AMENDMENT NO.:

TO THE TENDER DOCUMENTS

Defence Construction (1951) Limited

CLOSING DATE/TIME:	As indicated on the *Electronic Bidding System*
PROJECT NO.:	N230700_83716
AMENDMENT DATE:	March 5, 2025
PROJECT TITLE:	CFHA Apartment Building 6-Plex Kingston, Ontario

TO ALL TENDERERS:

THE PURPOSE OF THIS AMENDMENT IS TO GIVE EFFECT TO THE FOLLOWING:

1. To **ISSUE** Addendum No. 3, enclosed (2 pages).

   1.1. To **ISSUE** Addendum S1, enclosed (1 pages).

   1.2. Reference Specification 07 25 00 - Air and Vapour Barriers; **DELETE** in its entirety and **REPLACE** with “07 25 00 - Air and Vapour Barriers Rev. 01 (2025-03-04)” enclosed (11 pages).

   1.3. Reference Specification 31 21 13 - Radon Mitigation Rough-In System; **DELETE** in its entirety and **REPLACE** with “31 21 13 - Radon Mitigation Rough-In System Rev. 01 (2025-03-04)” enclosed (6 pages).

2. Reference Drawing L-KN-ZKN99-200-B - Concrete Notes #4; **DELETE** in its entirety and **REPLACE** with “4. PROVIDE 152mm PLASTIC WRAPPED CARDBOARD VOID FORM BELOW ALL PILE CAPS AND STRUCTURAL SLABS.”

3. Reference Drawing L-KN-ZKN99-300-B - Floor Types; **DELETE** “F6 - WOOD JOIST FLOOR - ENTRANCE - NBC F13a STC 43” and **REPLACE** with “F5 - WOOD JOIST FLOOR - ENTRANCE - NBC F13a STC 43”

4. Reference Drawing L-KN-ZKN99-301-B - Detail 1/301; **DELETE** 7620 mm x 6096 mm concrete pads shown on North-East and North-West Corner and **REPLACE** with Heavy Duty Asphalt.

5. Reference Drawing L-KN-ZKN99-302-B – Detail 2/302 & Detail 3/302; Tenderers are advised that the “Capillary Break” shall meet to requirements of Specification Section 07 14 00 Fluid-Applied Waterproofing.

6. Tenderers are advised that the *Closing Date* on the *Electronic Bidding System* has been extended to March 13, 2025. There is no change to the *Closing Time*.

End of Amendment No. 4

REPUBLIC

Addendum

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Addendum Number: 03

Consultant: Stephen Oberlin, Republic Architecture Inc. **Date: March 4, 2025**

Owners Representative: Lynn Tansey, Defence Construction Canada

Project Number and Name: 743 - CFHA 6-Plex (Kingston Site) **Total Pages: 3**

The following information supplements and/or supersedes the Issued for Tender documents issued on January 24, 2025.

This Addendum forms part of the contract documents and is to be read, interpreted, and coordinated with all other parts. The cost of all contained herein is to be included in the contract sum. The following revisions supersede the information contained in the original drawings and specifications issued for the above-named project to the extent referenced and shall become part thereof.

This addendum consists of 3 pages, and the following attachments:

- 07 25 00 – Air and Vapour Barriers Rev.01 (2025-03-04)
- 31 21 13 – Radon Mitigation Rough-In System Rev.01 (2025-03-04)

Description:

1.1 CHANGES TO DRAWINGS

.1 Structural Drawings

.1 **REFERENCE** Package B - Drawing L-KN-ZKN99-200-B – General Notes, regarding Concrete Notes, **REMOVE** Note 14 and **REPLACE** with "PROVIDE HYDROPHILIC SWELLING-TYPE WATERSTOP IN ALL VERTICAL CONCRETE JOINTS BELOW GRADE AND ALL PIT WALLS OR SLABS."

.2 **REFERENCE** Package B - Drawing L-KN-ZKN99-206-B – Roof Framing Plan, regarding Roof Framing Plan Notes, **ADD** "Design roof trusses for the following factored axial wind loads: Grids 1 and 4 = 2.55 kN/m and Grids 2 and 3 = 3.40 kN/m."

1.2 CHANGES TO PROJECT MANUAL

.1 SECTION 07 25 00 – Air and Vapour Barriers

.1 **DELETE** Paragraph 2.4.1 - Installation in its entirety and **REPLACE** with paragraph 2.4.1 from 07 25 00 - Air and Vapour Barriers Rev. 01 (2025-03-04).

.2 **ADD** Paragraph 2.4.7 "Adhesives: Per manufacturers guidelines and appropriate to application conditions."

.3 **DELETE** Paragraph 3.4 Installation – Vapour Barriers, in its entirety and **REPLACE** with paragraph 3.4 from 07 25 00 - Air and Vapour Barriers Rev. 01 (2025-03-04).

.4 **INSERT** Paragraph 3.5 Installation – Smart Vapour Retarder and associated sub paragraphs.

.2 SECTION 31 21 13 – Radon Mitigation Rough-In System

.1 **DELETE** Paragraph 3.2 - Installation in its entirety and **REPLACE** with paragraph 3.2 from 31 21 13 – Radon Mitigation System Rough-In Rev. 01 (2025-03-04).

END OF ADDENDUM

Issued by:

Stephen Oberlin

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Project No.: **23950** **Date: March 4, 2025**

Project Name: **CFHA Apartment Buildings, CFB Kingston**

Addendum No. **S1**

This Addendum is issued prior to Tender due date to revise the Tender/Contract Documents and as such is part of those documents; value of all items shall be included in Tender. After acceptance of Tender, claims for costs will not be considered by reason of failure by Tenderer to have read Addenda.

Item No 01- Waterstop

Reference: Drawing No. 200

a) Refer to Concrete notes; REMOVE Note 14 and REPLACE with "PROVIDE HYDROPHILIC SWELLING-TYPE WATERSTOP IN ALL VERTICAL CONCRETE JOINTS BELOW GRADE AND ALL PIT WALLS OR SLABS."

Item No 02- Roof Truss Axial Loads

Reference: Drawing No. 1/206

a) Design roof trusses for the following factored axial wind loads:
   - Grids 1 and 4 = 2.55 kN/m
   - Grids 2 and 3 = 3.40 kN/m

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section 07 08 00 - Commissioning of Thermal and Moisture Protection

.2 Section 07 92 00 - Joint Sealants

1.2 REFERENCES

.1 American Association of Textile Chemists and Colorists (AATCC)

.1 AATCC TM127-2017(2018)e, Test Method for Water Resistance: Hydrostatic Pressure.

.2 ASTM International

.1 ASTM D412-16(2021), Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers - Tension.

.2 ASTM D570-22, Standard Test Method for Water Absorption of Plastics.

.3 ASTM D882-18, Standard Test Method for Tensile Properties of Thin Plastic Sheeting.

.4 ASTM D903-98(2017), Standard Test Method for Peel or Stripping Strength of Adhesive Bonds.

.5 ASTM D1970/D1970M-21, Standard Specification for Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection.

.6 ASTM D1976-20, Standard Test Method for Elements in Water by Inductively-Coupled Plasma Atomic Emission Spectroscopy.

.7 ASTM E84-23b, Standard Test Method for Surface Burning Characteristics of Building Materials.

.8 ASTM E96/E96M-16, Standard Test Method for Water Vapor Transmission of Materials.

.9 ASTM E154/E154M-08a(2019), Standard Test Methods for Water Vapor Retarders Used in Contact with Earth Under Concrete Slabs, on Walls, or as Ground Cover.

.10 ASTM E283-04, Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen.

.11 ASTM E330/E330M-14, Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference.

.12 ASTM E331-00, Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference.

.13 ASTM E1643-18a, Standard Practice for Selection, Design, Installation, and Inspection of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs.

.14 ASTM E1745-17(2023), Standard Specification for Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill under Concrete Slabs.

.15 ASTM E2178-21a, Standard Test Method for Determining Air Leakage Rate and Calculation of Air Permeance of Building Materials.

.16 ASTM E2357-18, Standard Test Method for Determining Air Leakage Rate of Air Barrier Assemblies.

.3 Canadian General Standards Board (CGSB)

.1 CGSB 37-GP-56M-1985, Membrane, Modified, Bituminous, Prefabricated, and Reinforced for Roofing.

.2 CAN/CGSB 51.34-M86, Vapour Barrier, Polyethylene Sheet, for Use in Building Construction.

.4 Health Canada/Workplace Hazardous Materials Information System (WHMIS)

.1 Safety Data Sheets (SDS).

.5 ULC Standards (ULC)

.1 CAN/ULC S741-08, Standard for Air Barrier Materials - Specification.

.2 CAN/ULC-S742-11, Standard for Air Barrier Assemblies - Specification.

1.3 SUBMITTALS

.1 Submit in accordance with Section 01 33 00 - Submittal Procedures.

.2 Product Data:

.1 Refer to Section 07 08 00 - Commissioning of Thermal and Moisture Protection.

.2 Submit manufacturer's printed product literature, specifications, and datasheet. Include product characteristics, performance criteria, physical size, finish, and limitations.

.3 Submit WHMIS Safety Data Sheets (SDS).

.3 Quality Assurance Submittals:

.1 Manufacturer's Instructions: Submit manufacturer's installation instructions and special handling criteria, installation sequence, and cleaning procedures.

.2 Certificates: Submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.

1.4 MOCK-UPS

.1 Provide mock-ups in accordance with Section 01 43 00 - Quality Assurance and Section 07 08 00 - Commissioning of Thermal and Moisture Protection.

.2 Vapour Barrier Mock-ups: Construct mock-up of sheet vapour barrier installation including one lap joint, one inside corner and at one electrical box.

.3 Air Barrier Mock-ups: Incorporate into construction of a typical exterior wall panel, full height by 3 m wide, incorporating door frame and sill, insulation, building corner condition, junction with roof system; illustrating materials interface and seals.

.4 Locate where directed.

.5 Mock-up will be used to judge quality of work, substrate preparation, and material application.

.6 Allow for inspection of mock-up by DCC Representative before proceeding with air and vapour barrier work.

.7 When accepted, mock-up will demonstrate minimum standard of quality required for this work.

.8 Accepted mock-up may remain as part of finished work.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store, and handle materials in accordance with Section 01 61 00 - Common Product Requirements and with manufacturer's written instructions.

.2 Deliver materials to site in original packaging, labelled with manufacturer's name and product identification.

.3 Storage and Handling Requirements:

.1 Store materials off ground in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.

.2 Store and protect products from damage.

.3 Replace defective or damaged materials with new.

1.6 AMBIENT CONDITIONS

.1 Install solvent curing sealants and vapour release adhesive materials in open spaces with ventilation.

.2 Ventilate enclosed spaces in accordance with Section 01 51 00 - Temporary Utilities.

.3 Maintain temperature and humidity recommended by material manufacturers before, during, and after installation.

1.7 SEQUENCING

.1 Sequence work to permit installation of materials in conjunction with related materials and seals.

Part 2 Products

2.1 GENERAL

.1 Provide air barrier system components from one manufacturer.

.2 Provide vapour barrier system components from one manufacturer.

2.2 SHEET MATERIALS

.1 Smart Vapour Barrier: Vapour retarder (exterior and interior) moisture variable vapour control layer for permanently airtight building envelopes for wall and ceiling structures. Made from modified PE/PA polyethylene copolymer, reinforced with polypropylene or PET fibres, meeting or exceeding the following minimum requirements:

- .1 Effective thickness: Min 0.25 mm (10 mil).
- .2 Weight: Min 110 g/m^2 (0.36 oz/sf).
- .3 Air Tightness : to ASTM E2178.
- .4 Surface burning characteristics: ASTM E84
  - .1 Flame Spread: 0.
  - .2 Smoke Developed: max 75.
- .5 Tensile properties:
  - .1 Min 270N/50mm (310N/50mm) Lengthwise
  - .2 Min 210N/50mm (260N/50mm) Crosswise
- .6 Elongation:
  - .1 Min 15% Lengthwise
  - .2 Min 15% Crosswise
- .7 Nail Tear Resistance:
  - .1 Min 110 N (140 N) Lengthwise
  - .2 Min 120 N (135 N) Crosswise
- .8 Tapes: as recommended by manufacturer.

.2 Vapour barrier for under concrete slabs: Polyolefin to ASTM E1745, Class A, 0.508 mm (20 mil) minimum thickness.

- .1 Accessories: double sided tape as recommended by manufacturer.

.3 Self Adhering Vapour Permeable Air Barrier: Self-adhered, vapour permeable, water resistive, air barrier, composed of one microporous functional layer laminated between two non-woven Polypropylene (PP) layers, with full-coverage pressure-sensitive glue layer applied to the reverse, to ASTM E2357.

- .1 Thickness: 0.7 mm (28 mils).
- .2 Water Vapor Permeance: 16 US perms per ASTM E96, Method A
- .3 Air leakage:
  - .1 ASTM E2178 : Pass

.2 ASTM E2357: Pass (including ASTM E283, ASTM E330, and ASTM E331)

.3 CAN/ULC S741: Pass

.4 CAN/ULC-S742: Classification A1

.4 Water Penetration Resistance:

.1 AATCC TM127: Hydrostatic Pressure: ≥55 cm (22 inches)

.2 ASTM E331: Pass (No leaks @ 580 Pa (12.11 psf) on opaque and penetrated wall).

.5 Lap Adhesion ASTM D1976: Pass

.6 Nail Sealability ASTM D1970 Section 7.9: Pass

.7 Tensile Strength ASTM D882: ≥ 20 lbf/in

.8 Puncture resistance ASTM E154: 92 lbs

.9 Surface Burning Characteristics ASTM E84:

.1 Flame Spread: 20 (Class A)

.2 Smoke Developed: 20 (Class A)

.4 Mechanically attached Air Barrier: Spun-bonded polyolefin, non-woven, non-perforated.

.1 Air Penetration (ASTM E2178): Maximum 0.004 cfm/ft^2 at 1.57 psf.

.2 Water Vapour Transmission (ASTM E96 Method A): 50-60 perms.

.3 Water Penetration Resistance (AATCC 127): 250 cm.

.4 Tensile Strength (ASTM D882): min. 30 lbs/inch.

.5 Surface Burning Characteristics (ASTM E84): Class A.

.1 Flame Spread: ≤15.

.2 Smoke Development: ≤15.

.5 Vapour barrier for wall and ceiling assemblies: Polyethylene film to CAN/CGSB-51.34, 0.15 mm (6 mil) minimum thickness.

2.3 THROUGH-WALL FLASHING MEMBRANE

.1 Self-adhering air barrier membrane, SBS modified bitumen laminated to polyethylene film, vapour impermeable, cut to widths suitable for installation to window and door frames and other through-wall penetrations. Ensure compatibility with air barrier for remainder of system.

.1 Thickness: 1.0 mm (40 mil).

.2 Tensile strength (ASTM D412): Minimum 1.7 MPa.

.3 Water vapour permeance (ASTM E96): Maximum 2.8 ng/s•m^2•Pa (0.05 perms).

.4 Water absorption (ASTM D570): Maximum 0.1%.

.5 Low temperature flexibility (CGSB 37-GP-56M): -30°C.

.6 Elongation (ASTM D412): Minimum 200%.

.7 Puncture resistance (ASTM E154): Minimum 178 N (40 lb-f).

2.4 ACCESSORIES

.1 Tapes:

.1 Single-sided, diffusible, and rainproof high-performance adhesive tape for permanent windtight bonding of component layers outdoors.

.1 Air resistant pressure sensitive adhesive tape, type recommended by vapour or air barrier manufacturer, 50 mm wide for lap joints and perimeter seals, 25 mm wide elsewhere.

.2 Double-sided adhesive tape, blend of synthetic rubber and resins, for below-slab and crawl space water vapor barriers or retarders to concrete, masonry, wood, metal, and other surfaces.

.1 Total thickness: 0.76 mm (30 mil).

.2 Dimensions: 51 mm x 15.24 m (2” x 50’).

.3 Multi-layered, polyethylene, aperture film, and acrylic pressure-sensitive adhesive tape. For securing and sealing vapour barrier membrane to underside of slab when concrete is placed. Allows wet concrete to cast into textured top surface to form mechanical bond/seal.

.1 Total thickness: 0.66 mm (26 mil).

.2 Dimensions: 152 mm x 55 m (6” x 180’).

.3 180° Adhesion Peel Strength: ASTM D903 17.6 lbf/in.

.2 Primer: As recommended by air barrier manufacturer and appropriate to application conditions.

.3 Grommets:

.1 Sealing grommets for pipes, Ø 15 mm-30 mm (1/2"-1 3/16”), for interior and exterior use. Water-resistant solid adhesive, silicone-coated paper.

.2 Sealing grommets for 1 cable, Ø 4.8-12 mm (3/16”-1/2”), for interior and exterior use. Water-resistant solid adhesive, silicone-coated paper.

.4 Sealant:

.1 Vapour Barriers: Compatible with vapour barrier materials, recommended by vapour barrier manufacturer and to Section 07 92 00 - Joint Sealants.

.2 Air Barriers: Mastic as recommended by air barrier manufacturer.

.5 Staples: Minimum 6 mm leg.

.6 Moulded box vapour barrier: Factory-moulded polyethylene box for use with recessed electric switch and outlet device boxes.

.7 Adhesives: Per manufacturers guidelines and appropriate to application conditions.

Part 3 Execution

3.1 MANUFACTURER'S INSTRUCTIONS

.1 Comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and datasheets.

3.2 EXAMINATION

.1 Verify surfaces and conditions are ready to accept work of this section.

.2 Ensure surfaces are clean, dry, sound, smooth, continuous, and in compliance with air/vapour barrier manufacturer's requirements.

.3 Report unsatisfactory conditions to DCC Representative.

.4 Do not start work until deficiencies have been corrected.

3.3 PREPARATION

.1 Remove loose or foreign matter that might impair adhesion of materials.

.2 Ensure substrates are clean of oil or excess dust; open joints filled; and concrete surfaces free of large voids, spalled areas, or sharp protrusions.

.3 Ensure substrates are free of surface moisture prior to application of self-adhesive membrane and primer.

.4 Ensure metal closures are free of sharp edges and burrs.

.5 Prime substrate surfaces in accordance with manufacturer's instructions.

3.4 INSTALLATION – VAPOUR BARRIERS

.1 Ensure services are installed and inspected prior to installation of vapour barrier.

.2 Install vapour barrier on warm side of assemblies to form continuous barrier.

.3 Use sheets of largest practical size to minimize joints.

.4 Inspect for continuity. Repair punctures and tears with manufacturer’s approved sealing method before work is concealed.

.5 Cut vapour barrier to form openings and ensure material is lapped and sealed to substrate with continuous bead of sealant and secured mechanically or with adhesive per manufacturer’s guidelines.

.6 Perimeter Seals:

.1 Seal perimeter of vapour barrier as follows:

.1 Apply continuous bead of sealant to substrate at perimeter of sheets.

.2 Lap sheet over sealant and press into sealant bead.

.3 Install staples through lapped sheets at sealant bead into wood substrate.

.4 Ensure that no gaps exist in sealant bead. Smooth out folds and ripples occurring in sheet over sealant.

.7 Lap Joint Seals:

.1 Seal lap joints of vapour barrier as follows:

.1 Attach first sheet to substrate.

.2 Apply continuous bead of sealant over solid backing at joint.

.3 Lap adjoining sheet minimum 150 mm and press into sealant bead.

.4 Install staples through lapped sheets at sealant bead into wood substrate.

.5 Ensure that no gaps exist in sealant bead. Smooth out folds and ripples occurring in sheet over sealant.

.8 Electrical Boxes:

.1 Seal electrical switch and outlet device boxes that penetrate vapour barrier as follows:

.1 Install moulded box vapour barrier on electrical boxes installed on exterior walls.

.2 Apply sealant to seal edges of flange to main vapour barrier and seal wiring penetrations through box cover.

.9 Installation - Under Slab:

.1 Install under slab vapour barrier in accordance with ASTM E1643 and manufacturer's recommendations.

.2 Lap seams minimum 150 mm (6 inches) and seal.

.3 Seal around permanent penetrations.

.4 Repair damaged areas of vapour barrier.

.5 Seal vapour barrier at terminating edges to foundation wall, slab, or grade beam.

.10 Installation –Under Slab as soil gas (Radon) control layer, refer also to part 3 of Section 31 21 13 - Radon Mitigation Rough-In System

.1 Place membrane barrier system over gas permeable venting layer. Overlap and seal membrane to manufacturer's requirements and specifications.

.2 Install and seal membrane barrier system around vertical penetrations with sufficient overlap and using approved sealing methods to manufacturer's requirements and specifications.

.3 Overlap and seal radon membrane barrier system at perimeters and floor slab penetrations to provide continuous seal of building area in contact with soil gas mitigation and extraction layer, to manufacturer requirements, system design.

.4 Install liquid applied waterproofing membrane as transition between radon membrane and grade beams, footings, and items that penetrate finished floor slab. Refer to Section 07 14 00 – Fluid-Applied Waterproofing.

.1 Ensure joints accommodate anticipated movement.

.5 Provide gas tight seals around surfaces of vertical penetrations. Prepare surfaces to manufacturer's requirements to facilitate membrane adherence. Use air barrier membrane, sealants, and tapes as required to provide continuous seal between radon membrane and pipe, conduit, or other items that penetrate floor slab.

.6 Terminate membrane with upturn at perimeter grade beams, foundation walls, footings, and strip footings. Seal and secure membrane edge using double sided Adhesive Tape, or both Term Bar and double-sided Adhesive Tape, per manufacturer's instructions. Ensure the concrete and vapour barrier is clean and dry prior to adhering tape.

.7 Membrane seams: prepare, overlap, and seal to manufacturer's recommendations.

.8 Mechanically seal and secure radon membrane to the underside of the cast in place concrete using multi-layered, polyethylene, aperture film, and acrylic pressure-sensitive adhesive tape, per manufacturer's instructions.

.9 Avoid puncturing membrane excessively during floor slab construction. To limit membrane puncture during floor slab construction, design items such as rebar chair supports with wide base instead of legs to better spread rebar load.

3.5 INSTALLATION - SMART VAPOUR RETARDER

.1 Install smart vapour barrier in accordance with manufacturer recommendations.

.2 Install membranes tight and without creases along the substrate, with the writing facing the installer.

.3 Overlap subsequent courses of membrane by approximately 10cm (4").

.1 Tape all overlaps.

.4 Ensure installed membrane is free of wrinkles, fish mouths, and bubbles.

.5 Seal any tears or cuts with seam tape as recommended by vapor control layer manufacturer.

3.6 INSTALLATION - AIR BARRIERS

.1 Install materials in accordance with manufacturer's instructions.

.2 Install air barrier in a continuous fashion with no gaps.

.3 Lap and seal joints in accordance with manufacturer's recommendations.

.4 Position lap seal over firm bearing.

.5 Apply sealant within recommended application temperature range.

.1 Consult manufacturer when sealant cannot be applied within recommended temperature range.

.6 Where bridging of gaps (over 12 mm) occurs in the supporting substrate, provide minimum 0.76 mm (22 gauge) thick galvanized sheet metal or purpose-made reinforced backup sheet as recommended by membrane manufacturer.

.7 At inside and outside corners, provide extra layer of membrane extending 200 mm each side of corner.

.8 At wall-to-ceiling transitions, co-ordinate transition to maintain continuity of wall membrane with ceiling air barrier membrane.

.9 At penetrations through air barrier membrane at structural members, ductwork, piping, conduits, and similar penetrations seal penetrations with grommet with elastomeric liquid air barrier coating compatible with self-adhesive membrane. Install flange as indicated.

.10 Incorporate allowance for deflection of structure below roof beam locations, provide looped butyl membrane, mechanically fastened and sealed to air membrane and substrate.

.11 Seal air barrier membrane to wind break window frames. Prior to installing window frame, wrap rough opening and extend air barrier membrane 200 mm beyond onto adjacent sheathing or wood buck of exterior wall. Fill void space between rough opening and window frame with low-expanding foam insulation and caulk to air barrier return.

.12 Return air barrier membrane into pressed-steel door frame rough openings, fill void space between rough opening and frame with low-expanding foam insulation, and caulk to air barrier return.

.13 Self-adhere air barrier membrane to aluminum storefront framing in accordance with storefront supplier recommendations.

.1 Storefront supplier is responsible for final fastening and sealing of air barrier to storefront.

.14 Maintain air barrier membrane continuity at mechanical penetrations.

.1 Return air barrier membrane into rough openings.

.2 Install grommet according to manufacturer’s recommendations.

.3 At galvanized ductwork and louvres, provide suitable galvanized metal or aluminum flange around perimeter of duct or louvre for mechanical fastening and sealing of air barrier membrane.

.15 Apply insulation as soon as possible after air barrier is installed. Do not leave applied air barrier exposed for longer than recommended by manufacturer.

3.7 INSTALLATION - THROUGH-WALL FLASHING MEMBRANES

.1 Prime substrate in accordance with manufacturer’s instructions.

.2 Measure and cut through-wall flashing to required length, apply to rough openings, and integrate into wall air barrier system in accordance with manufacturer's instructions.

.3 Hand roller or squeegee membrane into place per manufacturer's recommendations to smooth out wrinkles, air bubbles, and creases.

.4 Form laps to shed water. Make laps in widths recommended by manufacturer.

.5 Apply continuous bead of mastic sealant at laps, seams, penetrations, and along top edges of flashing membrane.

.6 Keep edge of membrane flashing and mastic at least 13 mm (1/2 inch) away from exterior finish.

3.8 INSTALLATION - SELF-ADHERING SHEET AIR BARRIER

.1 Install self-adhering sheet air barrier over exterior face of exterior wall substrate in accordance with manufacturer recommendations.

.2 Remove release paper as membrane is applied.

.3 Apply pressure with roller over surface of membrane while installing.

.4 Ensure installed self-adhered membrane is free of wrinkles, fish mouths, and bubbles.

3.9 CLEANING

.1 Clean in accordance with Section 01 74 00 - Cleaning.

.2 Leave Work area clean at end of each day.

.3 Final Cleaning: Upon completion, remove surplus materials, rubbish, tools, and equipment.

.4 Waste Management: Remove waste materials in accordance with Section 01 74 19 - Waste Management and Disposal.

3.10 PROTECTION OF WORK

.1 Do not permit adjacent work to damage work of this section.

.2 Ensure finished work is protected from climatic conditions.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section 03 10 00 - Concrete Forming and Accessories

.2 Section 07 14 00 - Fluid-Applied Waterproofing

.3 Section 07 21 13 - Board Insulation

.4 Section 07 26 00 - Vapour Barriers

.5 Section 22 05 02 - Plumbing and Drainage

.6 Section 23 05 29 - Hangers and Supports for Mechanical Piping and Equipment

.7 Section 23 05 53 - Identification for Mechanical Piping and Equipment

1.2 REFERENCE STANDARDS

.1 ASTM International:

.1 ASTM C33/C33M-23, Standard Specification for Concrete Aggregates

.2 ASTM D3786/D3786M-18(2023), Standard Test Method for Bursting Strength of Textile Fabrics - Diaphragm Bursting Strength Tester Method

.3 ASTM D4533/D4533M-15(2023), Standard Test Method for Trapezoid Tearing Strength of Geotextiles

.4 ASTM D4632/D4632M-15a(2023), Standard Test Method for Grab Breaking Load and Elongation of Geotextiles

.5 ASTM D4833/D4833M-07(2020), Standard Test Method for Index Puncture Resistance of Geomembranes and Related Products

.6 ASTM D5261-10(2018), Standard Test Method for Measuring Mass per Unit Area of Geotextiles

.7 ASTM E154/E154M-08a(2019), Standard Test Methods for Water Vapor Retarders Used in Contact with Earth Under Concrete Slabs, on Walls, or as Ground Cover

.8 ASTM E1745-17(2023), Standard Specification for Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill under Concrete Slabs

.2 US Environmental Protection Agency (EPA):

.1 EPA 625-R-92-016-1994, Radon Prevention in the Design and Construction of Schools and Other Large Buildings

.3 Health Canada:

.1 Guide for Radon Measurements in Public Buildings – 2021

.2 Guide for Radon Measurements in Residential Dwellings – 2017

.4 Health Canada/Workplace Hazardous Materials Information System (WHMIS):

.1 Safety Data Sheets (SDS)

1.3 SUBMITTALS

.1 Submit in accordance with Section 01 33 00 - Submittal Procedures.

.2 Product Data:

.1 Submit manufacturer's product literature, specifications and datasheets. Include product characteristics, performance criteria, physical size, finishes, and limitations.

.2 Submit WHMIS SDS - Safety Data Sheets.

.3 Include geotextile fabric, gas permeable venting layer, membrane barrier system, collection/extension/riser piping, and sealing methods for slab perimeters and penetrations.

.3 Certificates: Product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.

.4 Closeout Submittals:

.1 Perform in accordance with Section 01 78 00 - Closeout Submittals.

.2 Provide maintenance data for incorporation into O&M manual.

.3 Provide final as-built drawings indicating final locations of collection/extension/riser pipes.

1.4 QUALITY CONTROL

.1 Installation: radon mitigation rough-in system is to be installed by competent and skilled workers with vapour barriers, sealants, and waterproofing membranes.

.2 Installation workers are to obtain appropriate training on radon mitigation systems from component product manufacturers.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store, and handle materials in accordance with Section 01 61 00 - Common Product Requirements and with manufacturer's instructions.

.2 Deliver materials to site in original packaging, labelled with manufacturer's name and product identification.

.3 Storage and Handling Requirements:

.1 Store materials off ground in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.

.2 Store and protect products from damage.

.3 Replace defective or damaged materials with new.

1.6 ENVIRONMENTAL/SITE CONDITIONS

.1 Perform installation work when weather conditions are within installation guidelines established by manufacturer.

Part 2 Products

2.1 PERFORMANCE REQUIREMENTS

.1 If post turnover long term radon testing results indicate rough-in system needs to be activated, installed components of the rough-in subfloor depressurization system are to provide radon gas extraction points from within building. The system is intended to address protection from radon ingress and provide a means to address high radon concentrations post construction, as required.

.2 Radon testing and extraction system activation are to be completed by the owner following turnover as per the per current Health Canada guidelines.

2.2 MATERIALS

.1 All system components: to ASTM E154, chemically compatible with soil environment.

.2 Collection, extension, and riser pipes: minimum Schedule 40 non-perforated smooth walled 100 mm (inside) diameter rigid pipe of PVC.

.3 Pipe Hangers: Provide hangers to support the piping from the slab in accordance with 23 05 29 - Hangers and Supports for HVAC Piping and Equipment.

.1 Hangers, rod and hardware to be stainless steel.

.4 Gas permeable venting layer: coarse aggregate to ASTM C33/C33M, Size #5 and EPA 625-R-92-016.

.5 Membrane barrier system (vapour barrier): to ASTM E1745, minimum 20 mil polyolefin-based resin sheet membrane. Refer to Section 07 26 00 - Vapour Barriers, and to drawings for vapour barrier systems.

.6 Geotextile Fabric: Non-woven fiber construction with an apparent opening size of 0.15 mm.

.1 Unit weight 340 g/m^2 (ASTM D5261)
.2 Grab tensile strength 1100 N (ASTM D4632).
.3 Elongation from 45 to 105% (ASTM D4632).
.4 Trapezoid tear resistance 450 N (ASTM D4533).
.5 Puncture resistance 700 N (ASTM D4833).
.6 Mullen Burst 3600 Pa (ASTM D3786).

Part 3 Execution

3.1 EXAMINATION

.1 Verify conditions of substrates are acceptable for product installation in accordance with manufacturer's written instructions.

.1 Visually inspect substrate.

.2 Inform DCC Representative of unacceptable conditions.

.3 Proceed with installation only after unacceptable conditions have been remedied.

3.2 INSTALLATION

.1 Install products according to manufacturers' requirements and as indicated on accepted Shop Drawings.

.2 Connect each individual sub-slab area isolated by building footings, foundation walls or grade beams to installed radon roughed-in mitigation system. Use collection piping to draw radon gas from multiple sub-slab areas to single, capped extraction risers.

.3 Prepare sub-grade surface prior to installation of geotextile fabric, and collection, extension and riser piping, to elevations indicated.

.4 Install geotextile fabric on subsoil below gas permeable venting layer. to protect gas-venting layer from being contaminated with fines from subsoil.

.5 Place geotextile fabric layer over entire sub-grade surface, with overlaps to manufacturer's requirements.

.6 Install and seal floor drains, pits/cages, and collection/extension/riser pipes.

.7 Confirm riser pipe penetration locations and sub-slab inlet location with the DCC Representative on site prior to installation.

.8 Where piping is installed below a structural slab with void form:

.1 Install piping in accordance with Section 22 05 02 – Plumbing and Drainage

.2 Maximum horizontal spacing between supports: in accordance with the National Plumbing Code of Canada (NPC) to suite the pipe material.

.9 Install collection/extension/riser pipes.

.10 Install single vertical riser pipe to minimum of 300 mm above finished floor slab.

.11 Place collection pipes within gas permeable venting layer.

.12 Solvent-weld pipe joints and fully insert into coupling or fitting to ensure joint integrity.

.13 Ensure all piping is clearly labeled denoting its use. Refer to Section 23 05 53 - Identification for Mechanical Piping and Equipment for piping identification criteria.

.14 Construct gas permeable venting layer by placing, grading, and compacting over entire sub-grade surface, geotextile layer, and collection/extension/riser piping.

.15 Place void form per Section 03 10 00 – Concrete Forming and Accessories.

.16 Place rigid insulation board (XPS type 4) as indicated on drawings, per Section 07 21 13 – Board Insulation.

.1 When multiple layers of XPS rigid insulation are used, bond layers with adhesive per Section 07 21 13 – Board Insulation.

.2 Secure rigid insulation layer (XPS) to underside of the vapour and radon barrier membrane using dual sided adhesive tape, or construction adhesive. Ensure adhesives are approved for bonding rigid insulation (XPS) and Polyolefin vapour barrier.

.17 Place membrane barrier system over gas permeable venting layer. Refer to Section 07 26 00 - Vapour Barriers.

.1 Place membrane barrier system over gas permeable venting layer. Overlap and seal membrane to manufacturer’s requirements and specifications.

.2 Ensure joints accommodate anticipated movement.

.3 Install and seal membrane barrier system around vertical penetrations with sufficient overlap and using approved sealing methods to manufacturer’s requirements and specifications.

.4 Overlap and seal radon membrane barrier system at perimeters and floor slab penetrations to provide continuous seal of building area in contact with soil gas mitigation and extraction layer, to manufacturer requirements, system design.

.5 Install liquid applied waterproofing membrane as transition between radon membrane and grade beams, footings, and items that penetrate finished floor slab. Refer to Section 07 14 00 - Fluid-Applied Waterproofing.

.6 Provide gas tight seals around surfaces of vertical penetrations. Prepare surfaces to manufacturer’s requirements to facilitate membrane adherence. Use air barrier membrane, sealants, and tapes as required to provide continuous seal between radon membrane and pipe, conduit, or other items that penetrate floor slab.

.7 Terminate membrane with upturn at perimeter grade beams, foundation walls, footings, and strip footings. Seal and secure membrane edge using double sided Adhesive Tape, or both Term Bar and double-sided Adhesive Tape, per manufacturer’s instructions. Ensure the concrete and vapour barrier is clean and dry prior to adhering tape.

.8 Membrane seams: prepare, overlap, and seal to manufacturer’s recommendations.

.9 Mechanically seal and secure radon membrane to the underside of the cast in place concrete using multi-layered, polyethylene, aperture film, and acrylic pressure-sensitive adhesive tape. Install around the perimeter of the slab and within the slab area per manufacturer's instructions.

.18 Avoid puncturing membrane excessively during floor slab construction. To limit membrane puncture during floor slab construction, design items such as rebar chair supports with wide base instead of legs to better spread rebar load.

.19 Once concrete floor slab has cured sufficiently to allow work to proceed, clean joint surfaces in accordance with manufacturer’s instructions and seal finished floor slab perimeter cold joints and other floor slab penetration junctions between dissimilar materials using high quality sealants appropriate to substrates. Test sealant to confirm adhesion with all surfaces prior to use. Design joints to accommodate anticipated movement.

.20 Cap above-slab exposed open top of riser pipes and solvent weld to provide complete seal.

.21 Label above-slab exposed riser pipe and cap to identify them as part of Radon Mitigation System. Where the riser pipe passes through above grade walls each portion of the wall (floor to floor) must receive labelling identifying the pipe as part of Radon Mitigation System.

3.3 CLEANING

.1 Clean in accordance with Section 01 74 00 - Cleaning.

.2 Leave Work area clean at end of each day.

.3 Final Cleaning: Upon completion, remove surplus materials, rubbish, tools, and equipment.

.4 Waste Management: Remove waste materials in accordance with Section 01 74 19 - Waste Management and Disposal.

END OF SECTION