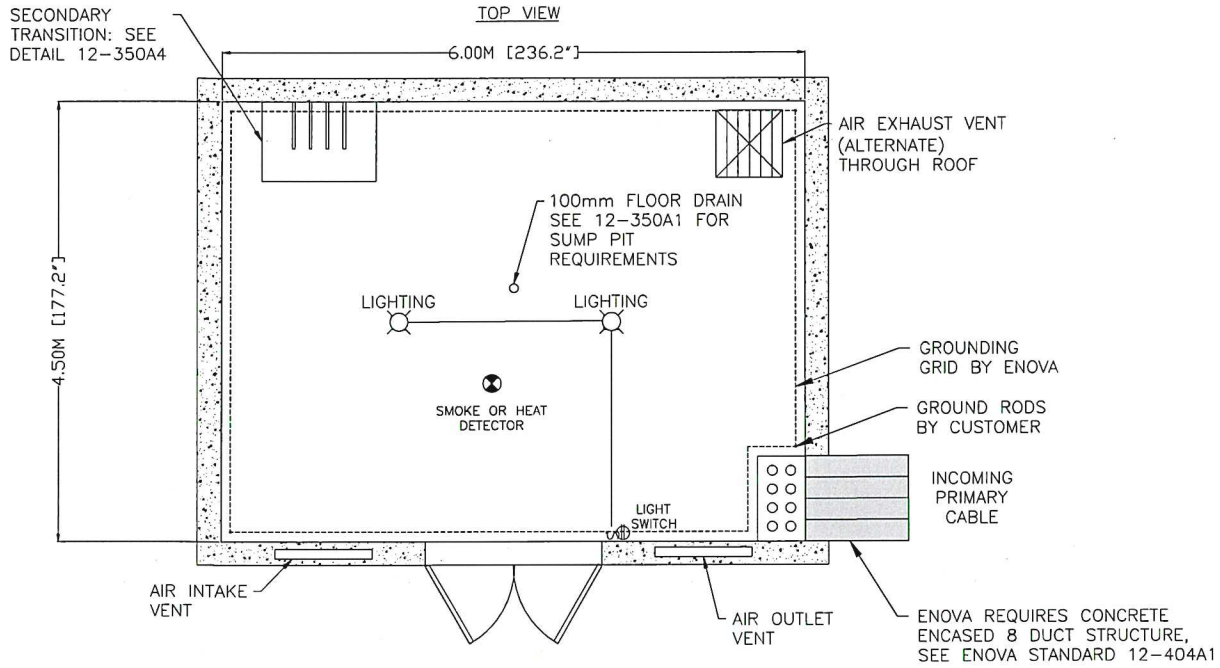
The installation work covered by this document meets the safety requirements of Section 4 of Regulation 22/04

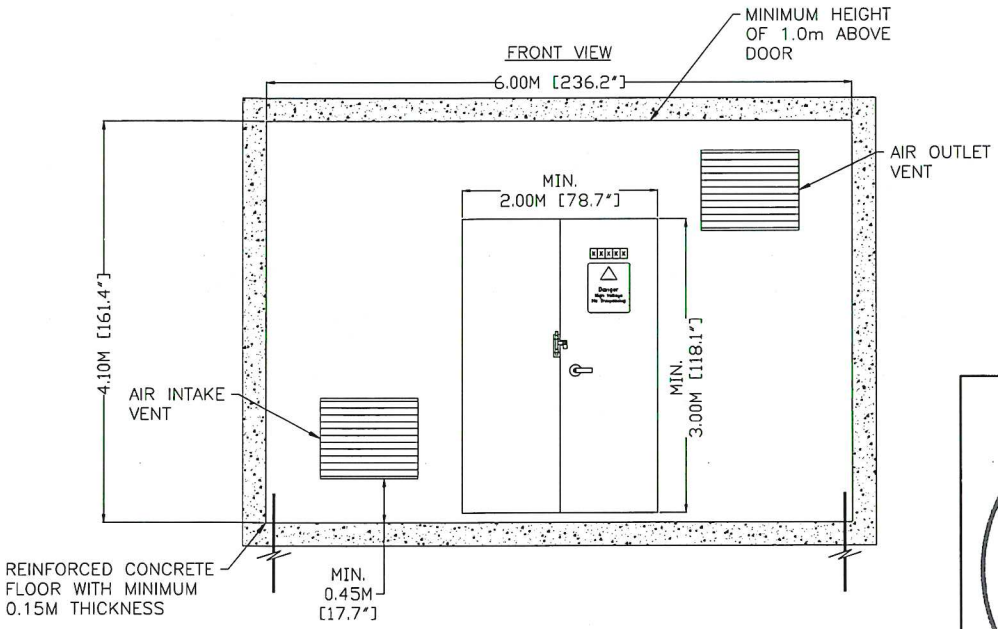
Shawn Wang — Feb. 24. 2026
Date

P.Eng.
Signature & Professional Designation

DATE:	SCALE:	REV.	DWG. NO.
2025-02-14	NTS	2	12-350A2

TITLE: **TRANSFORMER VAULT ROOM - LAYOUT (TRANSFORMERS UP TO 300kVA)**





LICENSED PROFESSIONAL ENGINEER
C.V. FILIMON
100042010
May 12/25
PROVINCE OF ONTARIO

*- DIMENSIONS ARE IN METERS UNLESS OTHERWISE INDICATED

Certificate of Approval

The installation work covered by this document meets the safety requirements of Section 4 of Regulation 22/04

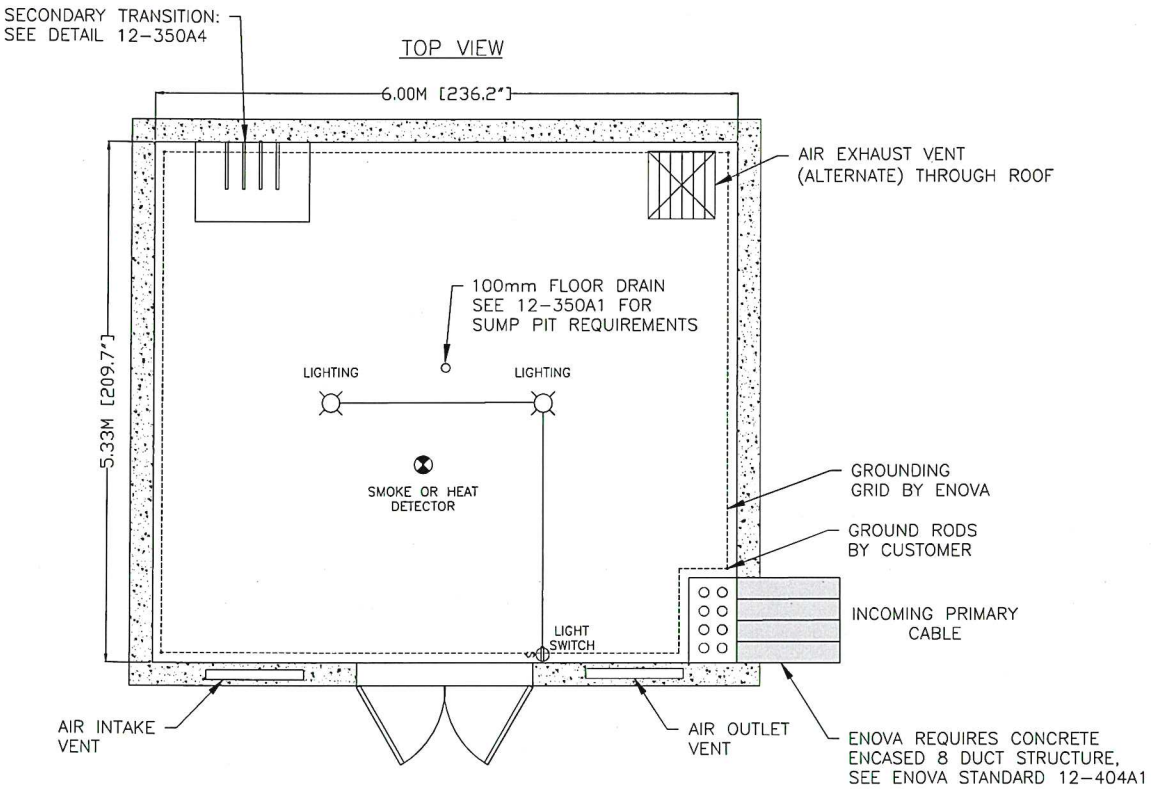
CARMEN FILIMON — MAY 12, 2025
Date

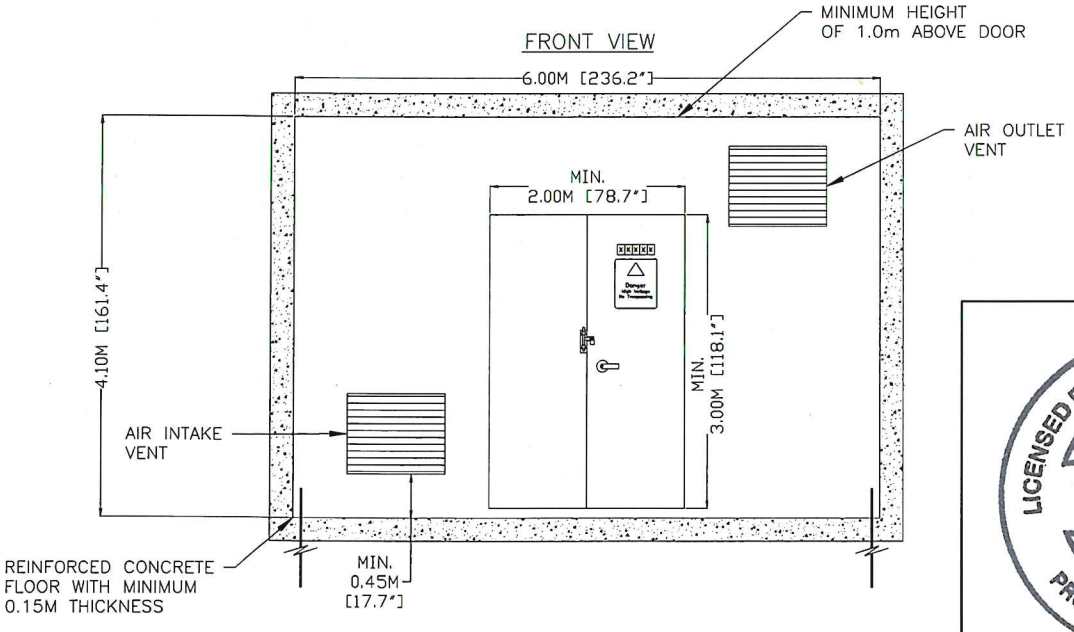
P.ENG.
Signature & Professional Designation

REV.	DESCRIPTION	DATE	INITIALS
1	Updated branding.	2022/12/09	M.S.
2	ENOVA UPDATE.	2025/02/14	B.M.

DATE:	SCALE:	REV.	DWG. NO.
2025-02-14	NTS	2	12-350A3

TITLE: **TRANSFORMER VAULT ROOM - LAYOUT (TRANSFORMERS GREATER THAN 300kVA)**





LICENSED PROFESSIONAL ENGINEER
C.V. FILIMON
100042010
May 12/25
PROVINCE OF ONTARIO

*– DIMENSIONS ARE IN METERS UNLESS OTHERWISE INDICATED

Certificate of Approval

The installation work covered by this document meets the safety requirements of Section 4 of Regulation 22/04

CARMEN FILIMON — MAY 12/2025
Date

P.ENG.
Signature & Professional Designation

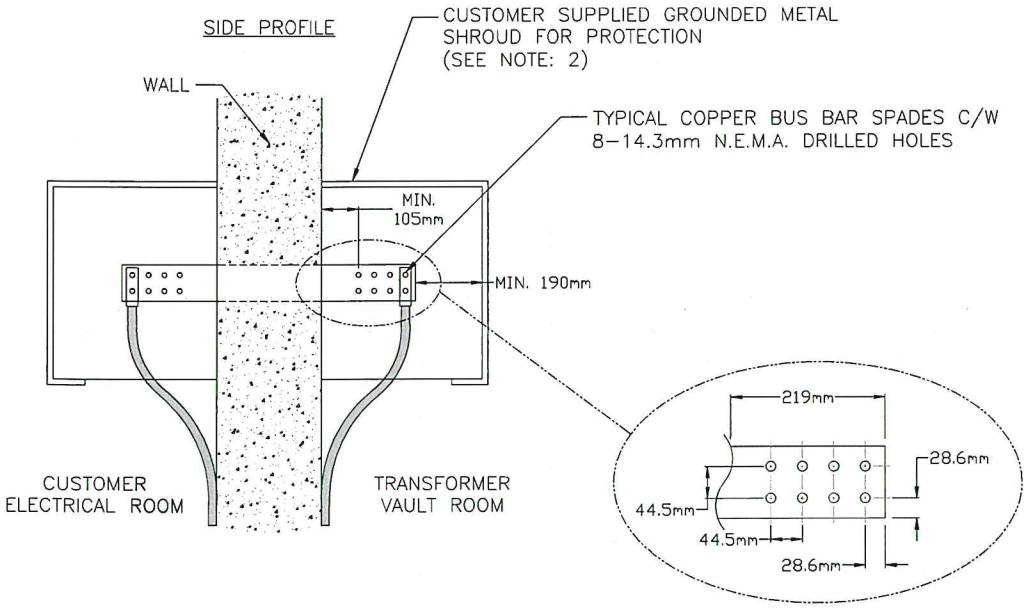
REV.	DESCRIPTION	DATE	INITIALS
1	Updated branding.	2022/12/09	M.S.
2	ENOVA UPDATE.	2025/02/14	B.M.

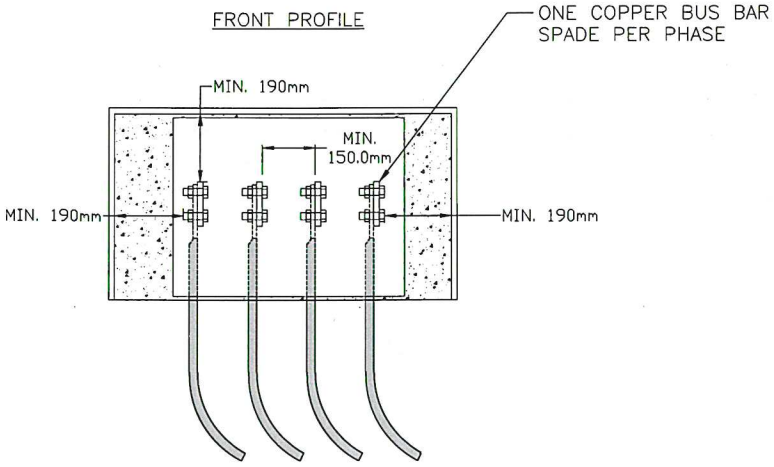
DATE:	SCALE:	REV.	DWG. NO.
2025-02-14	NTS	2	12-350A4

TITLE: **TRANSFORMER VAULT ROOM - SECONDARY TRANSITION BUS DETAILS**

NOTES:

1. CUSTOMER TO SUPPLY AND INSTALL SECONDARY TRANSITION BUS AS PER THE ONTARIO ELECTRICAL SAFETY CODE AND THE ONTARIO BUILDING CODE REQUIREMENTS.
2. SECONDARY TRANSITION BUS SHALL BE AT A HEIGHT OF 2.0m FROM FINISHED VAULT ROOM FLOOR LEVEL. IF APPROVED BY ENOVA, TRANSITION BUS HEIGHT CAN BE REDUCED TO A MINIMUM OF 1.0m FROM FLOOR LEVEL. IF LOWER THAN 1.5m FROM FLOOR LEVEL, A GROUNDED METAL SHROUD IS REQUIRED.
3. SECONDARY TRANSITION COPPER BUS BAR SPADES TO BE SIZED AS PER ESA BY CUSTOMER WITH 8–14.3mm N.E.M.A. DRILLED HOLES.
4. MINIMUM CLEARANCE BETWEEN LIVE PARTS (METAL–TO–METAL BETWEEN BOLTS) SHALL BE NO LESS THAN 150mm.





LICENSED PROFESSIONAL ENGINEER
C.V. FILIMON
100042010
May 12/25
PROVINCE OF ONTARIO

*– DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE INDICATED

REV.	DESCRIPTION	DATE	INITIALS
1	Updated branding.	2022/12/09	M.S.
2	ENOVA UPDATE.	2025/02/14	B.M.

Certificate of Approval

The installation work covered by this document meets the safety requirements of Section 4 of Regulation 22/04

CARMEN FILIMON — MAY 12, 2025

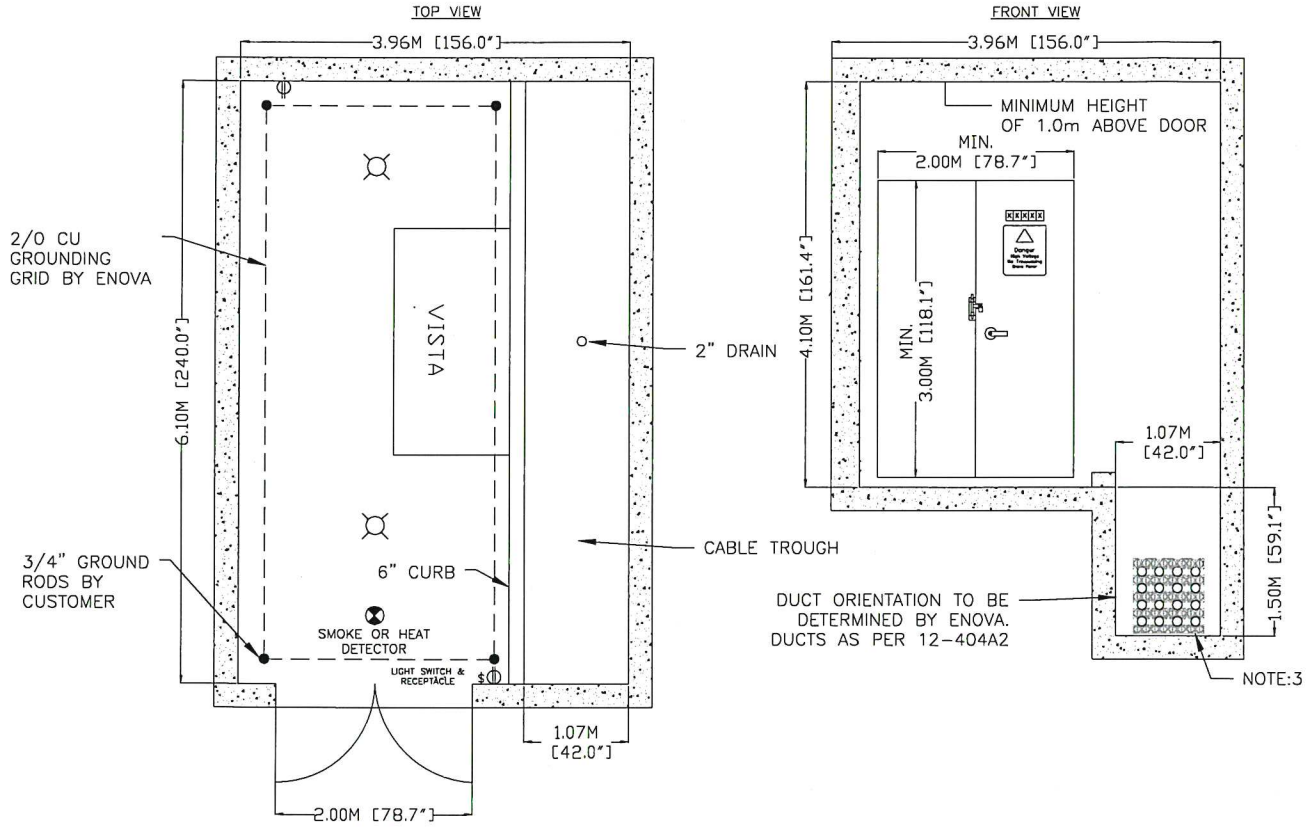
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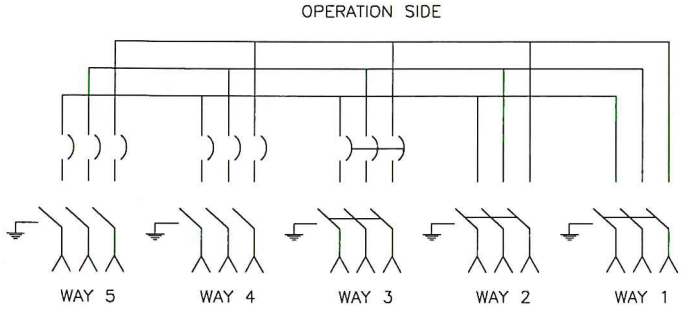
P.ENG.

Signature & Professional Designation

DATE:	SCALE:	REV.	DWG. NO.
2025-01-23	NTS	0	12-370A1

TITLE: **VISTA VAULT ROOM - ROOM LAYOUT**





NOTES:

1. REFER TO 12-370A2 FOR CONSTRUCTION DETAIL REQUIREMENTS.
2. PLACE SWITCH AS SHOWN ON LAYOUT TO MAINTAIN MINIMUM WORKING SPACE.
3. CONFIRM TROUGH DEPTH WITH ENOVA PRIOR TO CONSTRUCTION. TROUGH DEPTH OF 1.5m IS TYPICAL.
4. TYPICAL ROOM CONFIGURATION SHOWN WITH CABLE PULLING TROUGH. CABLE TROUGH CAN BE OMITTED & ROOM SIZE REVISED WHILE MAINTAINING A ROOM SIZE OF 260 SQUARE FEET WITH ENOVA'S APPROVAL.
5. RACK CABLES AS PER 12-201A2.



REV.	DESCRIPTION	DATE	INITIALS

Certificate of Approval

The installation work covered by this document meets the safety requirements of Section 4 of Regulation 22/04

Shaun Wang Sep. 3 2025
Date

P. Eng.
Signature & Professional Designation

DATE:	SCALE:	REV.	DWG. NO.
2026.02.24	NTS	1	12-370A2

TITLE: **VISTA VAULT ROOM - CONSTRUCTION DETAILS**

THE CUSTOMER SHALL PROVIDE AT THEIR COST THE ITEMS LISTED BELOW IN COMPLIANCE WITH THE LATEST EDITIONS OF THE NATIONAL BUILDING CODE, ONTARIO BUILDING CODE (OBC), ONTARIO ELECTRICAL SAFETY CODE (OESC), NFPA80; ENOVA POWER CORP. (ENOVA) CONDITIONS OF SERVICE AND SITE SPECIFIC REQUIREMENTS LISTED IN ENOVA'S OFFER TO CONNECT (OTC).

1. ACCESSIBILITY:
   - 1.1. ACCESSIBILITY MUST BE AT GRADE ON GROUND FLOOR WITH DIRECT OUTSIDE ACCESS AT ALL HOURS. WHERE UNDERGROUND PARKING EXISTS, THE VAULT ROOM SHALL LOCATED AT THE OUTSIDE EDGE OF THE UNDERGROUND PARKING. THE INCOMING DUCTS SHALL NOT PASS THROUGH THE PARKING STRUCTURE UNLESS A SITE SPECIFIC DEVIATION HAS BEEN APPROVED BY ENOVA.
   - 1.2. MUST BE ACCESSIBLE BY ENOVA LINE TRUCKS OVER A HARD SURFACE SUCH AS CONCRETE, ASPHALT, CRUSHED STONE OR OTHER ENOVA APPROVED MATERIAL.
   - 1.3. THE VAULT ROOM SHALL NOT BE USED FOR STORAGE OR CONTAIN EQUIPMENT FOREIGN TO THE ELECTRICAL INSTALLATION.

2. VAULT WALLS, ROOF AND FLOORS:
   - 2.1. WALLS, ROOF AND FLOORS TO BE REINFORCED CONCRETE WITH MINIMUM OF 0.15m THICKNESS.
   - 2.2. VAULT MUST BE THOROUGHLY CLEANED PRIOR TO INSTALLATION OF GROUNDING AND OTHER WIRING.
   - 2.3. WALLS AND CEILING TO BE BARE CONCRETE OR PARGED FINISHED WITH A LIGHT GREY SURE-TRED RESILCRETE PAINT.
   - 2.4. A 2" FLOOR DRAIN SHALL BE CONNECTED FROM THE CABLE TROUGH TO A STORM DRAIN.
   - 2.5. THE CABLE TROUGH SHALL RUN THE LENGTH OF THE ROOM AT THE DEPTH SHOWN.

3. FIRE DOORS:
   - 3.1. TWO CLASS 'A' 3 HOUR RATED FIRE DOORS WITH MIN. DIMENSIONS OF 1.0m x 3.0m PER DOOR.
   - 3.2. DOORS COMPLETE WITH A 10" TAMPER PROOF PAD BOLT CAPABLE OF ACCEPTING A 5/16" ENOVA PADLOCK, A HASP AND TANG ARRANGEMENT, AND A HEAVY DUTY LOCKING PASSAGE KNOBSET (KNOBSET SUPPLIED BY ENOVA).
   - 3.3. TO PREVENT REMOVAL OF DOORS EXTERNALLY, DOOR PINS ARE TO BE WELDED TO HINGE UNLESS DOOR PINS HAVE SET SCREW LOCKS AND HINGE PLATES THAT ARE CONCEALED OR WELDED.

4. FIRE PROTECTION AND ALARM:
   - 4.1. 3 HOUR FIRE RATED CONSTRUCTION IS REQUIRED OF ALL VAULTS.
   - 4.2. A CEILING MOUNTED SMOKE DETECTOR IS REQUIRED TO ACTUATE THE BUILDING FIRE ALARM SYSTEM IN CASE OF A FIRE.
   - 4.3. VAULT ROOM SHALL NOT BE SPRINKLERED.

5. GROUNDING:
   - 5.1. CUSTOMER TO SUPPLY AND INSTALL FOUR 3/4" x 10' GROUND RODS IN THE FOUR CORNERS OF THE VAULT ROOM, PROTRUDING NO MORE THAN 300mm ABOVE GRADE.
   - 5.2. CUSTOMER TO CONNECT DOORS AND LOUVRES TO THE GROUND LOOP USING #2/0 EXTRA FLEX STRANDED COPPER FOR THE DOORS AND MIN. #4 STRANDED COPPER FOR THE LOUVRES.
   - 5.3. REMOTE GROUNDING GRIDS (IF APPLICABLE) TO BE APPROVED BY ESA, STAMPED BY A P.ENG AND SUBMITTED TO ENOVA FOR REVIEW.
   - 5.4. ENOVA TO INSTALL GROUND LOOP 300mm ABOVE FINISHED FLOOR. CONCENTRIC NEUTRAL'S AT CABLE TERMINATIONS SHALL BE TIED DIRECTLY TO THE VISTA MOUNTED GROUND BUS. THE GROUND BUS SHALL BE TIED TO THE GROUND LOOP AT BOTH ENDS OF THE GROUND BUS WITH 2/0 CU.

6. ACCESSORIES:
   - 6.1. CUSTOMER TO SUPPLY/INSTALL TWO LIGHTS AND TWO 15A, 120V RECEPTACLES. **CONFIRM LOCATIONS WITH ENOVA PRIOR TO INSTALLATION**. LIGHTING SHALL PROVIDE 500 LUX AT FLOOR LEVEL.



REV.	DESCRIPTION	DATE	INITIALS
1	ADDED 500 LUX LIGHTING LEVEL	2026.02.24	B.M.

Certificate of Approval

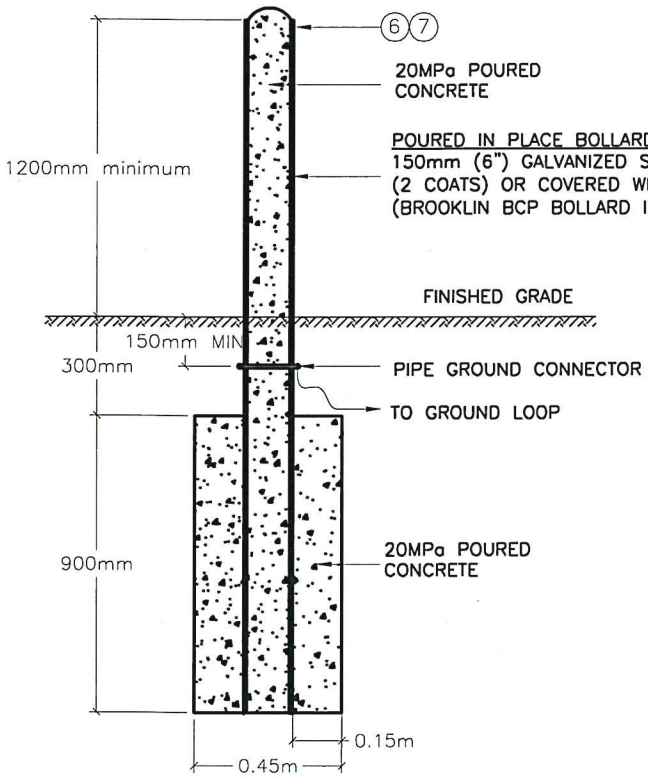
The installation work covered by this document meets the safety requirements of Section 4 of Regulation 22/04

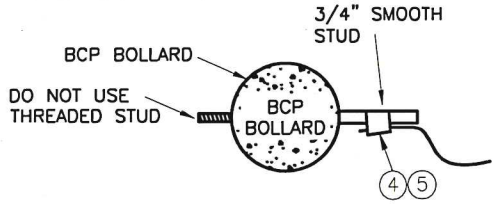
Shaun Wang — Feb. 24. 2026
Date

P. Eng.
Signature & Professional Designation

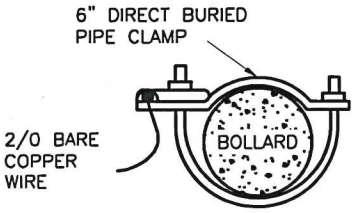
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2026.03.18	NTS	2	12-400A1

TITLE: **TYPICAL BOLLARD INSTALLATION AND GROUNDING DETAIL**

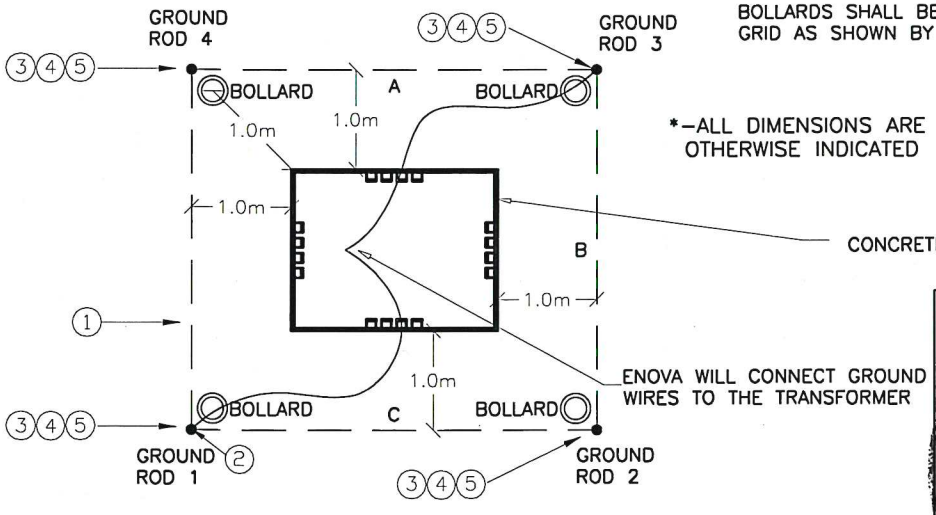




GROUND WIRE CONNECTION DETAIL FOR BROOKLIN BCP BOLLARD



GROUND WIRE CONNECTION DETAIL FOR POURED IN PLACE BOLLARD



BOLLARDS SHALL BE CONNECTED TO THE GROUND GRID AS SHOWN BY THE ELECTRICAL CONTRACTOR.

*–ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE INDICATED

ADDITIONAL BOLLARDS AT LOCATIONS A, B, C MAY BE REQUIRED FOR HIGH TRAFFIC AREAS

BOLLARDS ARE TO BE INSTALLED ONLY IF THEY ARE REQUIRED TO PROTECT ENOVA EQUIPMENT FROM VEHICLE TRAFFIC. BOLLARD PLACEMENT SHOULD NOT INTERFERE WITH OPERATION, MAINTENANCE OR REPLACEMENT OF ENOVA EQUIPMENT.

REV.	DESCRIPTION	DATE	INITIALS
1	BOLLARD HEIGHT CHANGED FROM 900 TO 1200mm MIN.	FEB. 20-25	E.R.
2	ADDED BCP BOLLARD NOTES & DETAIL.	MAR. 18-26	B.D.

LICENSED PROFESSIONAL ENGINEER
S.W.
X. WANG
100089939
Mar. 26 2026
PROVINCE OF ONTARIO

Certificate of Approval

The installation work covered by this document meets the safety requirements of Section 4 of Regulation 22/04

Shaun Wang — Mar. 26 2026

Name — Date

Signature & Professional Designation

STANDARD 12-400A1

Material List			
Item	Quantity	Description	JDE Part #
1	28m	Conductor 2/0 bare Strand Copper	38W 088 002
2	4	Connector, C Type 2/O - 2/O Copper	38G 067 027
3	4	Ground Rod, Copper Clad 3/4"x 10ft	38G 067 030
4	4	Copper Tap Wedge Blue 350-2/0 (Note 1, 2)	38C 070 044
5	4	Cartridge Blue Tap (Note 1, 2)	38C 070 001
6		Yellow Plastic Covers supplied and installed by the Developer/Contractor	
7		Bollards and Grounding hardware supplied and installed by the Developer and or Contractor (Note 3)	Special Order

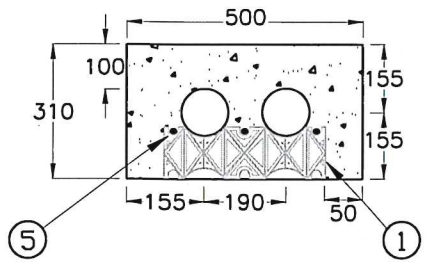
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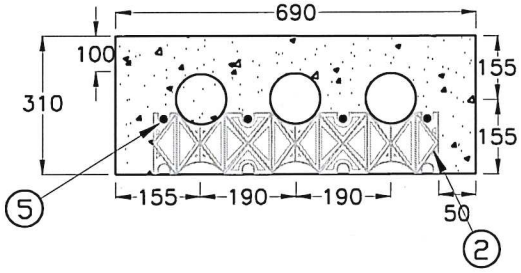
1. CONSULT WITH ENOVA FOR ALTERNATE GROUNDING CONNECTORS APPROVAL.
2. IF INSTALLING BCP BOLLARD, INCREASE ITEM QUANTITY TO 8.
3. BROOKLIN BCP BOLLARD OR POURED IN PLACE BOLLARD.
4. SEE DRAWING 12-300A2 FOR 3PH GROUND GRID INSTALLATION DETAILS.

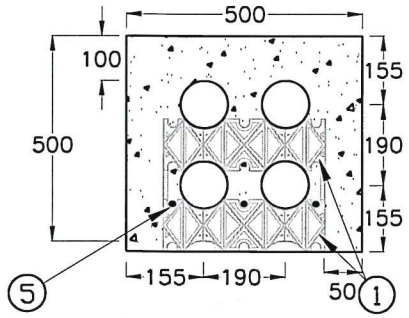
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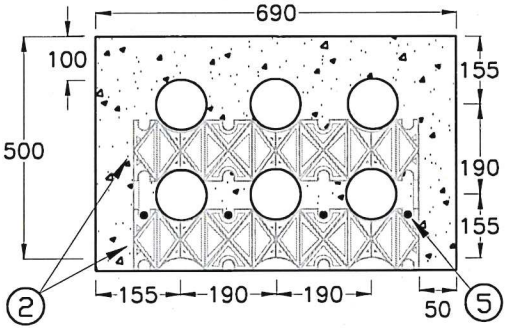
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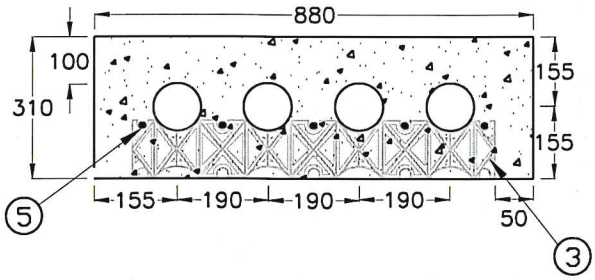
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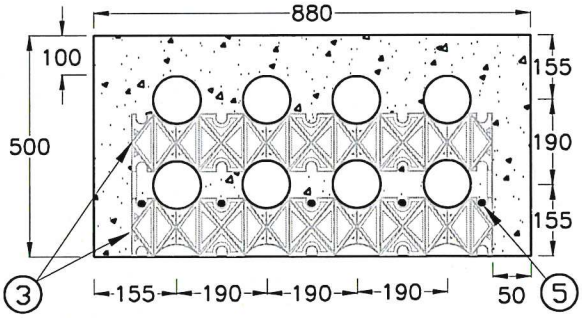












MATERIAL LIST			
ITEM	QUANTITY	DESCRIPTION	JDE PART #
1	AS REQUIRED	DUCT SPACER 4" – 2 WAY PVC INTERMEDIATE	38P020054
2	AS REQUIRED	DUCT SPACER 4" – 3 WAY PVC INTERMEDIATE	38P020056
3	AS REQUIRED	DUCT SPACER 4" – 4 WAY PVC INTERMEDIATE	38P020059
4	AS REQUIRED	BELL ENDS (NOT SHOWN)	38P020016
5	AS REQUIRED	REBAR–PLAIN, 15MM	38R027004

LICENSED PROFESSIONAL ENGINEER
C. A. LEE
26 OCT 2026
PROVINCE OF ONTARIO

APPROVED BY:

Certificate of Approval

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COLIN LEE — Name
26 OCT 2026 — Date
Colin Lee P. ENG — Signature & Professional Designation

**ALL DIMENSIONS IN mm UNLESS OTHERWISE NOTED.

REV.	DESCRIPTION	DATE	INITIALS
1	REBRANDED ON AN ENOVA TEMPLATE AND COMBINED WITH STANDARD C2727	2026-10-22	W.L.

DATE:	SCALE:	REV.	DWG. NO. / SHEET	
2026-10-22	NTS	0	2 OF 9	12-404A1

TITLE: TYPICAL CONCRETE ENCASED DUCT STRUCTURES 200A

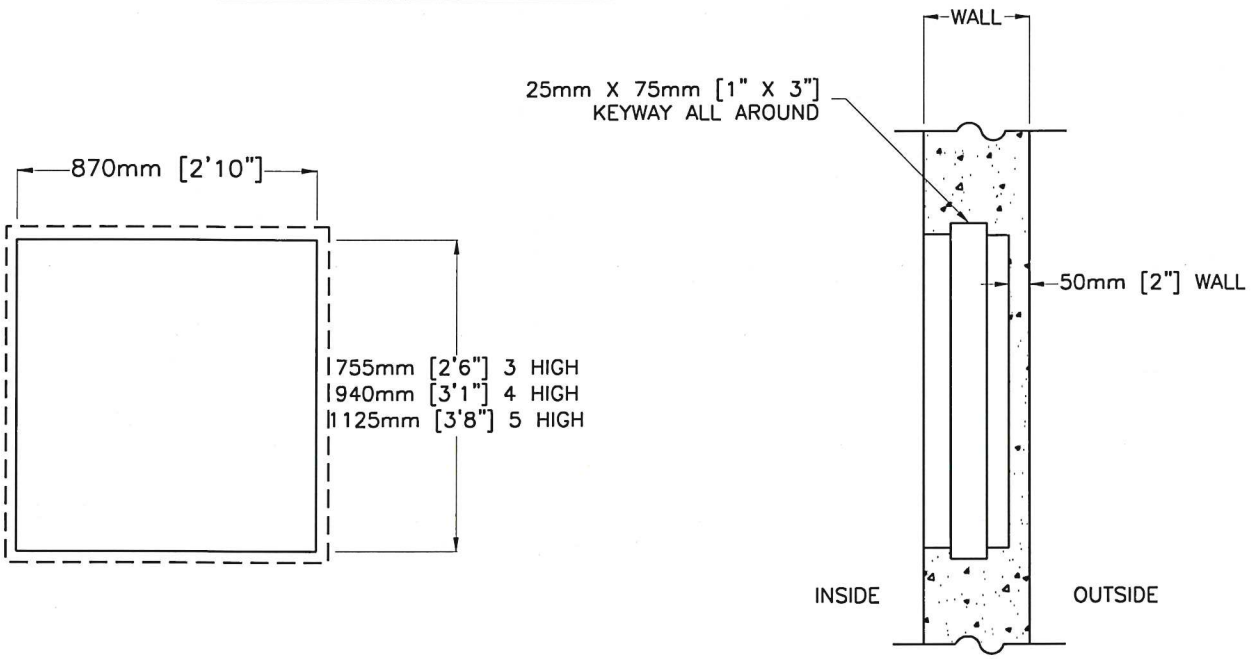


FIGURE 1

RECESS DETAIL FOR FUTURE DUCT
ENTRANCE IN POURED IN PLACE PULLBOXES

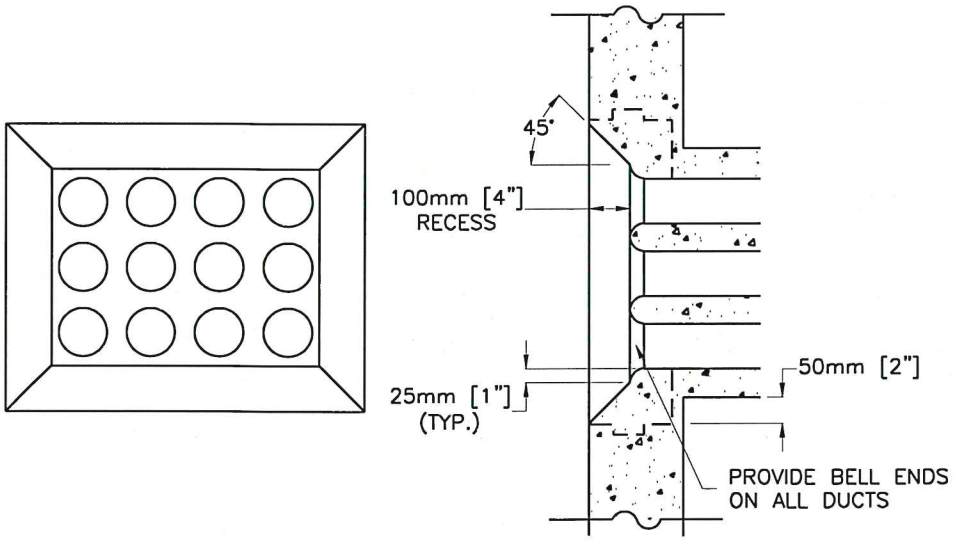


FIGURE 2

FINISHED DUCT ENTRANCE DETAIL
FOR POURED IN PLACE PULLBOXES

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26 OCT 2026
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Enova	DATE: 2026-10-22	SCALE: NTS	REV. 0	DWG. NO. SHEET 3 OF 9	12-404A1
	TITLE: TYPICAL CONCRETE ENCASED DUCT STRUCTURES 200A				

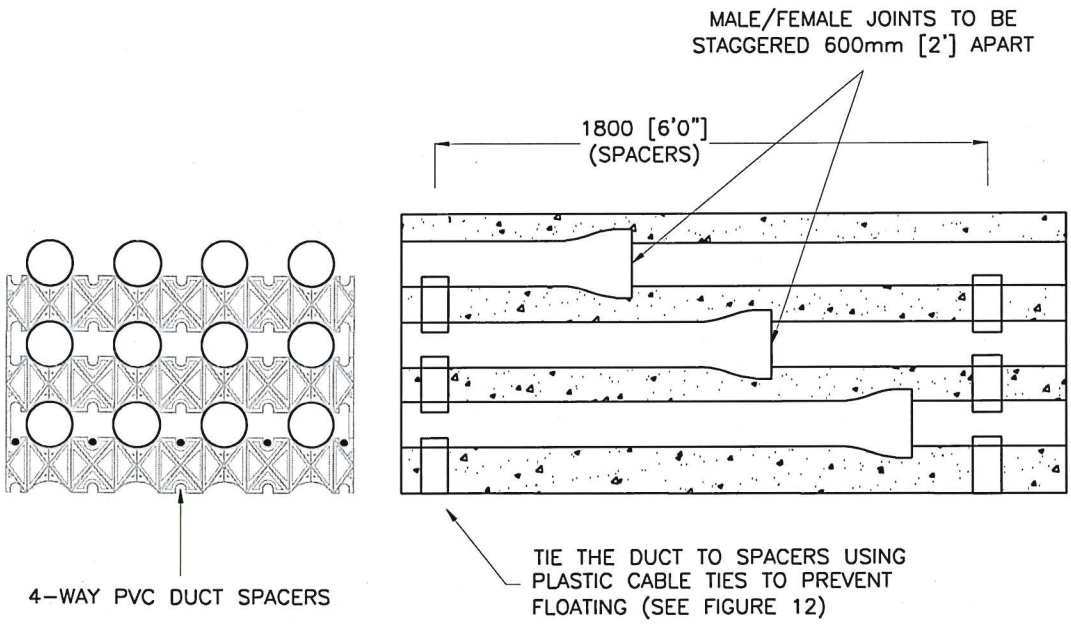


FIGURE 3

TYPICAL DUCTBANK INSTALLATION
USING DUCT SPACERS

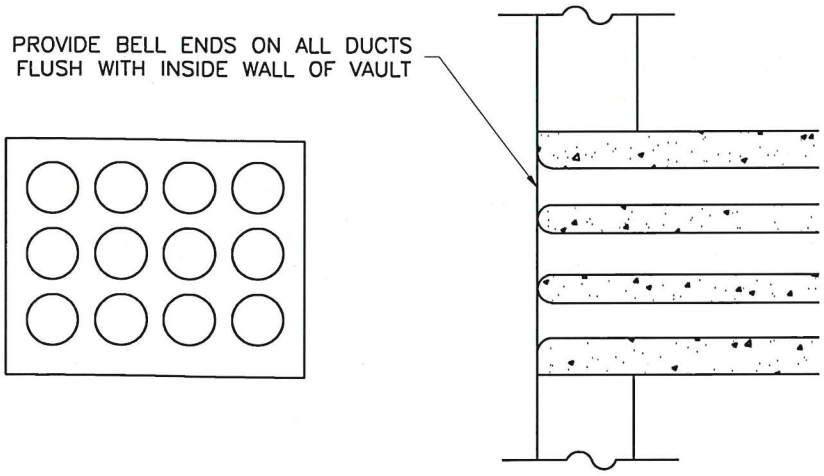


FIGURE 4

TYPICAL DUCTBANK INSTALLATION
USING DUCT SPACERS

LICENSED PROFESSIONAL ENGINEER
C. A. LEE
26 OCT 2026
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Enova	DATE: 2026-10-22	SCALE: NTS	REV. 0	DWG. NO. SHEET 4 OF 9	12-404A1
	TITLE: TYPICAL CONCRETE ENCASED DUCT STRUCTURES 200A				

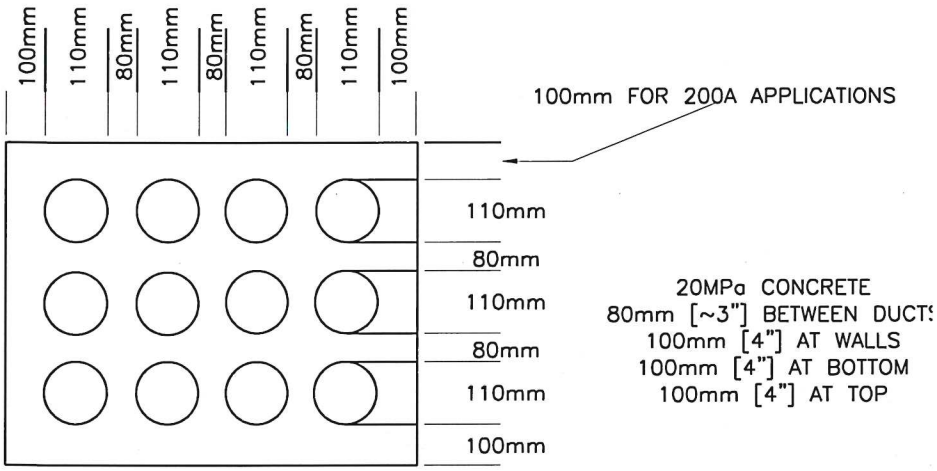


FIGURE 5

STANDARD DUCTBANK ENVELOPE DIMENSIONS
12–100mm [4"] DUCTS (4W X 3H)

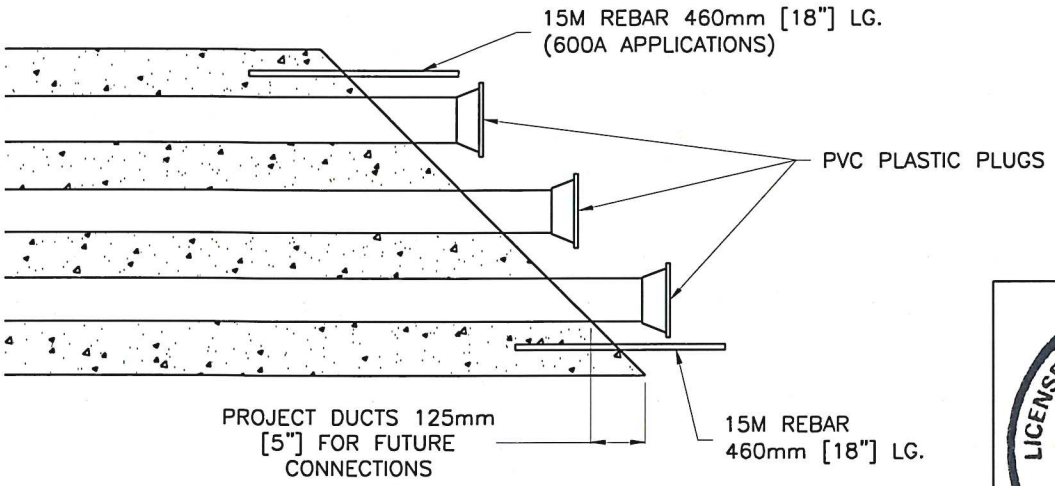


FIGURE 6

STANDARD DUCTBANK TERMINATION

LICENSED PROFESSIONAL ENGINEER
C. A. LEE
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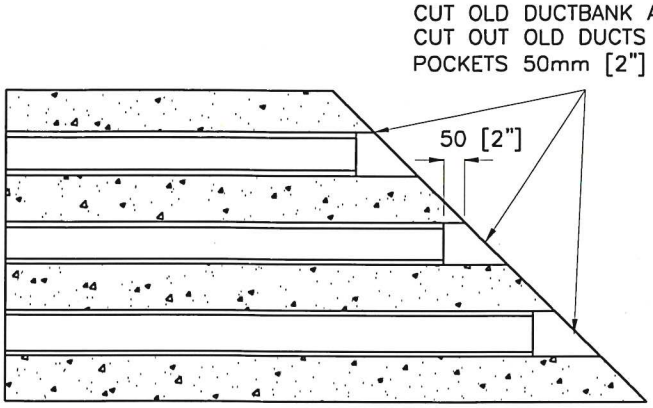
COLIN LEE — Name
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Signature & Professional Designation

**ALL DIMENSIONS IN mm UNLESS OTHERWISE NOTED.

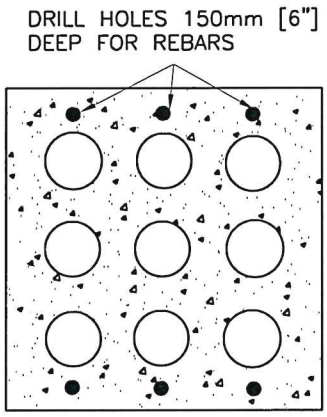
REV.	DESCRIPTION	DATE	INITIALS
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DATE:	SCALE:	REV.	DWG. NO. / SHEET	
2026-10-22	NTS	0	5 OF 9	12-404A1

TITLE: **TYPICAL CONCRETE ENCASED DUCT STRUCTURES 200A**

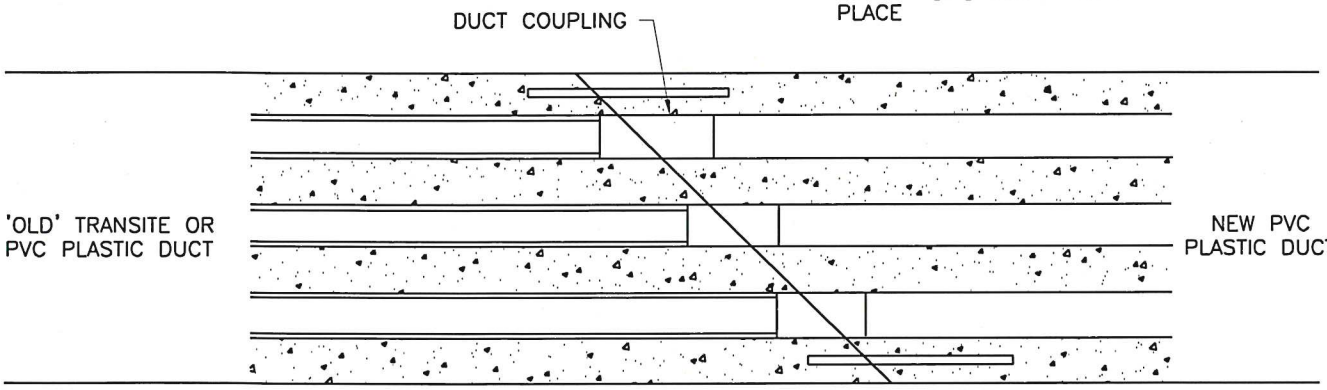


STEP 1



STEP 2

INSERT 15M X 460mm[18"] REBARS INTO 150mm [6"] DEEP HOLES AND GROUT IN PLACE



STEP 3

NEW DUCTBANK TO NON–STANDARD TERMINATION

1. CLEAN FACE OF OLD DUCT ENVELOPE, APPLY EPOXY AS PER MANUFACTURER'S INSTRUCTIONS, FIT NEW DUCT INTO POCKETS. NOTE: IF OLD DUCT IS 'TRANSITE' AND NEW DUCT IS PLASTIC, PLACE A PLASTIC COUPLING ON THE END OF THE PLASTIC DUCT. THIS WILL INCREASE THE DIAMETER OF THE PLASTIC AND GIVE A SNUG FIT IN THE POCKET
2. POUT CONCRETE TO CONTINUE DUCT ENVELOPE, WORK THE CONCRETE THOROUGHLY BETWEEN DUCTS IN ORDER TO ELIMINATE VOIDS.

NEW DUCTBANK TO STANDARD TERMINATION

1. WASH FACE OF STANDARD TERMINATION, REMOVE PLUGS AND CONNECT NEW DUCTS. APPLY EPOXY AS PER MANUFACTURER'S INSTRUCTIONS TO FACE.
2. POUR CONCRETE TO CONTINUE DUCT ENVELOPE, WORK THE CONCRETE THOROUGHLY BETWEEN DUCTS IN ORDER TO ELIMINATE VOIDS.

FIGURE 7

DUCTBANK JOINT CONSTRUCTION

LICENSED PROFESSIONAL ENGINEER
Colin Lee
C. A. LEE
26 OCT 2026
PROVINCE OF ONTARIO

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	TITLE: TYPICAL CONCRETE ENCASED DUCT STRUCTURES 200A				

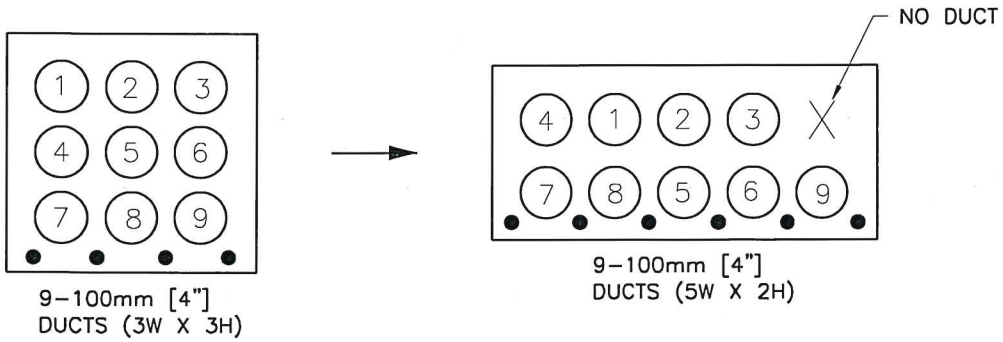


FIGURE 8

TYPICAL 9 DUCT TRANSITION ARRANGEMENTS

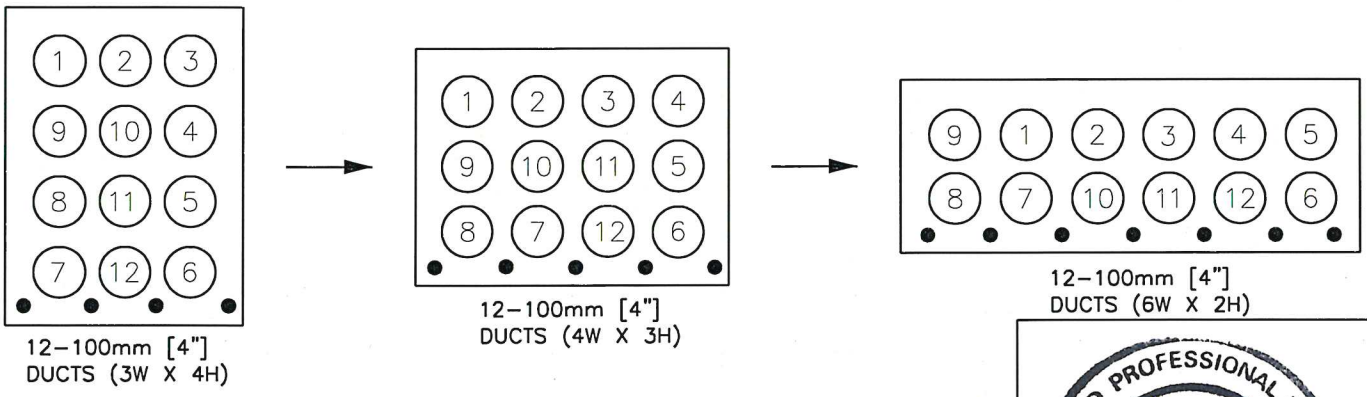


FIGURE 9

TYPICAL 12 DUCT TRANSITION ARRANGEMENTS

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Enova	DATE: 2026-10-22	SCALE: NTS	REV. 0	DWG. NO. SHEET 7 OF 9	12-404A1
	TITLE: TYPICAL CONCRETE ENCASED DUCT STRUCTURES 200A				

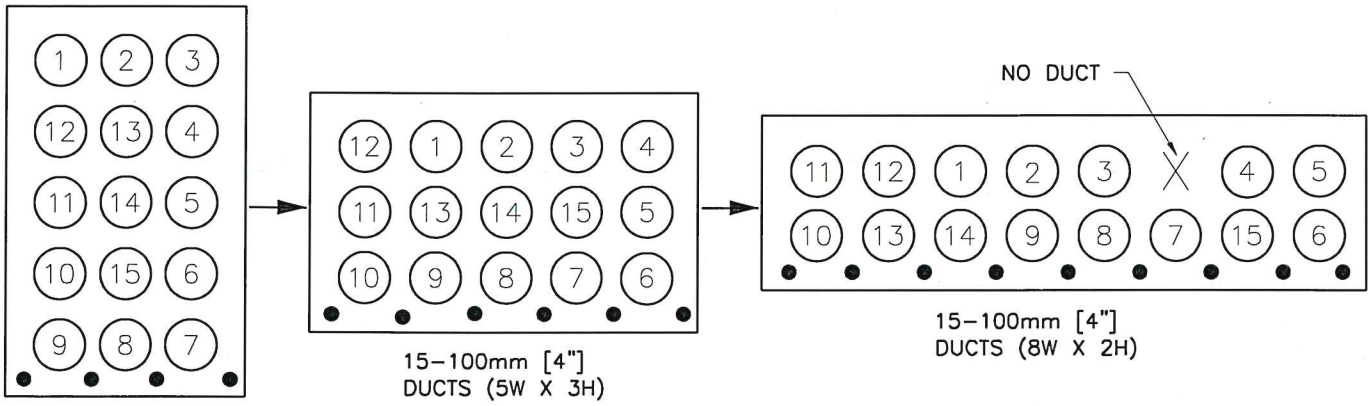


FIGURE 10

TYPICAL 15 DUCT TRANSITION ARRANGEMENTS

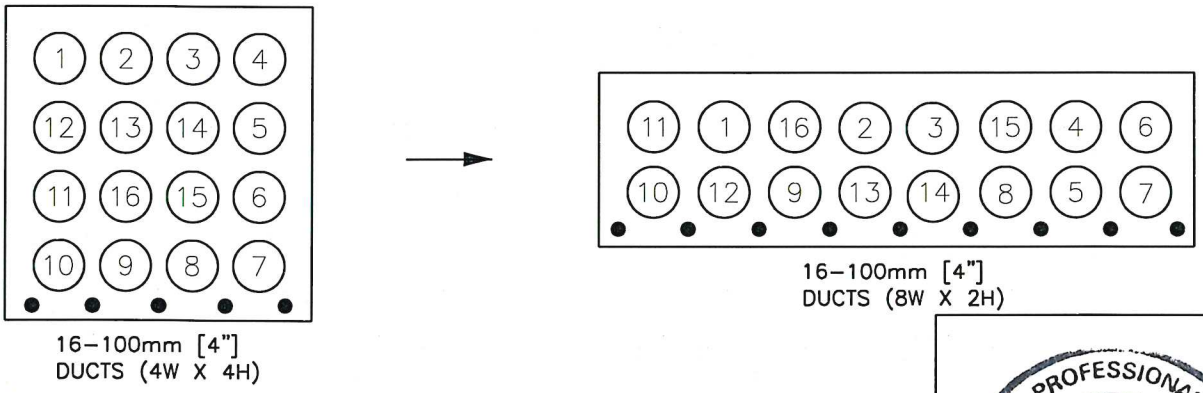


FIGURE 11

TYPICAL 16 DUCT TRANSITION ARRANGEMENTS

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C. A. LEE
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Enova	DATE: 2026-10-22	SCALE: NTS	REV. 0	DWG. NO. SHEET 8 OF 9	12-404A1
	TITLE: TYPICAL CONCRETE ENCASED DUCT STRUCTURES 200A				

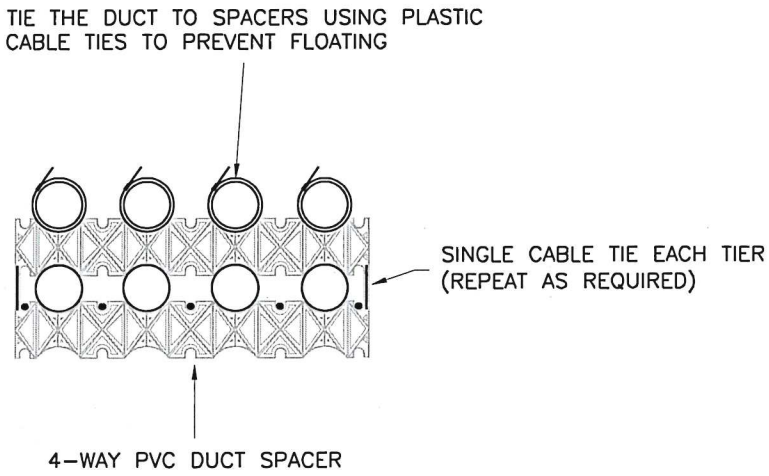


FIGURE 12

TYPICAL DUCT BANK INSTALLATION USING PLASTIC CABLE TIES TO PREVENT FLOATING

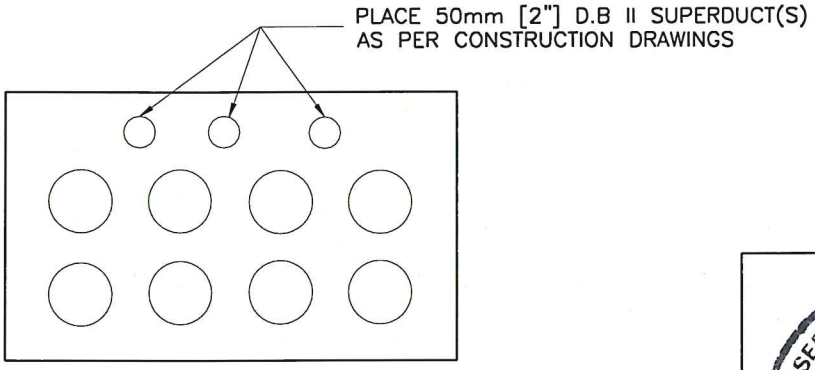


FIGURE 13

TYPICAL DUCTBANK INSTALLATION SHOWING 50mm D.B II SUPERDUCT FOR HYDRO

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C. A. LEE
26 OCT 2026
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26 OCT 2026 — Date
Colin Lee P. ENG. — Signature & Professional Designation

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DATE:	SCALE:	REV.	DWG. NO. / SHEET	
2026-10-22	NTS	0	9 OF 9	12-404A1

TITLE: **TYPICAL CONCRETE ENCASED DUCT STRUCTURES 200A**

NOTES

1. CONCRETE MATERIALS AND WORKMANSHIP TO CONFORM TO THE LATEST VERSION OF CSA A23.1 AND CSA A23.2.
2. REINFORCING STEEL TO CONFORM TO CSA G30.18–400R
3. CONCRETE TO BE NON AIR ENTRAINED, 10mm PEASTONE, 80mm SLUMP AND HAVE A COMPRESSIVE STRENGTH OF 20MPa AT 28 DAYS.
4. LEVEL BOTTOM OF EXCAVATION AND DEWATER AS REQUIRED.
5. SET DUCTS AT GRADES CONFORMING TO THE DRAWINGS. ENSURE THAT DUCTS DRAIN TO PULLBOXES, AND THAT NO WATER TRAPS ARE FORMED IN INDIVIDUAL DUCTS.
6. DO NOT PLACE CONCRETE ON EXCAVATED MATERIAL. IF EXCAVATION IS CARRIED TOO DEEP, FILL WITH SUITABLE INORGANIC NATIVE MATERIAL AND COMPACT TO A MINIMUM OF 95% STANDARD PROCTOR DENSITY
7. DUCT BANK IS TO BE ANCHORED TO PREVENT FLOATING. DO NOT ALLOW CONCRETE TO ENTER THE DUCTS DURING CONCRETE PLACEMENT.
8. 15 M DIAMETER REBAR TO BE PLACED AT THE BOTTOM OF EVERY DUCT BANK.
9. LAP SPLICES IN REINFORCING STEEL SHALL BE 460mm [18"] MINIMUM.
10. DUCT BANK TO HAVE MINIMUM 900mm [36"] COVER FROM FINISHED GRADE TO TOP OF DUCT BANK
11. SIDES OF ALL DUCT BANKS SHALL BE FORMED.
12. ALL BOTTOM DUCTS TO HAVE A MINIMUM 100mm [4"] CONCRETE UNDERNEATH.
13. DO NOT ALLOW DIRT AND OTHER FOREIGN MATERIALS FROM CONTAMINATING THE CONCRETE.
14. DUCT JOINTS TO BE STAGGERED A MINIMUM OF 200mm [8"] & SECURED WITH AN APPROVED COUPLING.
15. TO PREVENT INDUCED ELECTRICAL CURRENTS, DO NOT PERMIT ANY METALLIC WIRE OR ROD TO COMPLETELY ENCIRCLE ONE, OR ANY GROUP OF DUCTS WHICH FORM PART OF A DUCT ENVELOPE.
16. SPACERS ARE TO BE RIGID NON–BENDABLE TYPE AS PER IPEX PRODUCTS SHOWN. SPACERS TO BE PLACED UNDER EACH DUCT LAYER WITH MAXIMUM CENTER TO CENTER DISTANCE OF 1.8m [6'] AND LOCATED WITHIN 600mm [24"] EACH SIDE OF COUPLERS ALONG ENTIRE LENGTH OF DUCT BANK.
17. DUCT TO BE 100mm AND 50mm TYPE II P.V.C IPEX SUPERDUCT DB2 PVC UNDERGROUND CONDUIT.
18. ALL HORIZONTAL BENDS ARE TO HAVE A MINIMUM 900mm [35"] RADIUS UNLESS OTHERWISE NOTED.
19. AVOID ABRUPT BENDS. WHEN BENDS ARE TAKEN AT COUPLINGS, REAM THE INSIDE OF THE DUCT ENDS TO ELIMINATE SHARP EDGES.
20. ALL DUCT JOINTS SHALL BE SOLVENT WELDED (GLUED) AS PER DUCT MANUFACTURER'S RECOMMENDATIONS.
21. NON–METALLIC ROPE OR PLASTIC CABLE TIES SHALL BIND DUCTS & SPACERS EVERY 3m [10'].
22. BELL ENDS ARE TO BE USED ON ALL DUCTS ENTERING PULL BOXES, VAULTS OR CONCRETE ENCLOSURES. BELL ENDS MUST BE INSTALLED FLUSH WITH THE INSIDE WALL OF THE BUILDING OR CONCRETE ENCLOSURE.
23. EACH DUCT TO BE CLEANED & 2000 lb FLAT MULE ROPE INSTALLED.
24. CLEAN COMPLETED DUCT RUNS BY PULLING AN APPROVED CLEANING DEVICE THROUGH THE DUCTS BY MEANS OF A WINCH LINE. TAIL THE CLEANING DEVICE WITH A SECOND WINCH LINE TO PERMIT WITHDRAWAL IN CASE OF BLOCKAGE. WHEN EXTRACTING WINCH LINE TAIL WITH ONE 100% POLYPROPYLENE TWINE SIZE 700 IN EACH DUCT, LEAVING IT IN PLACE AS A FISH LINE.
25. ENDS OF DUCTS TO BE CAPPED & MARKED WITH ELECTRONIC MARKERS.
26. RED CAUTION TAPE TO BE INSTALLED 300mm [12"] ABOVE THE DUCT BANK, ONE STRIP ON EACH SIDE OF THE TRENCH.
27. DO NOT ENCASE OTHER UTILITIES IN CONCRETE. MAINTAIN A MINIMUM SEPARATION OF 12" [300mm] FROM ANY OTHER UTILITY UNLESS A LESSER CLEARANCE IS SPECIFICALLY APPROVED BY THE ENGINEER. COMMUNICATIONS CABLES OR DUCTS MAY BE LAID DIRECTLY ON TOP (ZERO SEPARATION) OF A CONCRETE ENCASED DUCTBANK WHERE BOTH ENOVA AND THE COMMUNICATIONS UTILITY AGREE.
28. MAINTAIN A MINIMUM SEPARATION OF 2.0m [6'–8"] FROM THE INSIDE WALLS OF ADJACENT SWIMMING POOLS.

    THE MINIMUM SEPARATION MAY BE REDUCED TO 1.0m [3'–4"] IF NO CABLES OPERATING AT A VOLTAGE GREATER THAN 15000 VOLTS PHASE–TO–PHASE WILL BE INSTALLED IN THE DUCTBANK.

LICENSED PROFESSIONAL ENGINEER
Colin Lee
C. A. LEE
26 OCT 2026
PROVINCE OF ONTARIO

APPROVED BY:

REFERENCE DRAWINGS:

12–404A3 – RISER GUARD INSTALLATION AND TERMINATION DETAILS

THIS DRAWING SUPERCEDES C3727

**ALL DIMENSIONS IN mm UNLESS OTHERWISE NOTED.

REV.	DESCRIPTION	DATE	INITIALS
1	REBRANDED ON AN ENOVA TEMPLATE AND COMBINED WITH STANDARD C2727	2026-10-22	W.L.

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COLIN LEE — Name

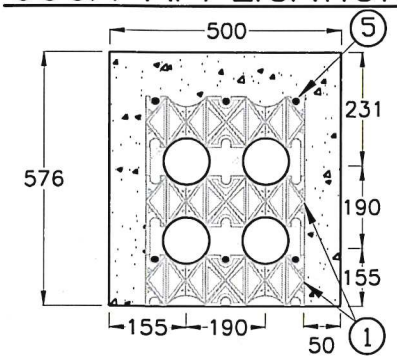
26 OCT 2026 — Date

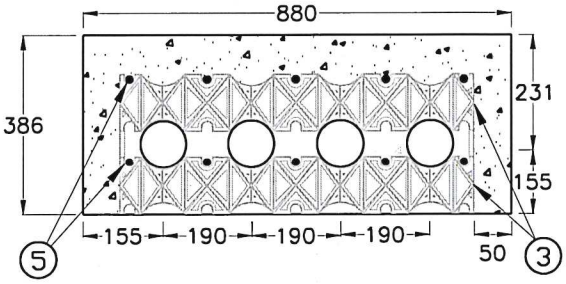
Colin Lee P. ENG — Signature & Professional Designation

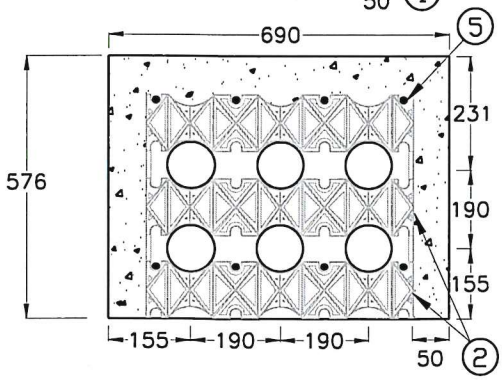
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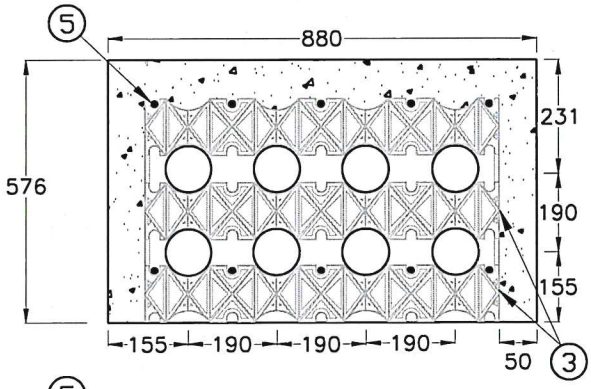
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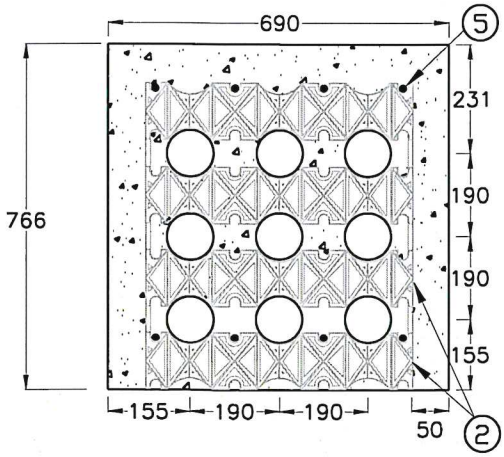
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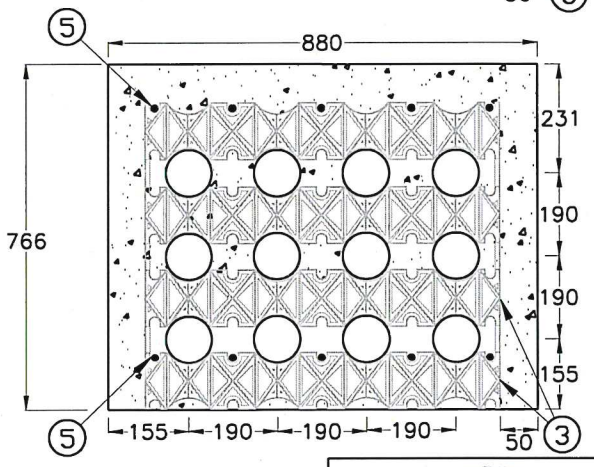












MATERIAL LIST			
ITEM	QUANTITY	DESCRIPTION	JDE PART #
1	AS REQUIRED	DUCT SPACER 4" – 2 WAY PVC INTERMEDIATE	38P020054
2	AS REQUIRED	DUCT SPACER 4" – 3 WAY PVC INTERMEDIATE	38P020056
3	AS REQUIRED	DUCT SPACER 4" – 4 WAY PVC INTERMEDIATE	38P020059
4	AS REQUIRED	BELL ENDS (NOT SHOWN)	38P020016
5	AS REQUIRED	REBAR–PLAIN, 15MM	38R027004

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C. A. LEE
26 OCT 2026
PROVINCE OF ONTARIO

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Enova	DATE: 2026-10-22	SCALE: NTS	REV. 0	DWG. NO. SHEET 2 OF 9	12-404A2

TITLE: **TYPICAL CONCRETE ENCASED DUCT STRUCTURES 600A**

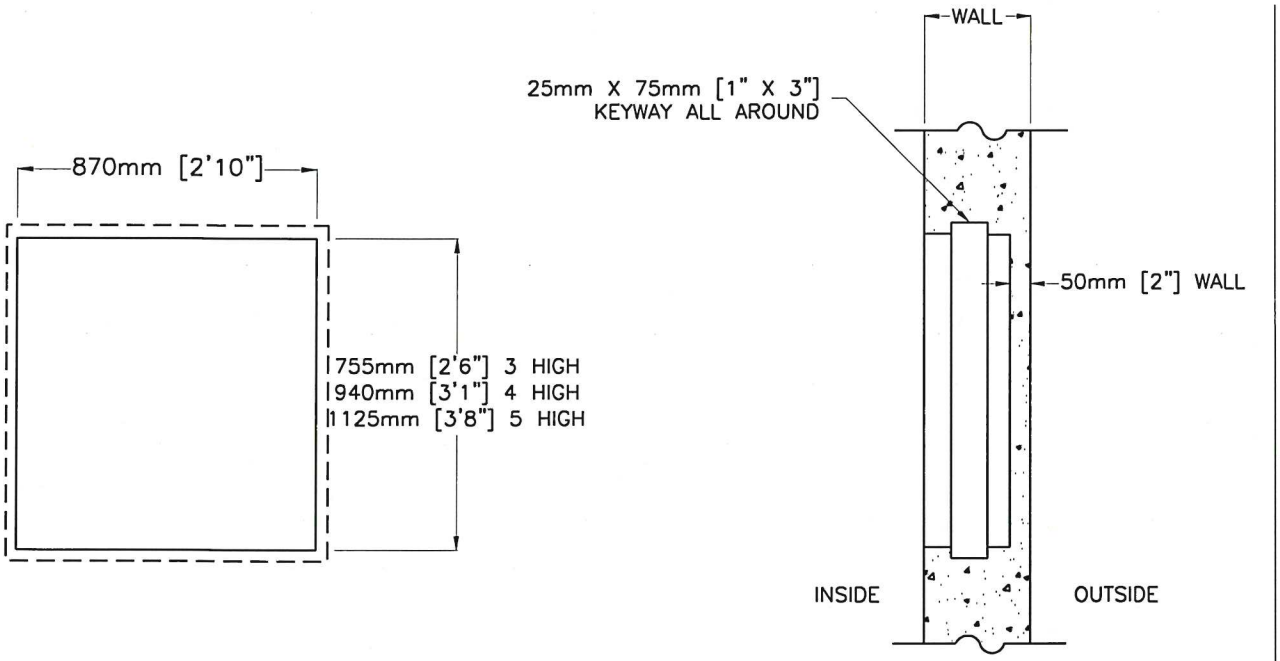


FIGURE 1

RECESS DETAIL FOR FUTURE DUCT
ENTRANCE IN POURED IN PLACE PULLBOXES

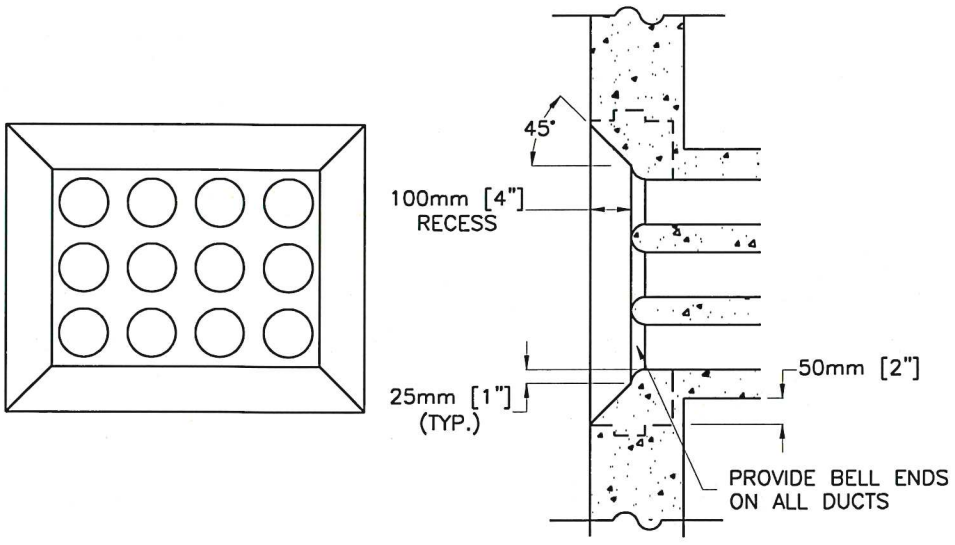


FIGURE 2

FINISHED DUCT ENTRANCE DETAIL
FOR POURED IN PLACE PULLBOXES

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The installation work covered by this document meets the safety requirements of Section 4 of Regulation 22/04

COLIN LEE — Name
26 OCT 2026 — Date
Colin Lee P.ENG — Signature & Professional Designation

**ALL DIMENSIONS IN mm UNLESS OTHERWISE NOTED.

REV.	DESCRIPTION	DATE	INITIALS
1	REBRANDED ON AN ENOVA TEMPLATE AND COMBINED WITH STANDARD C2727	2026-10-22	W.L.

Enova	DATE: 2026-10-22	SCALE: NTS	REV. 0	DWG. NO. SHEET 3 OF 9	12-404A2
	TITLE: TYPICAL CONCRETE ENCASED DUCT STRUCTURES 600A				

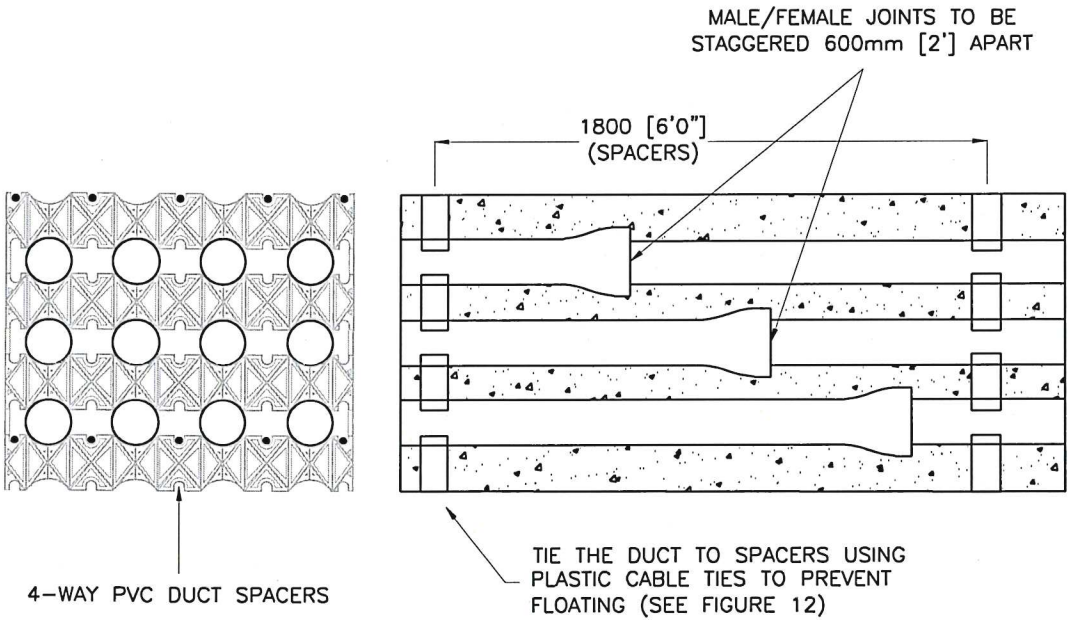


FIGURE 3

TYPICAL DUCTBANK INSTALLATION
USING DUCT SPACERS

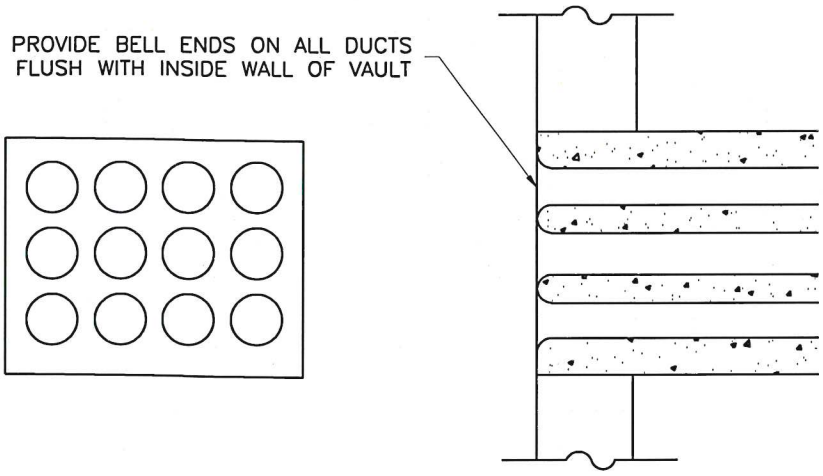


FIGURE 4

TYPICAL DUCTBANK INSTALLATION
USING DUCT SPACERS

LICENSED PROFESSIONAL ENGINEER
Colin Lee
C. A. LEE
26 OCT 2026
PROVINCE OF ONTARIO

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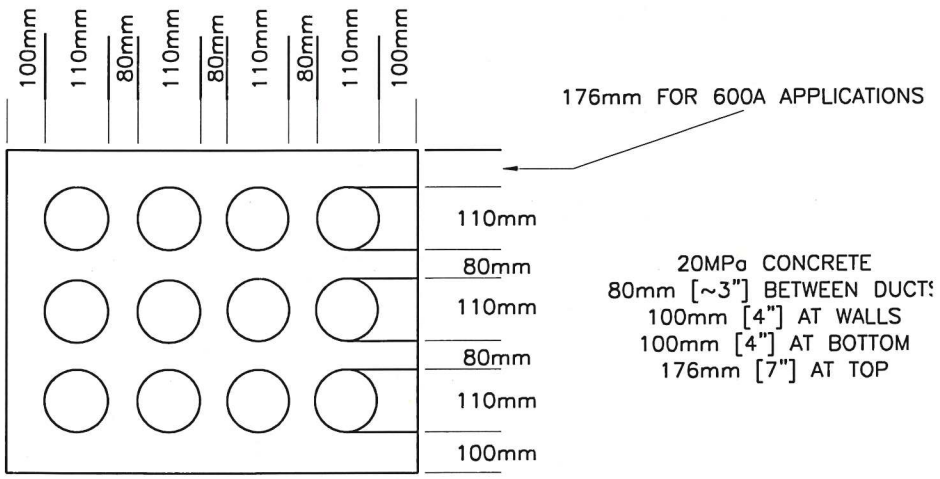


FIGURE 5

STANDARD DUCTBANK ENVELOPE DIMENSIONS
12–100mm [4"] DUCTS (4W X 3H)

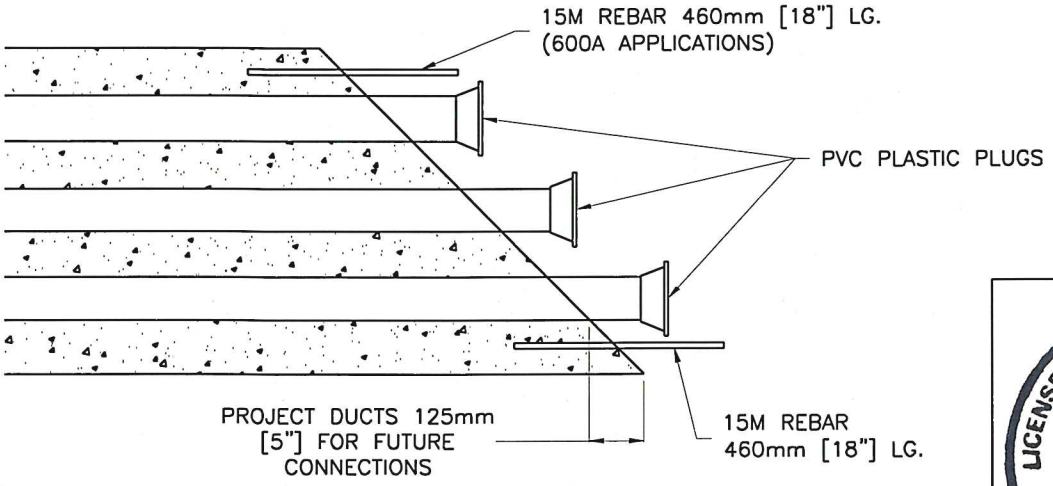


FIGURE 6

STANDARD DUCTBANK TERMINATION

LICENSED PROFESSIONAL ENGINEER
C. A. LEE
26 OCT 2026
PROVINCE OF ONTARIO

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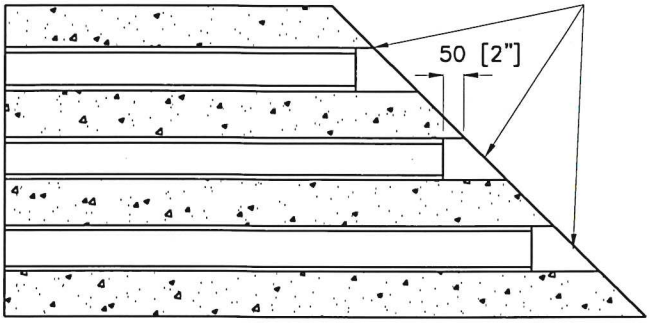
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DATE:	SCALE:	REV.	DWG. NO. SHEET	
2026-10-22	NTS	0	5 OF 9	12-404A2

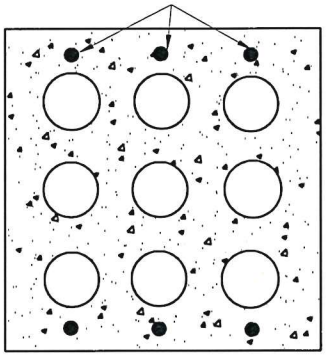
TITLE: **TYPICAL CONCRETE ENCASED DUCT STRUCTURES 600A**

CUT OLD DUCTBANK AT 45°
CUT OUT OLD DUCTS TO FORM
POCKETS 50mm [2"] DEEP



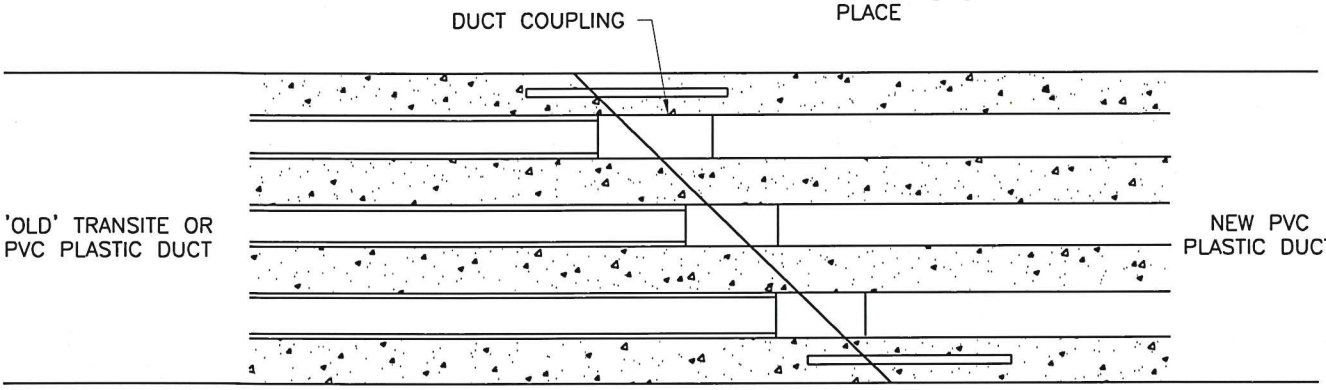
STEP 1

DRILL HOLES 150mm [6"]
DEEP FOR REBARS



STEP 2

INSERT 15M X 460mm [18"] REBARS INTO 150mm [6"] DEEP HOLES AND GROUT IN PLACE



STEP 3

NEW DUCTBANK TO NON–STANDARD TERMINATION

1. CLEAN FACE OF OLD DUCT ENVELOPE, APPLY EPOXY AS PER MANUFACTURER'S INSTRUCTIONS, FIT NEW DUCT INTO POCKETS. NOTE: IF OLD DUCT IS 'TRANSITE' AND NEW DUCT IS PLASTIC, PLACE A PLASTIC COUPLING ON THE END OF THE PLASTIC DUCT. THIS WILL INCREASE THE DIAMETER OF THE PLASTIC AND GIVE A SNUG FIT IN THE POCKET
2. POUT CONCRETE TO CONTINUE DUCT ENVELOPE, WORK THE CONCRETE THOROUGHLY BETWEEN DUCTS IN ORDER TO ELIMINATE VOIDS.

NEW DUCTBANK TO STANDARD TERMINATION

1. WASH FACE OF STANDARD TERMINATION, REMOVE PLUGS AND CONNECT NEW DUCTS. APPLY EPOXY AS PER MANUFACTURER'S INSTRUCTIONS TO FACE.
2. POUR CONCRETE TO CONTINUE DUCT ENVELOPE, WORK THE CONCRETE THOROUGHLY BETWEEN DUCTS IN ORDER TO ELIMINATE VOIDS.

FIGURE 7

DUCTBANK JOINT CONSTRUCTION

LICENSED PROFESSIONAL ENGINEER
Colin Lee
C. A. LEE
26 OCT 2026
PROVINCE OF ONTARIO

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	TITLE: TYPICAL CONCRETE ENCASED DUCT STRUCTURES 600A				

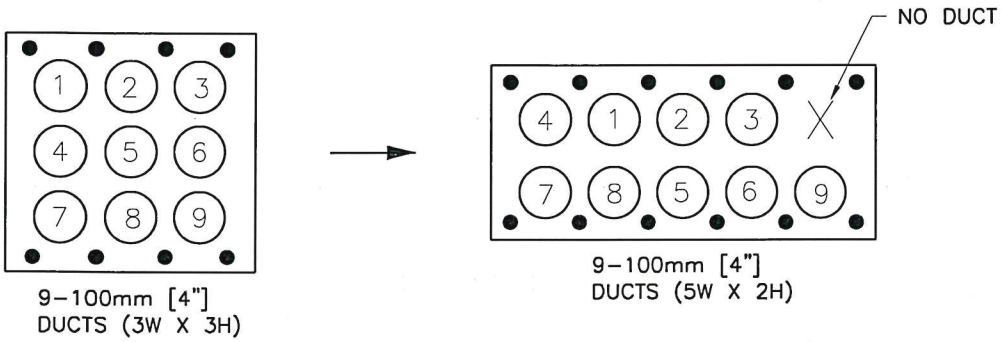


FIGURE 8

TYPICAL 9 DUCT TRANSITION ARRANGEMENTS

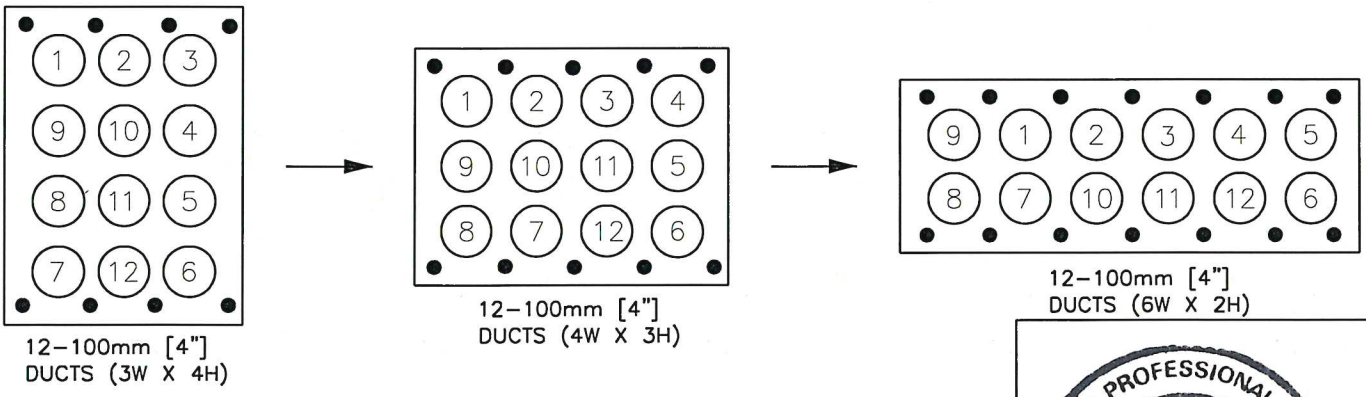


FIGURE 9

TYPICAL 12 DUCT TRANSITION ARRANGEMENTS

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C. A. LEE
12 OCT 2026
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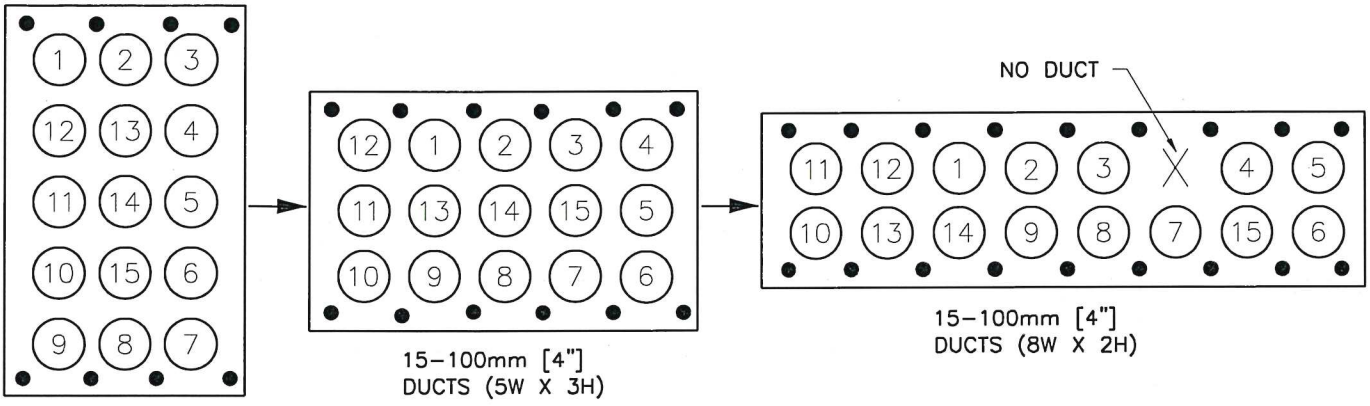
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	TITLE: TYPICAL CONCRETE ENCASED DUCT STRUCTURES 600A			



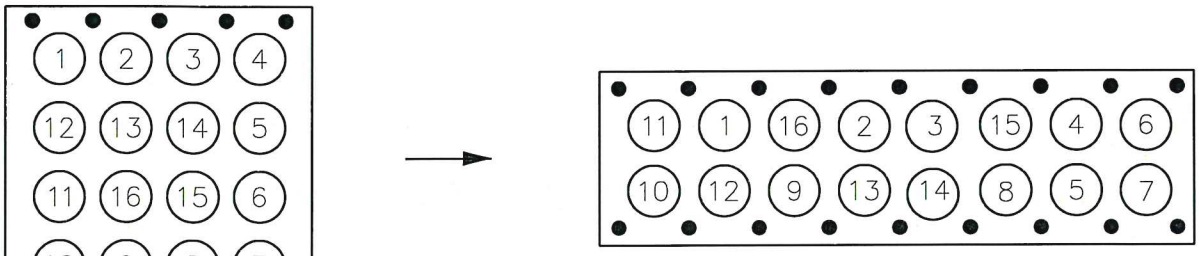
15–100mm [4"] DUCTS (3W X 5H)

15–100mm [4"] DUCTS (5W X 3H)

15–100mm [4"] DUCTS (8W X 2H)

FIGURE 10

TYPICAL 15 DUCT TRANSITION ARRANGEMENTS



16–100mm [4"] DUCTS (4W X 4H)

16–100mm [4"] DUCTS (8W X 2H)

FIGURE 11

TYPICAL 16 DUCT TRANSITION ARRANGEMENTS

LICENSED PROFESSIONAL ENGINEER
Colin Lee
C. A. LEE
26 OCT 2026
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	TITLE: TYPICAL CONCRETE ENCASED DUCT STRUCTURES 600A				

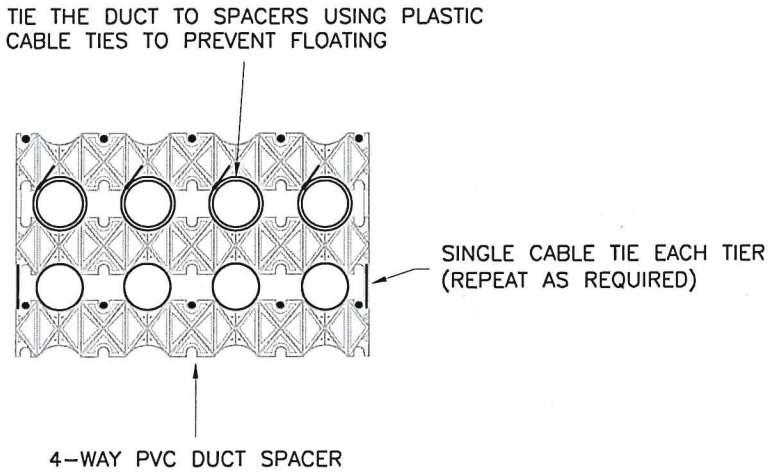


FIGURE 12

TYPICAL DUCT BANK INSTALLATION USING PLASTIC CABLE TIES TO PREVENT FLOATING

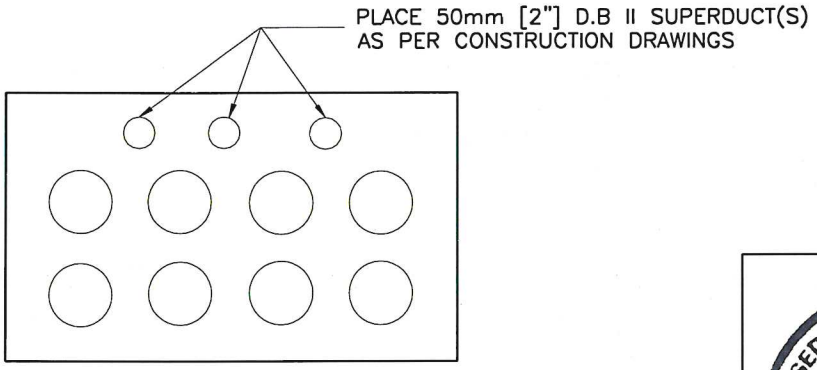


FIGURE 13

TYPICAL DUCTBANK INSTALLATION SHOWING 50mm D.B II SUPERDUCT FOR HYDRO

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C. A. LEE
26 OCT 2026
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2026-10-22	NTS	0	9 OF 9	12-404A2

TITLE: **TYPICAL CONCRETE ENCASED DUCT STRUCTURES 600A**

NOTES

1. CONCRETE MATERIALS AND WORKMANSHIP TO CONFORM TO THE LATEST VERSION OF CSA A23.1 AND CSA A23.2.
2. REINFORCING STEEL TO CONFORM TO CSA G30.18-400R
3. CONCRETE TO BE NON AIR ENTRAINED, 10mm PEASTONE, 80mm SLUMP AND HAVE A COMPRESSIVE STRENGTH OF 20MPa AT 28 DAYS.
4. LEVEL BOTTOM OF EXCAVATION AND DEWATER AS REQUIRED.
5. SET DUCTS AT GRADES CONFORMING TO THE DRAWINGS. ENSURE THAT DUCTS DRAIN TO PULLBOXES, AND THAT NO WATER TRAPS ARE FORMED IN INDIVIDUAL DUCTS.
6. DO NOT PLACE CONCRETE ON EXCAVATED MATERIAL. IF EXCAVATION IS CARRIED TOO DEEP, FILL WITH SUITABLE INORGANIC NATIVE MATERIAL AND COMPACT TO A MINIMUM OF 95% STANDARD PROCTOR DENSITY
7. DUCT BANK IS TO BE ANCHORED TO PREVENT FLOATING. DO NOT ALLOW CONCRETE TO ENTER THE DUCTS DURING CONCRETE PLACEMENT.
8. 15 M DIAMETER REBAR TO BE PLACED AT TOP & BOTTOM OF EVERY DUCT BANK.
9. LAP SPLICES IN REINFORCING STEEL SHALL BE 460mm [18"] MINIMUM.
10. DUCT BANK TO HAVE MINIMUM 900mm [36"] COVER FROM FINISHED GRADE TO TOP OF DUCT BANK
11. SIDES OF ALL DUCT BANKS SHALL BE FORMED.
12. ALL BOTTOM DUCTS TO HAVE A MINIMUM 100mm [4"] CONCRETE UNDERNEATH.
13. DO NOT ALLOW DIRT AND OTHER FOREIGN MATERIALS FROM CONTAMINATING THE CONCRETE.
14. DUCT JOINTS TO BE STAGGERED A MINIMUM OF 200mm [8"] & SECURED WITH AN APPROVED COUPLING.
15. TO PREVENT INDUCED ELECTRICAL CURRENTS, DO NOT PERMIT ANY METALLIC WIRE OR ROD TO COMPLETELY ENCIRCLE ONE, OR ANY GROUP OF DUCTS WHICH FORM PART OF A DUCT ENVELOPE.
16. SPACERS ARE TO BE RIGID NON-BENDABLE TYPE AS PER IPEX PRODUCTS SHOWN. SPACERS TO BE PLACED UNDER EACH DUCT LAYER WITH MAXIMUM CENTER TO CENTER DISTANCE OF 1.8m [6'] AND LOCATED WITHIN 600mm [24"] EACH SIDE OF COUPLERS ALONG ENTIRE LENGTH OF DUCT BANK.
17. DUCT TO BE 100mm AND 50mm TYPE II P.V.C IPEX SUPERDUCT DB2 PVC UNDERGROUND CONDUIT.
18. ALL HORIZONTAL BENDS ARE TO HAVE A MINIMUM 900mm [35"] RADIUS UNLESS OTHERWISE NOTED.
19. AVOID ABRUPT BENDS. WHEN BENDS ARE TAKEN AT COUPLINGS, REAM THE INSIDE OF THE DUCT ENDS TO ELIMINATE SHARP EDGES.
20. ALL DUCT JOINTS SHALL BE SOLVENT WELDED (GLUED) AS PER DUCT MANUFACTURER'S RECOMMENDATIONS.
21. NON-METALLIC ROPE OR PLASTIC CABLE TIES SHALL BIND DUCTS & SPACERS EVERY 3m [10'].
22. BELL ENDS ARE TO BE USED ON ALL DUCTS ENTERING PULL BOXES, VAULTS OR CONCRETE ENCLOSURES. BELL ENDS MUST BE INSTALLED FLUSH WITH THE INSIDE WALL OF THE BUILDING OR CONCRETE ENCLOSURE.
23. EACH DUCT TO BE CLEANED & 2000 lb FLAT MULE ROPE INSTALLED.
24. CLEAN COMPLETED DUCT RUNS BY PULLING AN APPROVED CLEANING DEVICE THROUGH THE DUCTS BY MEANS OF A WINCH LINE. TAIL THE CLEANING DEVICE WITH A SECOND WINCH LINE TO PERMIT WITHDRAWAL IN CASE OF BLOCKAGE. WHEN EXTRACTING WINCH LINE TAIL WITH ONE 100% POLYPROPYLENE TWINE SIZE 700 IN EACH DUCT, LEAVING IT IN PLACE AS A FISH LINE.
25. ENDS OF DUCTS TO BE CAPPED & MARKED WITH ELECTRONIC MARKERS.
26. RED CAUTION TAPE TO BE INSTALLED 300mm [12"] ABOVE THE DUCT BANK, ONE STRIP ON EACH SIDE OF THE TRENCH.
27. DO NOT ENCASE OTHER UTILITIES IN CONCRETE. MAINTAIN A MINIMUM SEPARATION OF 12" [300mm] FROM ANY OTHER UTILITY UNLESS A LESSER CLEARANCE IS SPECIFICALLY APPROVED BY THE ENGINEER. COMMUNICATIONS CABLES OR DUCTS MAY BE LAID DIRECTLY ON TOP (ZERO SEPARATION) OF A CONCRETE ENCASED DUCTBANK WHERE BOTH ENOVA AND THE COMMUNICATIONS UTILITY AGREE.
28. MAINTAIN A MINIMUM SEPARATION OF 2.0m [6'-8"] FROM THE INSIDE WALLS OF ADJACENT SWIMMING POOLS. THE MINIMUM SEPARATION MAY BE REDUCED TO 1.0m [3'-4"] IF NO CABLES OPERATING AT A VOLTAGE GREATER THAN 15000 VOLTS PHASE-TO-PHASE WILL BE INSTALLED IN THE DUCTBANK.

LICENSED PROFESSIONAL ENGINEER
C. A. LEE
26 OCT 2026
PROVINCE OF ONTARIO

APPROVED BY:

REFERENCE DRAWINGS:

12-404A3 - RISER GUARD INSTALLATION AND TERMINATION DETAILS

THIS DRAWING SUPERCEDES C3727

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