

Cover Page - Addendum No. 3

1. GENERAL

- 1.1 This Addendum shall form an integral part and shall be read in conjunction with Specifications and Drawings. This Addendum shall take precedence over all requirements to the aforementioned specifications with which it may prove to be at variance.
- 1.2 Receipt of this Addendum shall be acknowledged on the Bid Form. Failure to do so may subject the Proponent to disqualification.
- 1.3 This Addendum Contains:
 - .1 Cover Page – Addendum No.3 – 1 page;
 - .2 Landscape Addendum L-01 dated March 16, 2018 – 2 pages including 1 drawing;
 - .3 Architectural Addendum A2 dated March 16, 2018 – 30 pages including 25 specification pages, 2 drawings, and 1 architectural sketch;
 - .4 Mechanical Addendum M1 dated March 16, 2018 – 18 pages including 2 drawings, and;
 - .5 Bidder's Questions & Responses dated March 16, 2018 – 1 page.

END OF COVER PAGE

Landscape Addendum L-01

1. SPECIFICATIONS

1.1 Reference Section 13 11 12 “Splash Pad”, 2.6 Play Products:

- .1 Delete item 2.6.1 ~~“Play Product Structure Ground Geyser VOR-301”~~ in its entirety. Product not used for this work.
- .2 Delete item 2.6.2 ~~“Play Product Wall Spray VOR-302”~~ in its entirety. Product not used for this work.

2. DRAWINGS

2.1 Reference drawing L401 “Enlargement Plan-01”:

- .1 Drawing L401 “Enlargement Plan-01”, dated 2018-03-16 “Issued for Addendum No. 3” to replace and supersede drawing L401 “Enlargement Plan-01”, dated 2018-03-01 “Issued for Tender”. Changes include but are not limited to:
 - .1 Revised mechanical enclosure plan, and;
 - .2 Added and revised locations of steel bollards.

END OF LANDSCAPE ADDENDUM

Architectural Addendum A2

1. SPECIFICATIONS

1.1 Reference Section 07 18 13 "Service Room Traffic Coatings":

- .1 Add product to 2.1.1.1.3 "Acceptable *Products*:"
- .4 *Stonflex LTE System*

1.2 Reference Section 07 54 19 "Polyvinyl-Chloride (PVC) Roofing":

- .1 Section 07 54 19 "Polyvinyl-Chloride (PVC) Roofing", dated 2018-03-16 "Issued for Addendum No. 3" to replace and supersede Section 07 54 19 "Polyvinyl-Chloride (PVC) Roofing", dated 2018-03-01 "Issued for Tender". Changes include but are not limited to:
 - .1 to clarify and strengthen the language around the battens.

1.3 Reference Section 13 11 13 "Swimming Pool Tanks and Decks":

- .1 Section 13 11 13 "Swimming Pool Tanks and Decks", dated 2018-03-16 "Issued for Addendum No. 3" to replace and supersede Section 13 11 13 "Swimming Pool Tanks and Decks", dated 2018-03-01 "Issued for Tender". Changes include but are not limited to:
 - .1 to clarify and strengthen the language coordinating the concrete specs.

1.4 Reference Section 33 46 13 "Foundation Drainage":

- .1 Revise 2.1 "Materials" item 2.1.3 from:
"Drainage weepers and fittings (weepers): 100 mm (4") minimum diameter..."
To:
"Drainage weepers and fittings (weepers): 150 mm (6") minimum diameter..."

2. DRAWINGS

2.1 Reference drawing A111 "PLAN DETAILS - EXTERIOR":

- .1 Revise detail 7 / A111 "BASEMENT MECHANICAL - JAMB DETAIL" in accordance with architectural sketch ASK-001 "BASEMENT MECHANICAL - JAMB DETAIL", dated 2018-03-16 "Addendum No. 3".

2.2 Reference drawing A315 "WALL SECTIONS - ENVELOPE" (no drawing reissued):

- .1 Relocate the "*FOUNDATION DRAINAGE SYSTEM*" on detail 2 / A315 "WALL SECTION - SOUTH - GL 5-6" so that the bottom of the drainage system is aligned with the bottom of the structural concrete footing.

2.3 Reference drawing A333 "SECTION DETAILS - EXTERIOR" (no drawing reissued):

- .1 Revise "~~SS-Stub~~" note on detail 3 / A333 "SIGNAGE ENVELOPE PENETRATION" to "*Structural Steel Stub*".

2.4 Reference drawing A951 "Interior Signage – Location Plans":

- .1 Drawing A951 "Interior Signage – Location Plans", dated 2018-03-16 "Issued for Addendum No. 3" to replace and supersede drawing A951 "Interior Signage – Location Plans", dated 2018-03-01 "Issued for Tender". Changes include but are not limited to:

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- .1 Sign Schedule: Add Sign Type "G1.U."
- .2 Detail R3: Add note "55mm Typ. Signage Clearance".

2.5 Reference drawing A952 "Interior Signage – Vinyl Regulatory":

- .1 Drawing A952 "Interior Signage – Vinyl Regulatory", dated 2018-03-16 "Issued for Addendum No. 3" to replace and supersede drawing A952 "Interior Signage – Vinyl Regulatory", dated 2018-03-01 "Issued for Tender". Changes include but are not limited to:
 - .1 Sign Type "G1.U – Pool Regulations" added.

END OF ARCHITECTURAL ADDENDUM

Polyvinyl-Chloride (PVC) Roofing

Section revised and reissued by Addendum No. 03

PART 1 - GENERAL

1.1 Summary

- .1 Section includes:
 - .1 PVC roofing membrane, fully adhered with profile battens.
 - .2 Cover board, fully adhered.
 - .3 Rigid polyisocyanurate insulation,
 - .1 Top level: fully adhered
 - .2 Bottom level: mechanically fastened.
 - .3 Tapered insulation where indicated.
 - .4 Air/vapour barrier Membrane, self-adhered.
 - .5 Sheathing board, mechanically fastened.

1.2 Administrative Requirements

- .1 Coordination:
 - .1 Coordinate with Divisions 21, 22, and 23 to ensure that roof drains are suitable for roofing system design.
 - .2 Coordinate with installers of roof mounted items, equipment, and mechanical and electrical work at roof so that installation will not subvert the integrity of the roofing system.
 - .3 Coordinate with installation of air barrier at walls to ensure complete continuity of air barrier system for building. Roofing air barrier membrane to lap by 75 mm (3") minimum and terminate with wall system air barrier membrane.
- .2 Conduct a pre-installation meeting in accordance with Section 01 31 19.
 - .1 Independent inspection and testing company shall attend the pre-installation meeting.
 - .2 The manufacturer shall meet with the necessary parties at the jobsite to review and discuss project conditions as it relates to the integrity of the roofing assembly.
 - .3 Meet with *Consultant*, testing and inspecting agency representative, roofing Installer, roofing system manufacturer's representative, deck Installer, and installers whose work interfaces with or affects roofing including installers of roof accessories and roof-mounted equipment.
 - .4 Review methods and procedures related to roofing installation, including manufacturer's written instructions.
 - .5 Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
 - .6 Examine substrates and existing conditions for compliance with requirements, including flatness and fastening.

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- .7 Review structural loading limitations of roof deck during and after roofing.
- .8 Review base flashings, special roofing details, roof drainage, roof penetrations, equipment curbs, and condition of other construction that will affect roofing system.
- .9 Review governing regulations and requirements for insurance and certificates if applicable.
- .10 Review temporary protection requirements for roofing system during and after installation.
- .11 Review roof observation and repair procedures after roofing installation.
- .12 Forecasted weather conditions.

1.3 Submittals

- .1 Submit required submittals in accordance with Section 01 33 00.
- .2 *Product* data sheets:
 - .1 Submit manufacturer's *Product* data sheets for *Products* proposed for use in the work of this section.
- .3 Roofing manufacturer's warranty sample and wind uplift compliance reports:
 - .1 Manufacturer's pre-installation notification: Submit copy of completed roofing manufacturer's pre-installation notification form at least 10 *Working Days* prior to commencement of roofing installation.
 - .2 Warranty sample: Submit copy of roofing manufacturer's warranty specimen including warranty requirements prior to commencement of roofing installation.
 - .3 Roofing assembly wind uplift compliance reports: Submit roof system assessment reports for applicable CSA A123.21 compliant roof assemblies required to meet requirements for indicated wind uplift pressures and indicated roofing assembly configurations.
- .4 Shop drawings; general details:
 - .1 Submit shop drawings indicating fastening locations.
 - .2 Submit drawings showing locations of main joints, section of entire system, sections of each sleeve and penetration condition, flashing conditions, expansion joints and other fabrication information. Indicate layout of membrane fasteners.
 - .3 Include plans, elevations, sections, details, and attachments to other work.
 - .1 Base flashings and membrane terminations.
 - .2 Roof plan showing orientation of roof deck and orientation of membrane roofing.
 - .3 Insulation fastening patterns for corner, perimeter, and field-of-roof locations.
- .5 Samples:
 - .1 Submit samples complete with manufacturer's labels intact, of materials to be used for work of this section prior to commencement of work. Allowing ample time for review and acceptance by *Consultant* and independent inspection and testing company. Do not proceed with work until samples are accepted.

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- .2 Submit following samples, prior to ordering materials:
 - .1 Typical hot weld joint in 450 mm (18") long sample and 305 mm (12") square of each type of roofing material showing materials and colours.
- .6 Certificates:
 - .1 Installer certificates: Signed by roofing system manufacturer certifying that Installer is approved, authorized, or licensed by manufacturer to install roofing system.
 - .2 Manufacturer certificates: Signed by roofing manufacturer certifying that roofing system complies with requirements specified in "Performance Requirements" Article.
 - .1 Submit evidence of compliance with performance requirements.

1.4 Closeout Submittals

- .1 Submit closeout submittals in accordance with Section 01 77 00.
- .2 Operation and maintenance data:
 - .1 Submit manufacturer's maintenance instructions for incorporation into the operation and maintenance manuals.

1.5 Quality Assurance

- .1 Qualifications:
 - .1 Manufacturers: Company specializing in manufacturing the *Products* specified in this section, with minimum 10 years experience.
 - .2 Installers / applicators / erectors: Provide work of this section, executed by competent installers with minimum 5 years experience in application of *Products*, systems and assemblies specified and with approval and training of *Product* manufacturers.
 - .1 Work of this section shall be installed by a *Subcontractor* that is a member in good standing of the Canadian Roofing Contractors Association (CRCA).
 - .2 *Subcontractor* must be trained and approved by membrane manufacturer. Submit *Subcontractor's* (including full-time site supervisor responsible for the roofing work on site) certification letter prepared by membrane manufacturer.
 - .1 Heat welding of laps shall be performed only by skilled welders who have successfully completed a course of instruction provided by membrane manufacturer.

1.6 Delivery, Storage, and Handling

- .1 Deliver roofing materials to *Project* site in original containers with seals unbroken and labelled with manufacturer's name, product brand name and type, date of manufacture, and directions for storage.
- .2 Protect roof insulation materials from physical damage and from deterioration by sunlight, moisture, soiling, and other sources. Store in a dry location. Comply with insulation manufacturer's written instructions for handling, storing, and protecting during installation.

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- .3 Handle and store roofing materials and place equipment in a manner to avoid permanent deflection of deck or overloading of structure.
- .4 Handle materials to preclude damage or deterioration. Follow manufacturer's written recommendations.
- .5 Package materials and identify on attached labels the manufacturer, brand, contents, weight as applicable, and *Product* and specification numbers.
- .6 Protect edges of roll goods from damage during handling, and store rolls on end to prevent flattening.
- .7 Do not store roofing materials on roof. Store them in a dry area protected from inclement weather while roofing installation is not in progress. Store above materials under opaque, breathable and waterproof tarpaulins or in sheds.
- .8 Prevent compression of insulation panels at any point and breakage of edges and corners. Discard wet, cupped, bowed, or otherwise damaged insulation from *Place of the Work*.
- .9 Protect edges of roll goods from damage during handling, and store rolls on end to prevent flattening.

1.7 Field Conditions

- .1 Weather limitations: Proceed with installation only when existing and forecasted weather conditions permit roofing system to be installed according to manufacturer's written instructions and warranty requirements.

1.8 Extended Warranty

- .1 Warrant work of this section in accordance with Section 01 78 36.
- .2 Roofing manufacturer shall provide total system warranty including the following:
 - .1 Roofing membrane manufacturer will issue a written document in the *Owner's* name, valid for duration listed below, for the repair of leaks in the roofing membrane to restore the roofing system to dry and watertight condition, to the extent that membrane manufacturing or installation defects caused water infiltration.
 - .2 Warranty shall cover entire cost of the repair(s) required to maintain dry and watertight roofing system during the full warranty duration.
 - .3 Warranty shall include for labour, materials, and installation quality.
 - .4 Warranty shall be non-prorated with no dollar limit (NDL) for duration of warranty.
 - .5 Membrane manufacturer shall review installation of base ply prior to application of cap sheet.
 - .6 20 year warranty duration.

PART 2 – PRODUCTS

2.1 Manufacturers

- .1 Basis of design:
 - .1 Sika Sarnafil.

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- .2 Acceptable alternate roofing system manufacturers, subject to compliance with requirements of the *Contract Documents* including non-nominal membrane thickness:
 - .1 Carlisle Syntec.
 - .2 Duro-Last.

2.2 Performance/Design Requirements

- .1 The roofing system shall include roofing system materials required to achieve roofing membrane manufacturer's warranty.
- .2 Roofing system shall resist environmental and wind (uplift) loads, normal movement of structure, and effects of those loads in accordance with the building code and the following:
 - .1 Roofing system assemblies shall have been successfully tested by a qualified testing agency to resist project roofing uplift pressures in accordance with the building code.
 - .1 CSA A123.21 compliant roof assembly with respect to wind uplift resistance.
 - .2 Wind uplift pressures: as indicated on structural drawings.
 - .2 Movement within roofing system, and between roofing system and building structure.
- .3 Material compatibility: Provide roofing system materials that are compatible with one another under conditions of service and application required, as demonstrated by roofing system manufacturer based on testing and field experience.
- .4 Roofing system: Prevent water from entering building and roofing assembly through roofing membrane.
- .5 Roof covering classification: Roof assembly shall have a Class C classification as determined in conformance with CAN/ULC S107-10 "Standard Methods of Fire Tests of Roof Coverings".
- .6 Fire resistance: The roof assembly shall meet the conditions of acceptance of CAN/ULC-S126-06.
- .7 Air barrier system shall accommodate substrate movement, construction material changes, and transitions at perimeter conditions without deterioration and air leakage exceeding the following specified limits and requirements:
 - .1 Air permeance of air barrier material: Maximum 0.02 L/s m² at 75 Pa (0.004 cfm/ft² at 1.57 psf) to ASTM E2178-13.
 - .2 Rate of air leakage of air barrier system: Maximum 0.15 L/s m² at 75 Pa (0.030 cfm/ft² at 1.57 psf) to ASTM E283-04(2012).
 - .3 Water vapour transmission for air / vapour barriers: Maximum 5.7 ng/Pa.m².s. (0.1 perms).
 - .4 Pull-off strength of liquid or sheet applied membrane and laps: Cohesive or substrate failure permitted when tested to specified wind load. Air barrier system shall transfer wind load to structure and shall resist 100% of design wind load or minimum of 2.15 kPa (45 psf), whichever is greater.
 - .5 Low temperature flexibility: to -30°C (-22°F) to CGSB 37-GP-56M-1985.

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- .8 Air barrier system shall be joined in an airtight and flexible manner to air barrier material of adjacent building envelope air barrier systems, allowing for relative movement of systems due to thermal and moisture variations and creep. Connection shall be made between the following unless otherwise applicable:

- .1 Walls and openings.
- .2 Across construction, control, and expansion joints.
- .3 Penetrations.

2.3 Materials

- .1 Single ply premoulded membrane:
 - .1 Feltback fibreglass reinforced polyvinyl chloride sheet, with lacquer dirt repellent coating: ASTM D4434/D4434M-15, Classification Type II, Grade I.
 - .1 Adhered membrane:
 - .1 Basis of design:
 - .1 Sarnafil 'G410', 1.5 mm (60 mils) thick minimum, non-nominal.
 - .2 Membrane colours:
 - .1 Colour: to later selection by *Consultant*.
 - .3 Membrane interply reinforcement: as recommended by manufacturer to suit installation and attachment methods. Roofing shall be mechanically fastened, and fully adhered at required locations.
 - .2 Installed membrane system shall allow for structural movement or deflection of building, and span cracks in substrate of 6 mm (1/4") wide or less which may occur after installation of membrane.
 - .3 Elastic sheet materials shall be compatible with other materials used to provide the complete system including adhesives, insulation, protection materials and expansion joints.
 - .2 Cover board:
 - .1 Factory primed glass mat faced exterior grade gypsum sheathing board, 6.4 mm (1/4") thick minimum to ASTM C1177/C1177M-08, primed finish where used as substrate for adhesive applied materials.
 - .1 Acceptable *Products*:
 - .1 Georgia Pacific 'DensDeck Prime'.
 - .3 Insulation:
 - .1 INS-51:
 - .1 Rigid polyisocyanurate insulation board, inorganic felt faced:
 - .1 Description: Closed-cell polyisocyanurate foam core integrally laminated to heavy, durable and dimensionally stable inorganic coated-glass facers, CAN/ULC S704-03 Type 2 and Class 2, HCFC free, 138 kPa (20 psi) minimum compressive strength (at 10% deformation), CAN/ULC-S126-06, CAN/ULC S107-03. LTTR value to CAN/ULC S770-09.

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- .2 Where indicated as tapered:
 - .1 Factory tapered 1:48 (1/4 inch per 12 inches) minimum and as indicated on drawings, and flat board configurations.
 - .2 Provide preformed saddles, crickets, tapered edge strips, sumps, and other insulation shapes where indicated for sloping to drain. Fabricate to slopes indicated, and no less than 1:48 (1/4 inch per 12 inches) in addition to roof structure slope or to tapered insulation slope as applicable.
- .4 Air/vapour barrier membrane:
 - .1 Thickness: 0.8 mm (32 mils).
 - .2 Description:
 - .1 Self-adhesive vapour barrier that can also serve as temporary roof protection.
 - .1 Basis of design:
 - .1 Sarnafil 'SarnaVAP-SA', self-adhered.
 - .3 Primer: as recommended by manufacturer to suit substrate.
- .5 Sheathing board:
 - .1 Factory primed glass mat faced exterior grade gypsum sheathing board, 12.7 mm (1/2") thick minimum to ASTM C1177/C1177M-08.
 - .1 Basis of design:
 - .1 DensDeck Prime' by Georgia Pacific
- .6 Flashings:
 - .1 Flashings not exposed in final assembly or for attachment of membrane: Refer to Section 07 62 00.
 - .2 Membrane coated flashings coloured PVC sheeting as above, heat welded to 0.61 mm (0.0239") (24 gauge) minimum thickness Z275 galvanized steel.
- .7 Sealant: Two part polyurethane conforming to CAN/CGSB 19.24-M90, and containing no bituminous substances.
- .8 Fastening accessories:
 - .1 Membrane adhesives: Low VOC (250 gm/L maximum), product as recommended by roofing membrane manufacturer.
 - .2 Cover board adhesive: as approved by cover board and roofing membrane manufacturer.
 - .3 Insulation adhesive: as approved by insulation and roofing membrane manufacturer.
 - .4 Insulation fasteners and plates: to FM 4470-12. Fastener length to penetrate top flute of metal decking by a minimum of 19 mm (3/4") and maximum of 25.4 mm (1").
 - .5 Sheathing board fasteners:
 - .1 Flat head, self-tapping, corrosion resistant coating, to FM 4470-12.

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- .2 Fastener plates where required to meet the requirements of Factory Mutual 4470 for wind uplift. Fastener length to penetrate top flute of metal decking by a minimum of 19 mm (3/4") and maximum of 25.4 mm (1").
- .9 Metal termination bars: Manufacturer's standard, predrilled stainless-steel or aluminum bars, approximately 25 by 3.2 mm (1/8") thick; with anchors.
- .10 Miscellaneous accessories: Provide pourable sealers, preformed cone and vent sheet flashings, preformed inside and outside corner sheet flashings, T-joint covers, lap sealants and termination reglets.
- .11 Wood blocking and plywood: in accordance with Section 06 10 53.
- .12 Snow protection: PVC type compatible with membrane, as recommended by membrane manufacturer; located where indicated.
- .13 Snow guards:
 - .1 Extruded aluminum brackets with stainless steel base plate, with 25.4 mm (1") diameter pipe.
 - .2 Basis of design:
 - .1 Alpine SnowGuards '#115 Pipe-style', 3 pipes.
 - .3 Colour: to match roofing membrane.
 - .4 Fasteners: compatible with snow guards and roofing membrane.
- .14 Decorative battens/~~décor profile~~: extruded PVC battens in colour to match roofing membrane.
 - .1 Locations as indicated.
 - .2 Basis of design: Sarnafil 'Décor Profile'.

2.4 Fabrication

- .1 Whenever practicable, factory fabricate and heat weld seams in sheets of sizes designated on reviewed shop drawings. Supply membrane sheets as large as possible to minimize field joints.
- .2 Prefabricate where necessary, junctions and flashing upstands around penetrations and openings in membranes.
- .3 Fabricate premoulded inside and outside corners with or without preformed cant sections for corners or field fabricated corners to manufacturer's instructions.

PART 3 - EXECUTION

3.1 Examination

- .1 Before proceeding with application, ensure that:
 - .1 Roof deck is constructed smoothly; in true planes; and level, or sloped to drains, whichever is design intent.
 - .2 Roof deck is clean and sufficiently dry for application under specified warranty.
 - .3 Adjacent construction and installation of work is completed.

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- .4 Adjacent construction and installation of work of other sections incorporated with roof is completed.
- .5 Roofing surfaces are free of cracks that are wider than bridging ability of roofing materials.
- .6 Preparations have been made for bases on which equipment will be installed.
- .7 Work that penetrates roof has been installed.
- .8 Deck has been reviewed and accepted by *Consultant* and membrane manufacturer prior to start of roofing work.

3.2 General Installation Requirements

- .1 Do roofing work in accordance with applicable recommendations in CRCA Roofing Specifications Manual, ASTM D4434/D4434M-15, and in accordance with manufacturer's printed specifications and installation instructions, with greater requirements governing.

3.3 Preparation

- .1 Immediately following acceptance of slopes, support and surface conditions of support decking, commence application.
- .2 Examine materials over which work of this section is applied and ensure that roof decks are free of snow, ice, loose or adhering materials which would impair this work. Substrate shall be clean, dry and suitable for roofing application.
- .3 Undertake spot levels in an approved manner to determine if there is any unevenness in roof decks which may result in ponding of water on completed roofing in excess of 12.7 mm (1/2") depth.
- .4 Advise *Consultant* of areas requiring corrections and forward tabulation of results of spot levels.
- .5 Roof surfaces shall be free of ponding water, ice, and snow.
- .6 Do not proceed with roofing work until areas where water will pool or other surface defects are corrected to the acceptance of *Consultant*.

3.4 Installation

- .1 Follow manufacturer's instructions using only compatible adhesives and compounds recommended by manufacturer in quantities and techniques so recommended. Install membrane sheets to layout and details shown on reviewed shop drawings.
- .2 Welding method shall be hot air method only. Do hand welding, machine welding and progressive testing of seams in strict accordance with manufacturer's instructions.
- .3 Carry membrane up perimeter walls to height shown. Lap and weld joints minimum 50 mm (2") for hand welding and minimum 100 mm (4") for machine welding. Machine weld wherever practicable.
- .4 Extend membrane onto flashing flanges of deck drains and weld; make watertight. Lap end joints and seal.
- .5 Extend roofing to outer edges of roof and up vertical surfaces at least 200 mm (8") above horizontal roofing, and full height beneath counter flashing and top of curb flashing.

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- .6 At flashing termination points and roof drains, incorporate manufacturer's recommended materials, adhesives, sealing strips, and stainless steel compression rings and accessories to ensure completely waterproof system sealed against windblown water or air infiltration. Ensure continuity and integrity of air seal membrane and sheet membrane roofing assembly.
- .7 Flash at roof perimeter and penetrations through roof as detailed and conforming to manufacturer's standard details. Coordinate work of this section with metal counter flashings specified in Section 07 62 00.
- .8 Provide continuity between vapour barriers of this section and of Section 07 27 00 by lapping membrane with same. Coordinate with Section 07 27 00.

3.5 Parapet and Projection Blocking

- .1 Install plywood as detailed and required, at entire perimeter of roof and at projections. Support ends of plywood and fasten to substrate at a rate of 1 fastener per 0.2 m² (2ft²).
- .2 Install blocking at entire perimeter of roof and at projections and penetrations as detailed and required. Match height of blocking with height of insulation. Anchor blockings to deck 305 mm (12") on centre to resist a force of 2.5 kN/m (175 lb/ft) in any direction.

3.6 Sheathing Board

- .1 Lay sheathing with tightly butted joints. Longitudinal joints must be at right angles to flute direction. Joints occurring along widths of board to be continuously supported on top flange of metal deck. Stagger end joints of adjacent board by ½ the board width.
- .2 Ensure sheathing is immediately protected with membrane.
- .3 Mechanically fasten sheathing to steel deck with self-tapping, galvanized screws, spaced evenly to each board and to only top flanges of steel deck. Mechanical fasteners to penetrate top flutes only; by no less than 19 mm (3/4") and by no more than 25.4 mm (1"). Check underside of deck before installation to eliminate damaging existing conditions below the deck.

3.7 Installation of Self-Adhesive Air / Vapour Barrier

- .1 Beginning at the bottom of the slope, without adhering the membrane, unroll onto the substrate for alignment. Do not immediately remove the silicone release sheet.
- .2 Align the roll parallel to the corrugations of the steel deck. Make sure the membrane overlaps are supported along their entire length.
- .3 Peel back one end of the silicone release sheet and adhere this part of the membrane to the substrate. Peel back the remaining release sheet at a 45° angle to avoid wrinkles in the membrane.
- .4 If the membrane is not properly aligned, do not try to adjust it. Instead, cut the roll and start again, making sure that it is properly aligned and that it overlaps the end of the misaligned piece by 150 mm (6").
- .5 Overlap adjacent membranes by 100 mm (4"). Overlap end laps by 150 mm (6"). Stagger end laps by at least 305 mm (12"). Seal joints and edges with butyl tape to ensure continuity of vapour envelope.

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3.8 Insulation Application

- .1 Install rigid insulation boards with long side at right angle to deck flutes. Provide full support at ends. Cut and trim insulation boards to provide plain butt joints at perimeter, parapet and curbs. Lay insulation boards in parallel course, butted together in moderate contact without gaps, with staggered end joints. Lay rigid insulation in 2 layers with joints staggered. Place sloped insulation saddles at obstructions to roof drainage and as indicated; stagger joints over rigid insulation. Slope to drains, 2% minimum.
- .2 Adhesively applied insulation:
 - .1 Apply insulation to substrate or to adjoining board with specified adhesive applied in 50 mm (2") wide bands every 305 mm (12") or in 100 mm (4") diameter spots (9 spots per square metre) at a rate of 2 to 3 kg per square metre.
- .3 Mechanically fastened insulation:
 - .1 Fasteners must be attached to steel deck's upper flutes and at spacing to meet performance requirements, in accordance with roofing manufacturer's installation instructions
- .4 Offset board joints with successive board layers, minimum 300 mm (12"). Place tapered insulation where as indicated, in accordance with reviewed shop drawings.
- .5 Install only as much insulation as can be covered with membrane roofing in the same day.
- .6 Install insulation boards with edges in moderate contact without forcing and fill gaps greater than 6 mm (1/4") with insulation.
- .7 Cut insulation to fit to blocking, upstands, and penetrations through roof; fill gaps greater than 6 mm (1/4") with insulation.
- .8 *Provide* cut-offs by installing strip of air / vapour barrier membrane to seal sections of roofing to smaller sections, and at the exposed edges of insulation under at roof edges and vertical surfaces. Install water cut-offs between base sheet and air / vapour barrier to provide watertight separation to adjacent roofing section.
 - .1 Locate water cut-offs at 929 m² (10,000 sf) maximum sections.

3.9 Cover Board

- .1 Firmly set the boards, long joints continuous and short joints staggered. Boards shall be evenly and tightly butted together.
- .2 Vertical joints between boards and insulation shall be staggered, minimum 150 mm (6").
- .3 Apply only as many boards as can be covered with base sheet in the same day.
- .4 At parapets and curbs mechanically fasten cover board to substrate before installation of self-adhesive base flashings. Use 6.4 mm (1/4") overlay boards at these locations.
- .5 Adhesively applied cover board:
 - .1 Apply insulation adhesive to underside and immediately bond cover board to substrate.

3.10 Fully Adhered System

- .1 Install roofing membrane in accordance with roof membrane manufacturer's written requirements.

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- .2 Install premoulded membrane without folds or wrinkles. Follow roof manufacturer's layout drawings. Overlap membrane to overlap line provided on membrane.
- .3 Fully adhere roofing membrane, with no air pockets in accordance with roof manufacturer's installation instructions.
- .4 Hot air weld overlaps according to membrane manufacturer's recommendations.
 - .1 Spacing of seams to match spacing of décor profiles indicated.

3.11 Flashing Membrane

- .1 Adhere flashing membrane with membrane adhesive to vertical areas and flashing. Using a lambs wool roller, coat substrate with adhesive at rate recommended by manufacturer and dry 1 hour, as required.
- .2 Unroll flashing membrane in position. Coat underside of membrane with membrane adhesive at recommended rate and allow to dry tack. Press membrane to substrate and roll solidly in, removing air bubbles.
- .3 Do not apply adhesive to lap area. Clean with recommended cleaner if necessary.
- .4 Install a continuous strip of butyl tape between membrane flashings and cap flashings.

3.12 Decorative Battens

- .1 Install battens in accordance with manufacturer's recommendations.
- .2 Ensure surface of roofing membrane is clean before installing battens.
- .3 Install battens parallel to roof slope at spacing as indicated on drawings.
- .4 Attach batten to roofing membrane using welding equipment as recommended by manufacturer.
- .5 Weld a piece of coloured roofing membrane to exposed ends of battens and trim to match batten profile.

3.123.13 Field Quality Control

- .1 Conduct quality control in accordance with Section 01 45 00.
- .2 Manufacturer's field review to be in accordance with Section 01 45 00 supplemented as follows:
 - .1 Membrane manufacturers field representative shall be on-site and review installation a minimum of once per week during roofing installation.

3.123.14 Adjusting and Cleaning

- .1 Upon completion of work of this section, clean up surplus materials and debris attributable to this section.

END OF SECTION

Swimming Pool Tanks and Decks

Section revised and reissued by Addendum No. 03

PART 1 - GENERAL

1.1 Summary

.1 Section includes:

- .1 Swimming pool tanks and deck constructed in place.

1.2 Administrative Requirements

.1 Pre-installation meeting:

- .1 The *Contractor* shall schedule and conduct pre-installation meetings for swimming pool tanks as specified herein and in accordance with Section 01 31 19.

- .2 Pre-installation meeting for swimming pool tank work shall occur at least 2 months prior to commencement of swimming pool tank work at the *Place of the Work*.

.3 Attendees:

- .1 In addition to attendees specified in Section 01 31 19, attendees at swimming pool tank pre-installation meeting shall include *Subcontractors* responsible for or affected by the work of the following sections:

- .1 03 10 00 Concrete Formwork.
- .2 03 15 20 Integral 03 15 20 Waterproofing.
- .3 03 20 00 Concrete Reinforcement.
- .4 03 30 00 Cast-in-Place Concrete.
- .5 13 11 13 Swimming Pool Tanks and Decks.
- .6 13 11 20 Swimming Pool Waterproofing and Tiling.
- .7 13 11 21 Pool Tiling Schedule.
- .8 13 11 46 Swimming Pool Accessories.
- .9 13 11 47 Pool Accessories Schedule.
- .10 13 11 56 Movable Swimming Pool Floors.
- .11 Divisions 22, 23, and 26.
- .12 31 23 00 Excavation and Backfill.

- .2 Independent inspection and testing company shall attend pre-installation meeting.

.4 Agenda:

- .1 Refer to table appended to this section.

1.3 Submittals

- .1 Submit required submittals in accordance with Section 01 33 00.

.2 *Product Data*:

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- .1 Submit manufacturer's detailed technical *Product* data and installation instructions for each principal component or *Product*, and include certified test reports of required testing. List and describe features of control system, performances, and operating characteristics.
- .3 Shop drawings:
 - .1 Submit engineered shop drawings.
 - .2 Shop drawings will include plans of all pool tanks including an overall plan of the Filtration Room and Aquatic Hall which shows the relationship of the tanks to each other and to all adjacent elements of the building. Indicate pool layout and configuration, pool tank cross sections, materials and finishes, gutters, equipment locations, dimensions, details of assembly, reinforcing, anchors, water stops, joints, and utility rough-in locations. Show schematics, layouts, locations, of built-in pool and filtration equipment.
 - .3 Submit power wiring diagrams for control and interlock wiring.
- .4 Certificates:
 - .1 Submit to the *Owner* copies of inspection/acceptance certificates and operating permits as required by governing authorities to allow normal, unrestricted use of swimming pools.
- .5 Test and evaluation reports:
 - .1 Submit written and verified pressure test reports for every pool pipe installed underground.
- .6 Survey:
 - .1 Submit copy of survey specified under Part 3 of this section to the *Consultant*.

1.4 Closeout Submittals

- .1 Submit closeout submittals in accordance with Section 01 77 00.
- .2 Submit as-built documents, record drawings, and operation and maintenance manuals and service data in accordance with Section 01 77 00 and as specified in this section.
- .3 Include the following information in 1 electronic (pdf) copy and in 3 copies of a separate bound editions pertaining only to swimming pools:
 - .1 As-built documents and record drawings:
 - .1 Provide as-built drawings in accordance with Section 01 77 00.
 - .2 Provide a complete set of record drawings of the entire pool system and underground piping. Show the location and depth of piping.
 - .3 List of equipment including *Product* name, model number, size, parts lists, pump curves, manufacturer and closest service representative (name, address, telephone number).
 - .4 Shop drawings and manufacturer's printed assembly/wiring diagram or servicing drawings.
 - .2 Operation and maintenance manuals and service data:
 - .1 Equipment function, normal operating characteristics, and limiting conditions.

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- .2 Assembly, installation, alignment, adjustment and checking instructions.
- .3 Manufacturer's step-by-step operating instructions for startup, routing and normal operation, regulation and control, shutdown and emergency conditions for each filter and pool recirculation system including backwash.
- .4 Operating cycles shall be specifically described in outline format and in referenced detail. A legible wall-mounted colour-coded piping flow diagram shall be provided in equipment room.
- .5 Comprehensive step-by-step operating instructions for each different piece of equipment forming part of pool system.
- .6 Include manufacturer recommended maintenance schedule, parts lists, piping diagram (to agree with wall mounted diagram) and troubleshooting information for all pool mechanical equipment.
- .7 Provide a 760 mm x 900 mm (30" x 36") wall chart for each pool and spa filter system, as well as a reduced photocopy of each wall chart in the maintenance manuals. Using reference to keyed valves and wall diagram, include specific written instructions for procedures to be followed for:
 - .1 Emptying and refilling the pools including de-watering during the period that the pool will be empty.
 - .2 Filter operation and backwashing.
 - .3 Super chlorination.
 - .4 Water level control and adjustment/.
 - .5 Chemical controllers.
 - .6 Lubrication and maintenance instructions.
 - .7 Guide to "troubleshooting".
 - .8 Parts list and predicted life of parts subject to wear.
 - .9 Test all motors and provide written confirmation.
 - .10 Specific written instructions for procedure for emptying and refilling the pools including de-watering during any period that the pool will be empty. Provide a red sign with minimum 25.4 mm (1") letters in the equipment room reading as follows: WARNING DO NOT DRAIN POOL WITHOUT FOLLOWING THE PROCEDURES IN THE POOL OPERATION MANUAL.
 - .11 Provide 213 mm x 275 mm (8-1/2" x 11") laminated pump curve for each and every pump, posted next to the specific pump.
- .8 A reduced sized photocopy of the total equipment room and pool equipment schematic shall be included in maintenance manual.
- .3 Submit copies of operation and maintenance and service data manuals prior to the start-up instruction.

1.5 Quality Assurance

- .1 Qualifications:
 - .1 Installers / applicators / erectors:

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- .1 *Provide* the work of this section by a *Subcontractor* who has adequate plant, equipment, and skilled workers to perform the work expeditiously, and is known to have been responsible for satisfactory installations similar to that specified during a period of at least the immediate past 5 years, who is completely familiar with referenced standards and requirements of the work of this section, and with approval of *Product* manufacturers.
- .2 Aspects of the work of this section are required to be prepared by a professional engineer. Refer to Section 01 33 00 for specific details and requirements in this regard.

1.6 Field Conditions

- .1 Before commencement of the work of this section, examine the *Place of the Work* and report unsatisfactory conditions in writing to the *Consultant*.
- .2 Designate reference datum points for location of pool tanks.
- .3 Begin construction of the pool tank only after the area is protected from rain and snow.

1.7 Warranty

- .1 Warrant work of this section for a period of 5 years in accordance with Section 01 78 36 and as follows:
 - .1 Warranty includes no leakage in concrete pool tanks and piping.
 - .2 Warranty period for defects in materials or workmanship of the pool structure causing a loss of water: 10 years.
 - .3 Warranty period for defects in material or workmanship of the pool piping systems: 5 years.
 - .4 Warranty requirements and duration for pool secondary waterproofing and tiling systems: in accordance with Section 13 11 20.
 - .5 Pool accessories and pool gutter grates specified under Section 13 11 46.

PART 2 - PRODUCTS

2.1 Performance/Design Requirements

- .1 Provide design and layout information as required.
- .2 Concrete pool tanks are designed to be waterproof prior to application of additional waterproofing membranes. Follow ACI 350 Committee recommendations for watertight structures.
- .3 Work of this section includes construction of new pool tank, together with complete filtration systems, finishes, and installation of equipment indicated or required for a complete installation under the responsibility on a single *Subcontractor*. Work includes, but is not limited to the following:
 - .1 Pool deck drains: provide deck drain trenches and grates, including setting beds required to achieve deck slopes indicated. Coordinate penetrations through the deck slab. Plumbing below the deck slab shall be provided by Division 22.
 - .2 Pool tank and foundations:

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- .1 Final 200 mm (8") of compacted fill under pool tank in accordance with Section 31 23 00.
- .2 Construction of concrete tank, including formwork, reinforcing, accessories, poured concrete, primary waterproofing admixture, waterstops, inserts, control joints in accordance with Division 03.
- .3 Pool decks (in areas indicated), setting beds.
- .3 Pool deck drains and associated plumbing.
- .4 Tank, deck and wall finishes, to extents indicated or scheduled; ceramic tile finish, secondary waterproofing, joint sealants, tank markings as indicated and as required by the building code and coordinated with authorities having jurisdiction, and in accordance with Section 13 11 20.
- .5 Backfilling with clean sand around filtration plumbing.
- .6 Pool Filtration System, including filter tanks and any related tanks, plumbing, skimmers, outlets, nozzles, airjets, drains, and the like, that form part of the system shall be in accordance with Divisions 21, 22, and 23.
- .7 Design, supply, and installation of electrical equipment in accordance with Section 22 51 00 and Division 26, including:
 - .1 Electrical connections and associated electrical equipment, materials, and labour for the associated pool re-circulation systems within the Pool Filtration Room.
 - .2 Electrical materials and labour associated with the 600 V, 3 phase and/or 120/208 V, 1 or 3 phase connections to pool pumps and equipment, and 120 V branch circuit connections (hardwired or 120 V outlets) required for pool associated equipment.
 - .3 Connections to electrical panels, including the supply and installation of associated breakers.
 - .4 Standard housekeeping outlets are by Division 26.
- .8 Supply and installation of electrical grounding and bonding of metal in pool tanks, and within 3 m (9.8 ft) of pool tanks, in accordance with the Canadian Electrical Code (latest edition).
- .9 Coordination with *Owner* and suppliers for other equipment.
- .10 Supply and installation of pool accessories and pool gutter grates in accordance with Section 13 11 46.
- .11 Supply and installation of housekeeping pads, hangers, fire stops, pipe seals through sleeves, thrust blocks, anchorage and supports for pool piping and equipment. Furnish pipe sleeves for installation by other trades at the proper locations.
- .12 Supply and installation of master emergency stop buttons and timers.
- .13 Concrete surge tanks:
 - .1 Construction of concrete surge tanks, including waterstops and primary waterproofing by in accordance with Division 03.

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- .2 Applied coating, access hatches and ladders, and installation of pool plumbing systems as part of the work of this section.
- .14 Supply and installation of floor access hatches.
- .4 Regulatory Requirements
 - .1 Design, fabricate and install work of this section to requirements of the building code and other authorities having jurisdiction.
 - .2 In addition to the building code, pool and associated systems shall meet requirements of the Department of Health and Wellness regulations.
 - .3 Obtain all required inspections and permits, as applicable.

2.2 Materials

- .1 Ferrous metals: only stainless steel 316L to be used in the Aquatics Hall, unless specifically indicated otherwise.
- .2 Fill under tanks: In accordance with Section 31 23 00.
- .3 Concrete: in accordance with Section 03 30 00.
- .4 Integral waterproofing admixture (primary waterproofing): in accordance with Section 03 15 20.
- .5 Concrete reinforcement: in accordance with Section 03 20 00.
- .6 Waterstops:
 - .1 PVC waterstops:
 - .1 Basis of design:
 - .1 Durajoint.
 - .2 Subject to compliance with performance requirements the following manufacturers are acceptable:
 - .1 Sika Greenstreak.
 - .3 Wall to floor joints (vertical installations): Type 3, 100 mm (4") length, 4.7 mm (3/16") thickness.
 - .4 Floor to wall joints (horizontal installations): Type 500 Split ribbed type, 150 mm (6") length, 9.5 mm (3/8") thickness.
 - .5 Wall to wall control joints: Type 5, 150 mm (6") length, 9.5 mm (3/8") thickness
 - .6 Floor to floor control joints: External 'Base Seal' type: Type 62, 228 mm (9") length, 4.7 mm (3/16") depth.
 - .2 Adhesive waterstops:
 - .1 Surge tank walls, subject to approval by Consultant.
 - .2 Basis of design:
 - .1 Henry 'Synko-Flex Waterstop'.
 - .3 Hydrophilic (swell-seal) waterstop:
 - .1 Gutter perimeter at wall control joints.

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.2 Basis of design:

.1 OCM 'Adeka P-201'.

.7 Pipe penetrations: seal around pipe penetrations in method suitable to installation conditions.

.8 Sealant:

.1 For joints in ceramic tile: in accordance with Section 13 11 20.

.2 For joints other than in ceramic tile: two component polysulphide to CAN/CGSB 19.24-M90 Type 2 Class A, white colour when adjacent white grout, light grey in other areas of pool tanks.

.1 Basis of design: Duoflex by Sika Canada Inc.

.9 Floor access hatches:

.1 Single leaf, light duty, aluminum door, 3.16" flat plate lid reinforced for 4.9 kg/m² (150 lb/ft²) live load.

.2 150 mm (6") angle frame with 25.4 mm (1") recessed pan for tile installation.

.3 Stainless steel compression spring.

.4 Stainless steel hinge pin.

.5 Stainless steel hardware.

.6 Type 316 stainless steel snap lock.

.7 Automatic hold-open arm.

.8 Aluminum flush mounted lift handle.

.9 Sizes:

.1 Surge Tanks from Pool Deck areas: 762 mm x 762 mm (30" x 30").

.10 Basis of design:

.1 Surge Tanks from Pool Deck areas:

.1 Pennsylvania Insert Corp 'AERL3030S'.

.10 Applied flexible waterproofing membrane, at pool gutters and surge tanks coating: in accordance with Section 13 11 20.

.11 Pool tiling system, including secondary waterproofing: in accordance with Section 13 11 20.

.12 Swimming pool accessories, deck drains (trench drains), and pool gutter grates: in accordance with Section 13 11 46.

2.3 Pool Filtration System

.1 Pool filtration system shall be in accordance with Divisions 21, 22, and 23.

2.4 Surge Tank Ladders

.1 CSA HA5 aluminum 6351-T6 and low density polyethylene drive-in style climbing ladder.

.1 Basis of design:

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- .1 MSU 'Model 360 Alum - Poly Step Drive-in Style'.

2.5 Fabrication Tolerances

- .1 Tank Length (Lap Pool): +15 mm to 0 mm.
- .2 Tank Width (Lap Pool): +25 mm to 0 mm.
- .3 Diagonal length difference (Lap Pool): ± 25 mm.
- .4 Depth (all Pools): +25 mm to 0 mm.
- .5 Tank Markings: ± 5 mm.
- .6 Location of Inserts: ± 5 mm.

PART 3 - EXECUTION

3.1 Installation - General

- .1 Comply with manufacturer's instructions and shop drawings for assembly of swimming pool and pad, and for installation of required equipment and accessories.
- .2 Before commencing concrete pours, verify electrical bonding of swimming pool embedded items and reinforcing steel and verify that any required electrical, plumbing or building inspections have been performed.

3.2 Pool Tank Installation

- .1 Do excavation, trenching, backfilling, and compaction in accordance with Section 31 23 00.
- .2 Cast under-tank filtration system piping into concrete.
- .3 Set and cast equipment into concrete as required. Refer to Division 03 for materials and methods for concrete construction and remedial work.
- .4 Waterstops:
 - .1 Install continuous waterstops where indicated or required to prevent leakage, and to manufacturer's instructions. Build waterstops into forms and support against displacement during pouring of concrete. Do not displace concrete reinforcing when installing waterstops.
 - .2 Use butted, welded connections in accordance with manufacturer's recommendation. Only straight heat sealed welds shall be performed in the field. Use preformed or shop welded corners and intersections.
- .5 Install expansion and construction joints between concrete tanks and slabs as indicated. Align joints with tile grout lines to avoid cutting finish tile. Seal joints with approved sealants.

3.3 Surveying

- .1 Measure the length of the lap pool and bottom slopes of each pool tank bottom.
 - .1 Measure location of each pool tank to confirm location relative to other elements in the Aquatic Hall.
 - .2 Measurements to be performed by a Registered Nova Scotia Land Surveyor.

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- .3 Perform measurements prior to installation of waterproofing and tile work.

3.4 Pool Deck Installation

- .1 Install pool deck drains to achieve code compliance for drainage.
- .2 Pour concrete slabs over compacted backfill. Allow for tile setting bed.
- .3 Seal expansion and control joints in pool tanks and decks with sealant as specified.

3.5 Pool Tile and Secondary Waterproofing Installation

- .1 *Provide* secondary waterproofing where indicated and in accordance with Section 13 11 20.
- .2 *Provide* pool tile in tanks and on surrounding pool decks complete including base in accordance with Section 13 11 20.
- .3 Expansion and construction joints in concrete tanks and slabs must align with tile joints.

3.6 Flexible Cementitious Waterproofing Membrane Installation

- .1 *Provide* flexible waterproofing membrane at pool gutters and surge tanks in accordance with Section 13 11 20.

3.7 Floor Access Hatch Installation

- .1 Final door locations to be reviewed and confirmed by Consultant.
- .2 Rigidly secure frames to floor assembly, flush with adjacent floor finish.
- .3 Install in accordance with door manufacturer's written instructions.
- .4 Adjust Work to ensure free-running, tightly closing operation. Ensure that installation is free from warp, twist or other distortion. Lubricate operating hardware.

3.8 Equipment Installation

- .1 Install equipment in accordance with manufacturer's printed instructions.
- .2 Provide connections to the pool grounding loop in accordance with Divisions 26, 27, and 28. Connect all reinforcing bar in the pool structure and all metal pool fittings and accessories within 3050 mm (10 ft) of the pool tanks or as otherwise required by authorities having jurisdiction.
- .3 Deliver items to be cast-in or incorporated in work of other sections and supervise installation of same.
- .4 Cooperate with *Owner's* representative and other contractors as they install equipment not included in the work of this section.

3.9 Swimming Pool Accessories Installation

- .1 Install swimming pool accessories in accordance with Section 13 11 46.

3.10 Field Quality Control

- .1 Conduct quality control in accordance with Section 01 45 00.
 - .1 Provide quality control for concrete testing in accordance with Division 03.

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- .2 Conduct pressure tests of all buried or encased piping with water at 170 kPa (24.7 psi) for 12 hours minimum prior to concreting and backfilling.
- .3 Pour concrete or backfill only around piping under 170 kPa (24.7 PSI) pressure. Monitor pressure during and for a minimum of 12 hours after concreting and backfilling.
- .4 Testing for watertightness:
 - .1 Provide 2 waterproofing tests of the pool tanks at the following milestones:
 - .1 Test 1: Minimum 28 days after concrete placement and when the concrete has developed sufficient strength as determined by the *Consultant*, and after high-pressure water blast specified under Section 13 11 20.
 - .2 Test 2: After thin-set porcelain tile work is complete, with setting bed and grout materials properly cured and after start-up procedures are complete.
- .5 Testing procedures:
 - .1 Test 1:
 - .1 Clean out pool and surge tank structures, remove foreign matter that inhibits the performance of the materials being used. Plug drains, outlets and shut valves. Test hydrostatic pressure relief valves.
 - .2 Fill pool and surge tank at a rate of 25 mm (1") per hour to a depth of 100 mm (4") below the overflow channel (gutter). Allow water to remain at this depth for 24 hours to ensure that drains, returns and other penetrations are not leaking.
 - .3 After 24 hours fill to the lip and flood the overflow channel (gutter).
 - .4 Let water stand in pool for 48 hours to allow for absorption by concrete. Top up the pool water level.
 - .5 Fill a control bucket with water. Mark pool and bucket. Let water stand in pool tank, gutter and bucket for 72 hours.
 - .6 Record water and air temperature and relative humidity of the pool area every 8 hours.
 - .7 Every 12 hours, check the water level in the pool tank and gutter, and compare it with the water level in the pail. Document test every 12 hours.
 - .8 Test for 72 hours. Any loss more than 10 mm in a 24 hour period will require repairs.
 - .9 Drain pool, locate and repair leakage, if any, working from the interior, undercutting and patching using the same concrete mixture as pool, mixed with bonding agent, except coarse aggregate shall be left out. Retest until pools are watertight. Do not apply waterproofing membrane and tile work until pools are watertight. Do not rely on tile and setting bed for water proof qualities.
 - .10 Moisture and alkalinity:
 - .1 Prior to performing Test 2, test for moisture vapour transmission in accordance with ASTM F710-11 and ASTM F1869-16 or ASTM F2170-16a in accordance with manufacturer's written flooring installation instructions. Results must not exceed 170 $\mu\text{g}/\text{m}^2$ (3 lb per 1,000 ft^2) in 24 hours when tested to ASTM F1869-16, or exceed 75% when tested to ASTM F2170-16a.

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- .2 Test for surface pH. Levels shall not exceed 9 pH. Test in accordance with ASTM F710-11.
- .3 For each test type: Conduct 3 tests for areas up to 100 m² (1000 ft²), and conduct 1 additional test for each additional 100 m² (1000 ft²) of flooring area.
- .2 Test 2:
 - .1 Fill pool as per Initial Start-up instructions.
 - .2 Follow pool water level monitoring procedures of Test 1 as outlined above.
 - .3 Drain pool if there is evidence of leakage.
 - .4 Locate and repair leakage, if any, as required and directed by the *Consultant*. Retest until pools are watertight.
- .3 A calibrated Water Loss Sensor, such as the Leakalyzer by Anderson Manufacturing, may be used in lieu of a control bucket. Submit proposed testing procedures to the *Consultant* for review.
- .4 Water costs:
 - .1 The cost of water required for the initial leak tests as well as any fillings or partial Fillings resulting from required repair work are included in the *Contract Price*.

3.11 Start-Up

- .1 Start-up equipment, balance equipment, and furnish necessary starting chemicals, in consultation with *Owner*, as required to bring water's chemical characteristics into proper balance.
- .2 Maintain the chemical balance of the pool water (including the cost of all chemicals required) until the pool and mechanical system is fully operational and accepted by the *Consultant* and the *Owner*.
- .3 Provide to the *Owner* sufficient quantities of the necessary chemicals to maintain the pools operation for a minimum of 30 days from the date of *Substantial Performance of the Work*.
- .4 Provide the *Owner* with a list of necessary chemicals 60 days prior to filling of the pool complete with estimated monthly quantities.
- .5 Provide chemicals required for subsequent treatment of water to achieve chemical treatment standards outlined below, until take-over by *Owner* at date of *Substantial Performance of the Work*.
- .6 Initial fill:
 - .1 Fill pool tank at rate of 25 mm (1") per hour.
 - .2 Water temperature shall match the temperature of the pool tanks to prevent thermal shock to the concrete and finishes.

3.12 Chemical Treatment of Water

- .1 While the pools are being filled, water shall be treated during complete filling process to bring water to the following recommended levels, including supply and installation of necessary chemicals to adjust and balance water chemistry in the pools to these levels:

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- .1 Free available chlorine: 1.5.
- .2 Combined chlorine: ≤ 0.2 .
- .3 pH: 7.5.
- .4 Calcium hardness: 250 – 350 ppm.
- .5 Total alkalinity: 90 – 110 ppm.
- .6 Saturation index between -0.3 and +0.3.
- .2 Regularly monitor above levels during filling process and add chemicals as required throughout filling process to maintain these values. Ensure that water is properly treated during filling of pool to prevent damage to pool finish.
- .3 Monitor and verify fill water is balanced with a saturation index between -0.3 and +0.3.
- .4 Prior to initial filling of swimming pools, swimming pool contractor shall conduct the following water tests on the source of water, and correct the amount of chemicals to be added during the filling process:
 - .1 Chlorine - Free and combined (ppm).
 - .2 Total Alkalinity (ppm).
 - .3 pH.
 - .4 Iron (ppm).
 - .5 Copper (ppm).
 - .6 Calcium hardness.
 - .7 Total dissolved solids.

3.13 Closeout Activities

- .1 At a time to be identified by *Consultant*, during the initial fill and start-up of the system, provide instruction in maintenance and operations of pool filtration systems.
- .2 Each item of equipment and controls shall be operated for *Owner's* representatives to ensure an understanding of equipment functions, function of individual working parts, and location of valves and controls. Instruction shall deal with regular filter cycle, back-wash cycle, and emergency shut down.
- .3 Verify sequence of operation for each operational mode. Instruction shall also include advice on the maintenance of each item of equipment.
- .4 Training period shall be a minimum of 24 hours (total) conducted at the *Place of the Work* and as follows:
 - .1 Initial training: 16 hours minimum.
 - .2 Follow-up training:
 - .1 8 hours, minimum, after *Owner's* staff has had 2 weeks experience operating the systems.
 - .2 8 hours, minimum, 4 weeks after 2nd training session.

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- .5 Videotape training session and/or arrange taping sessions with major suppliers, such as filtration system, chemical feeders, and water level controller. Staff to be trained in general maintenance and operation procedures. Submit a DVD copy of the training sessions to the *Owner* upon completion of training sessions.

3.14 Adjusting and Cleaning

- .1 Clean exposed and semi-exposed surface. Touch-up finishes to restore damaged and soiled areas.
- .2 Refer also to cleaning requirements specified under Section 13 11 20.

3.15 Protection

- .1 Protect and maintain conditions necessary to ensure that pools, decks, and equipment will be without damage or deterioration at date of *Substantial Performance of the Work*.
- .2 Refer also to protection requirements specified under Section 13 11 20.

END OF SECTION

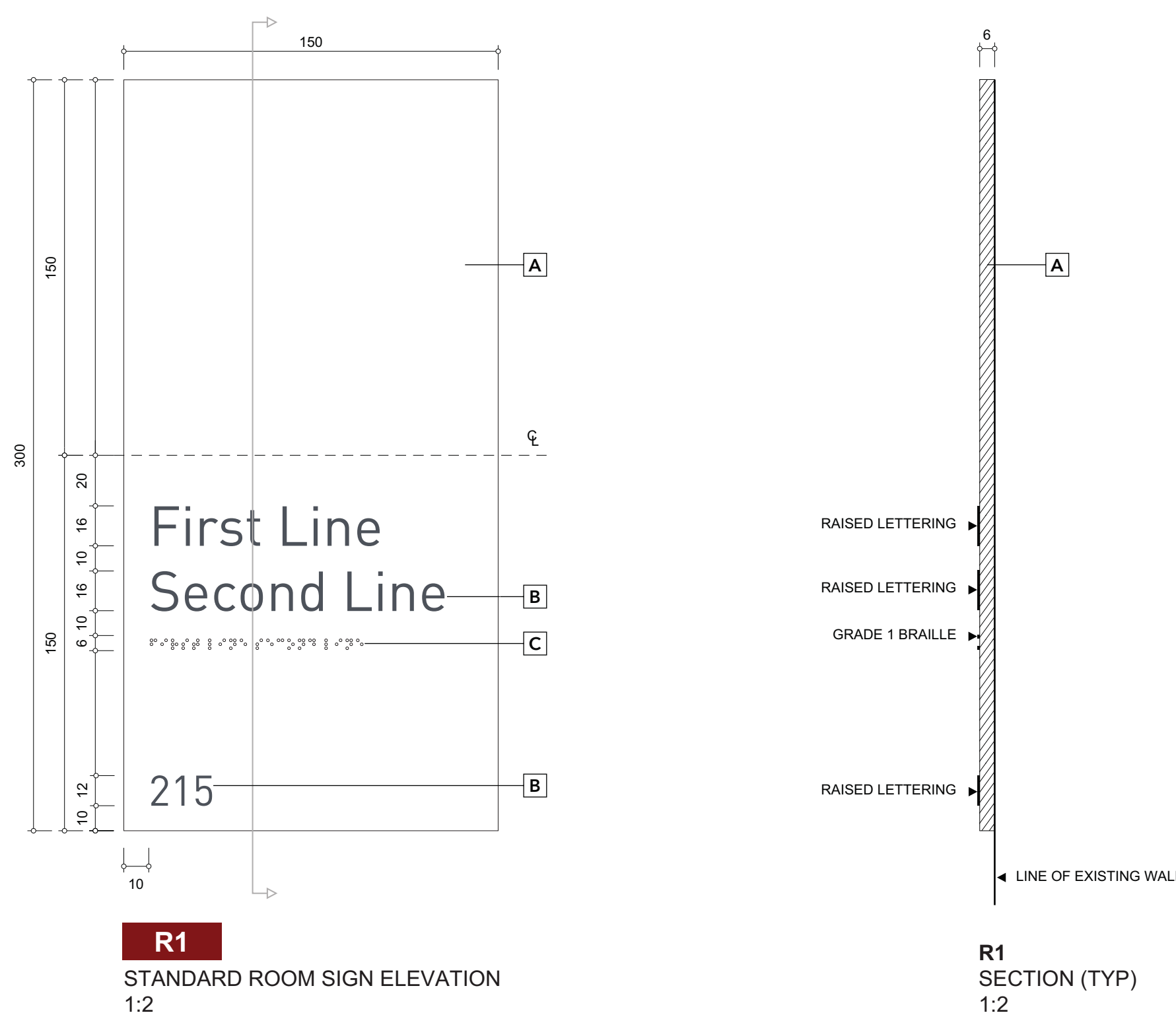
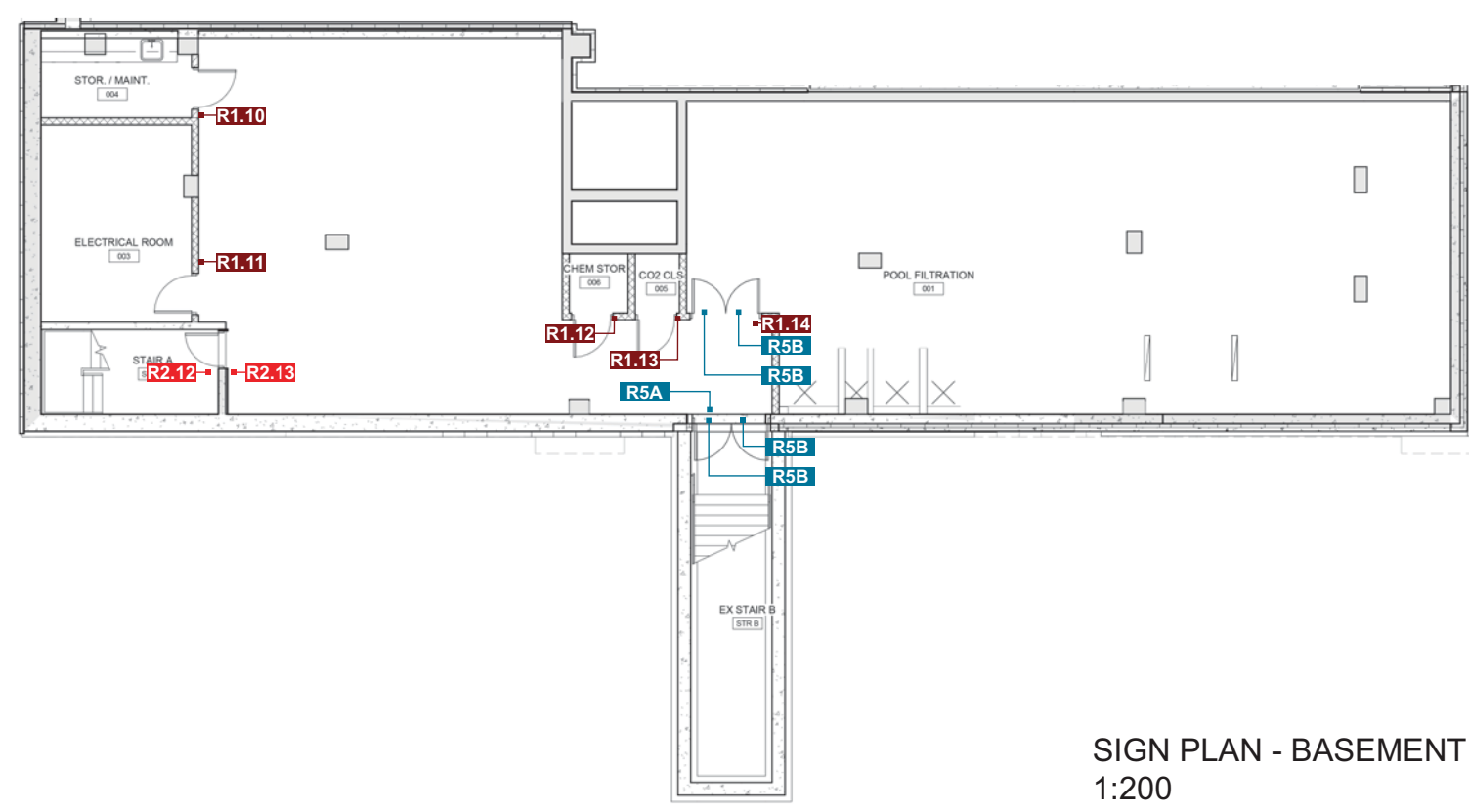
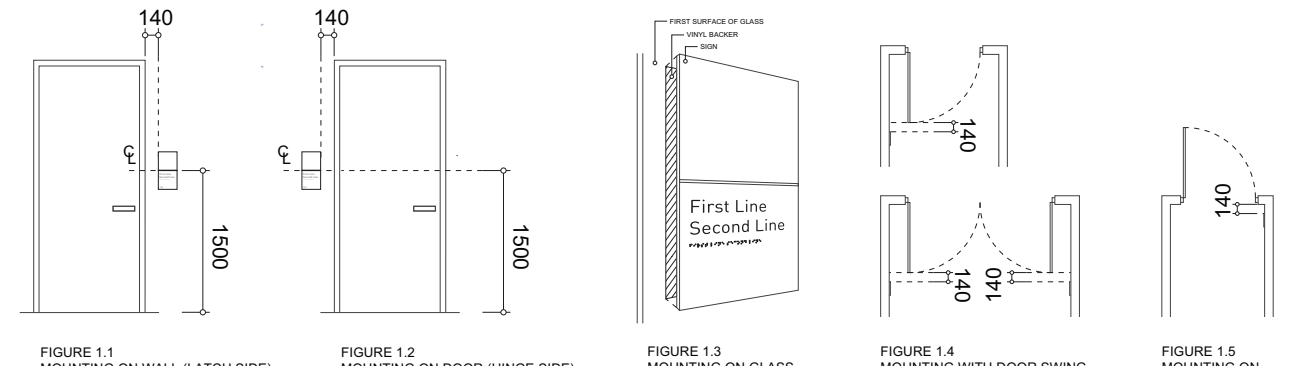
- R1 STANDARD ROOM SIGN
R2 ROOM W/ PICTOGRAM
R3 MAJOR ROOM SIGN
R4 VINYL - PICTOGRAM
R5 VINYL - TEXT
R6 VINYL - DISTRACTION BAND
R7 VINYL - PRIVACY SCREEN
R8 REGULATORY SIGNAGE (PLAQUE)
R9 REGULATORY SIGNAGE (LETTERS)
R10 VINYL - TEXT

GENERAL NOTES:

NOTES FOR ROOM SIGNAGE (R SERIES TYPE)
INSTALLATION:

- Center line of room signs (Type R), to be mounted at 1500mm A.F.F. (FIGURE 1.1)
- Room signs (Type R) are to be located on the latch side of the door with a leading vertical edge of 140mm from the outside edge of the door frame. (FIGURE 1.1)
- Only if no wall space is available to mount on latch side of door, mount sign on hinge side with a leading vertical edge of 140mm from the outside edge of the door frame. (FIGURE 1.2)
- When mounting on glass, vinyl (cut to the same dimensions of the sign, and same background colour as sign) is to be placed on the first surface, then sign is to be placed on top, in order to conceal mounting material(s). Make certain the vinyl is smoothed out in order to avoid all air bubbles and creases. All mounting instructions are same as above. (FIGURE 1.3)

- When mounting a sign where a single or double door that opens into a corridor where there is a sign required, place sign on wall specified in signage location plan with a leading edge of 140mm clear of the door swing. All mounting instructions are same as above. (FIGURE 1.4)
- When mounting a sign where a single door does not have enough space to accommodate sign, mount sign 140mm from edge of return wall. (FIGURE 1.5)
- All signs should be mounted on the wall / surface where indicated on signage location plans.
- These are General Notes ONLY. Adjustments to the above instructions will be noted on those signs that require alternative mounting instructions.



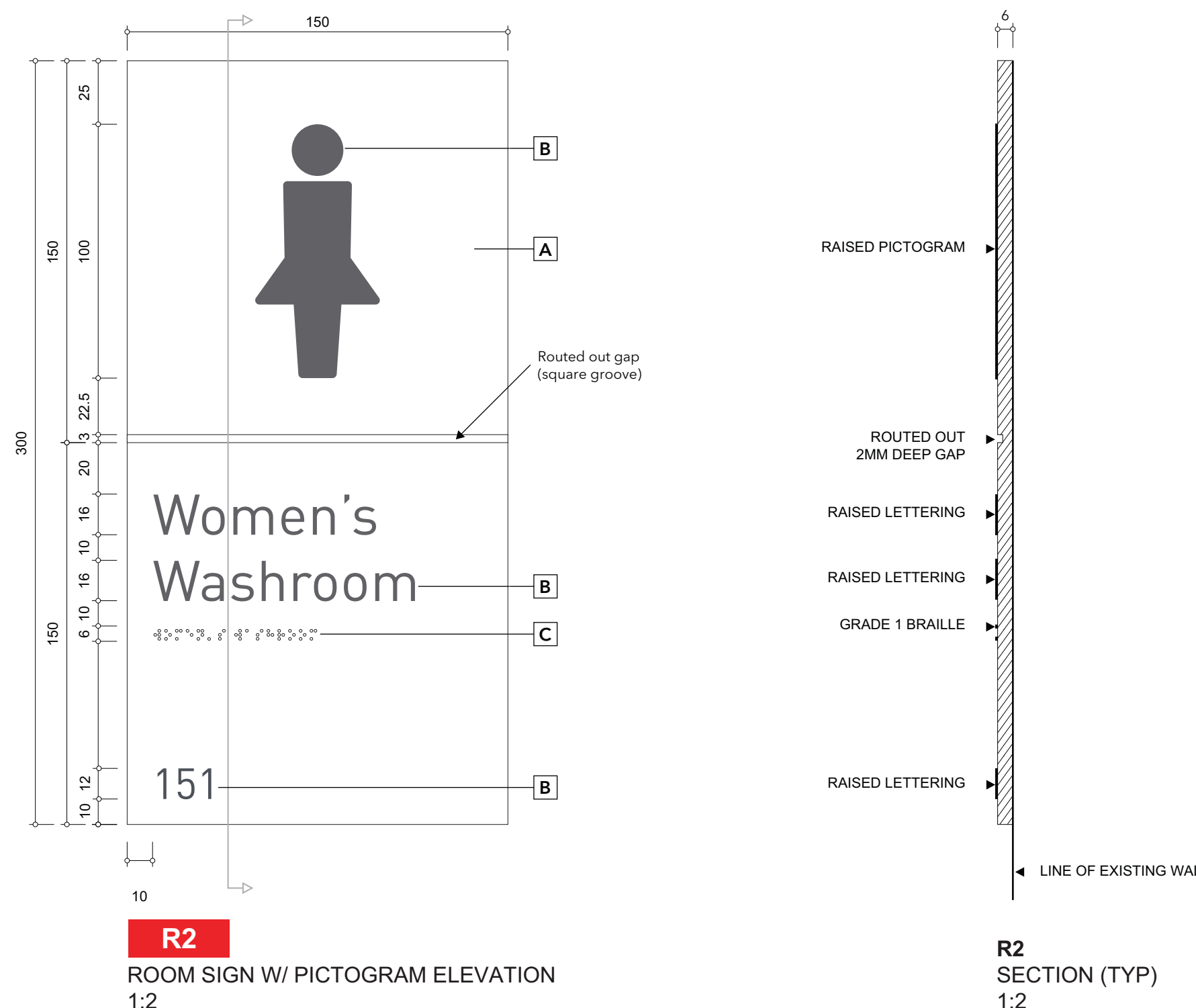
R1 SECTION (TYP) 1:2



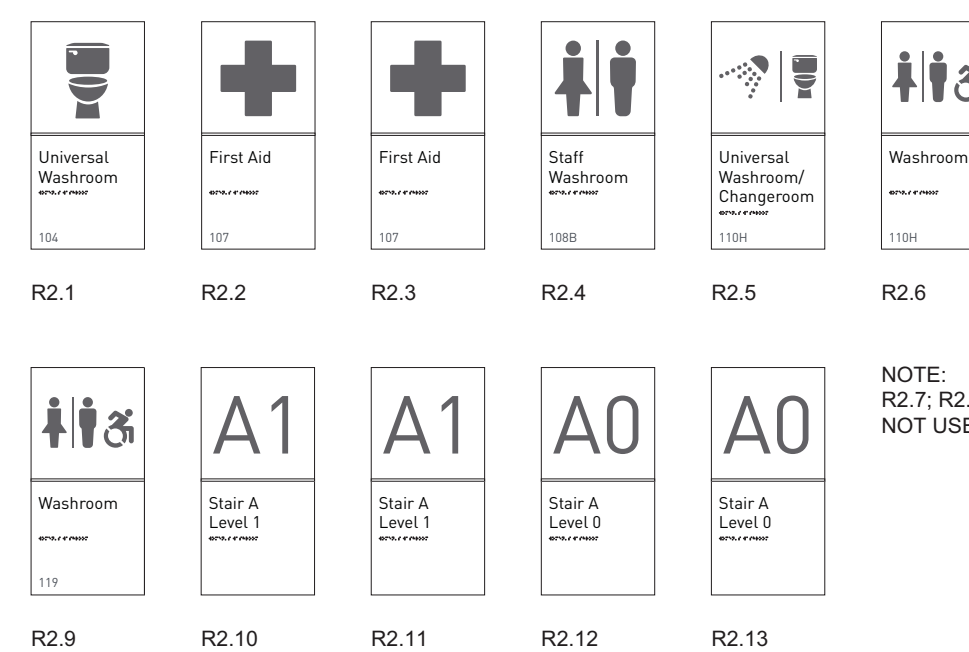
INFORMATION:
SCALE: AS NOTED.

MATERIAL COLOUR, FINISH:

- A • 6mm THICK, MATTE PHOTOPOLYMER
• PAINTED 'WHITE'
(MATTHEWS PAINT® - MP33490 - MATTE FINISH)
- B • 0.8mm RAISED TEXT
• PAINTED 'DARK GRAY'
(MATTHEWS PAINT® - MP27696 - MATTE FINISH)
- C • 0.8mm RAISED TEXT
• PAINTED 'WHITE'
(MATTHEWS PAINT® - MP33490 - MATTE FINISH)



R2 SECTION (TYP) 1:2



INFORMATION:
SCALE: AS NOTED.

MATERIAL COLOUR, FINISH:

- A • 6mm THICK, MATTE PHOTOPOLYMER
• PAINTED 'WHITE'
(MATTHEWS PAINT® - MP33490 - MATTE FINISH)
- B • 0.8mm RAISED TEXT
• PAINTED 'DARK GRAY'
(MATTHEWS PAINT® - MP27696 - MATTE FINISH)
- C • 0.8mm RAISED TEXT
• PAINTED 'WHITE'
(MATTHEWS PAINT® - MP33490 - MATTE FINISH)

FONT:

ABCDEFGHIJKLMNOPQRSTUVWXYZ
DIN PRO LIGHT

0123456789
DIN PRO LIGHT

ABCDEFGHIJKLMNOPQRSTUVWXYZ
DIN PRO REGULAR

0123456789
DIN PRO REGULAR

ABCDEFGHIJKLMNOPQRSTUVWXYZ
DIN PRO MEDIUM

0123456789
DIN PRO MEDIUM

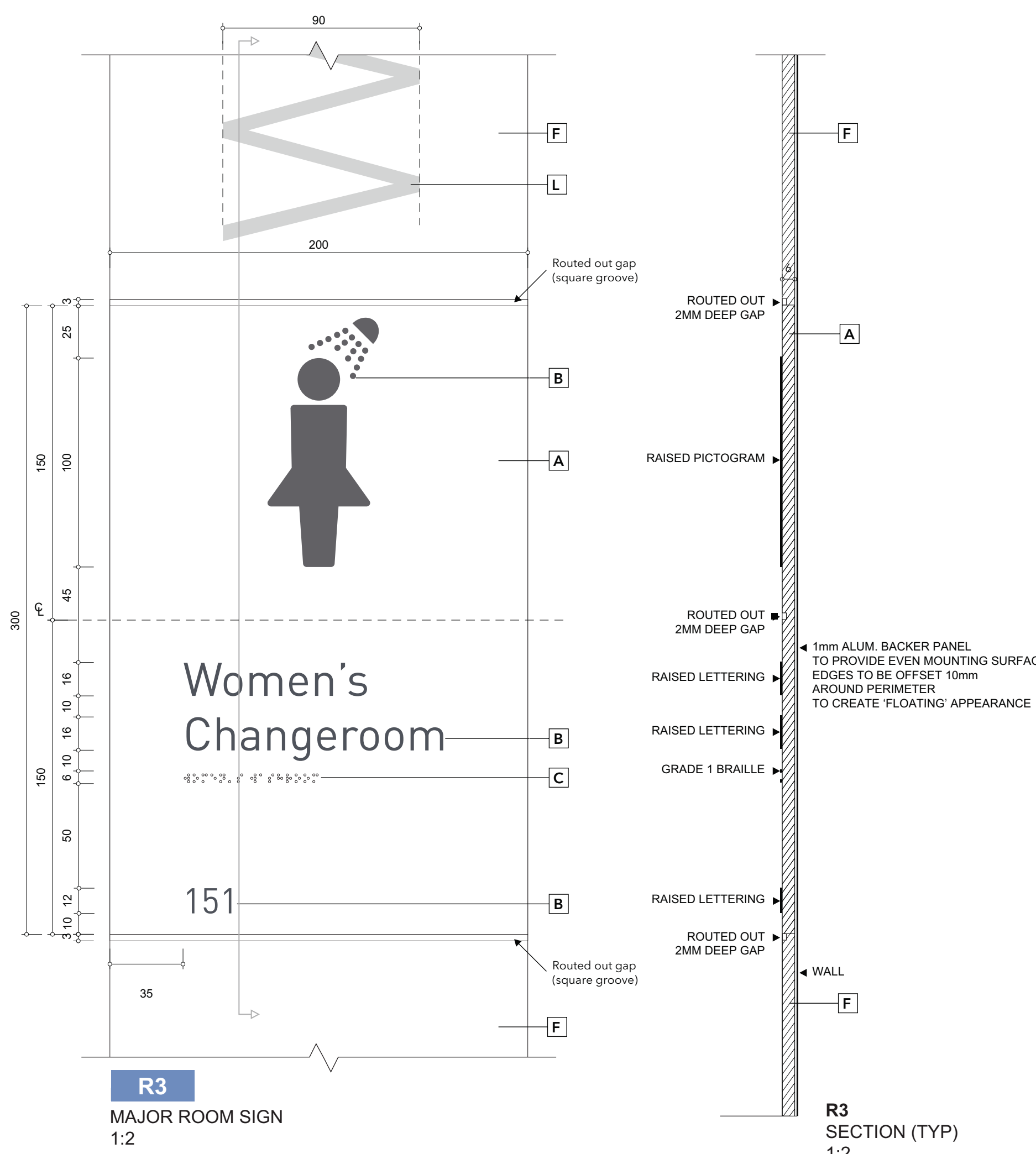
Sign Schedule table with columns for Sign Type, Level, and Sign Description.

Sign Schedule table with columns for Sign Type, Level, and Sign Description.

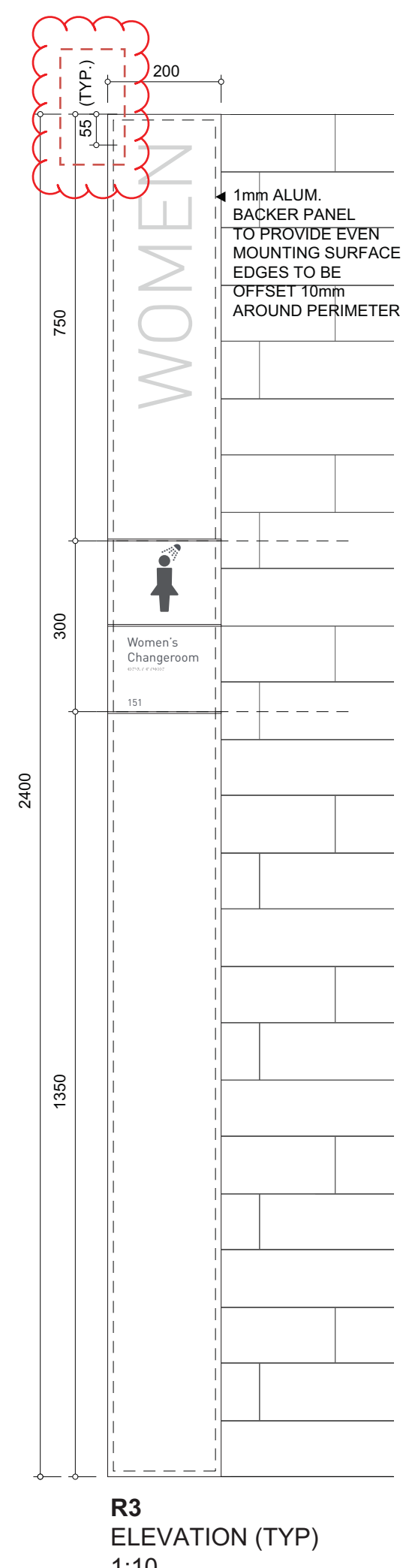
SAMPLE SCHEDULE:

- 1 Full Scale (1:1) 1'x 1' portion Sign Sample of:
X1 - BUILDING/SPONSOR NAME (ILLUMINATED).
- 1 Full Scale (1:1) Letter Sample of:
X2 - BUILDING NAME (NON-ILLUMINATED).
- 1 Full Scale (1:1) Sign Sample of:
R2 - ROOM W/ PICTOGRAM.
- 1 Full Scale (1:1) 1'x 1' portion Sign Sample of:
G1.A - POOL REGULATIONS

Levels Sign Types table with columns for Levels, Sign Types, and Sign Description.



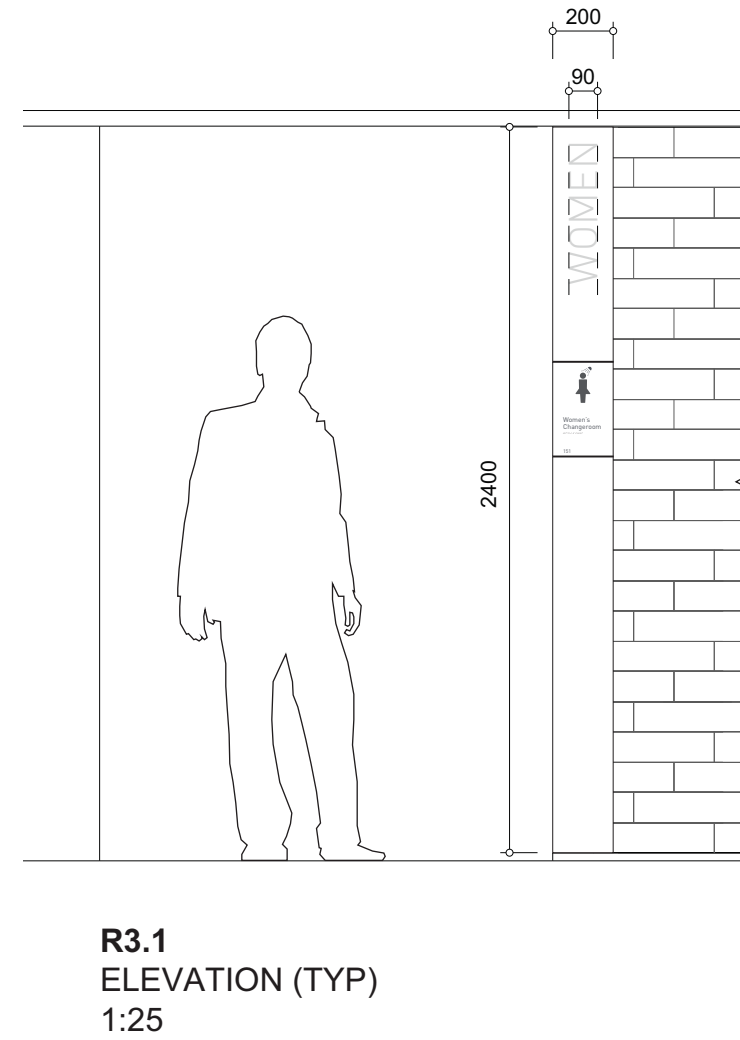
R3 SECTION (TYP) 1:2



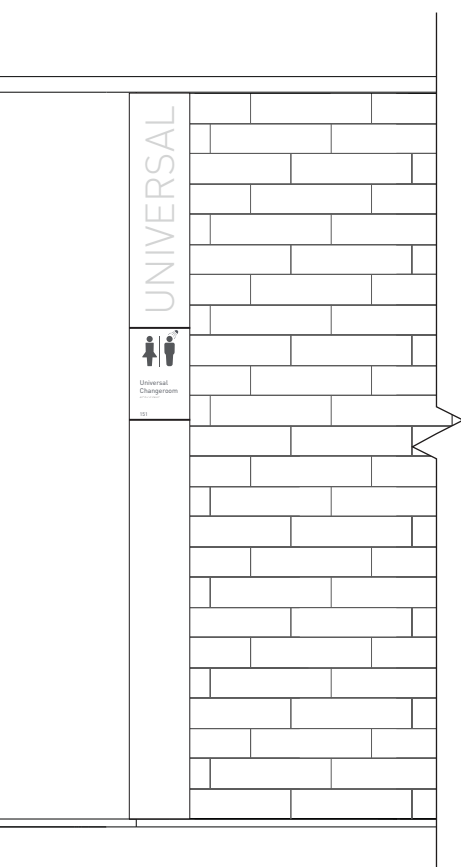
INFORMATION:
SCALE: AS NOTED.

MATERIAL COLOUR, FINISH:

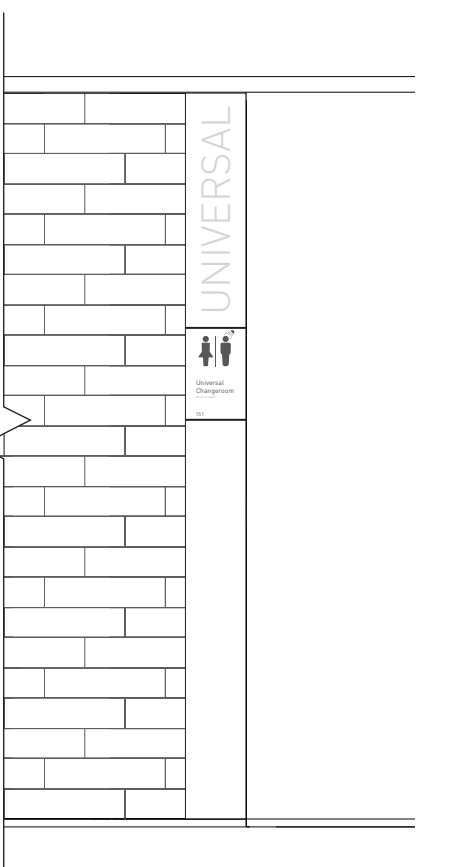
- A • 6mm THICK, MATTE PHOTOPOLYMER
• PAINTED 'WHITE'
(MATTHEWS PAINT® - MP33490 - MATTE FINISH)
- B • 0.8mm RAISED TEXT
• PAINTED 'DARK GRAY'
(MATTHEWS PAINT® - MP27696 - MATTE FINISH)
- C • 0.8mm RAISED TEXT
• PAINTED 'WHITE'
(MATTHEWS PAINT® - MP33490 - MATTE FINISH)
- F • 6mm THICK, MATTE ACRYLIC
• PAINTED 'WHITE'
(MATTHEWS PAINT® - MP33490 - MATTE FINISH)
- L • 3.5 MIL HIGH GRADE OPAQUE VINYL
• COLOUR: 'MEDIUM GRAY'
(AVERY® - HP700-801-0 - SLATE GRAY - 6030-0)



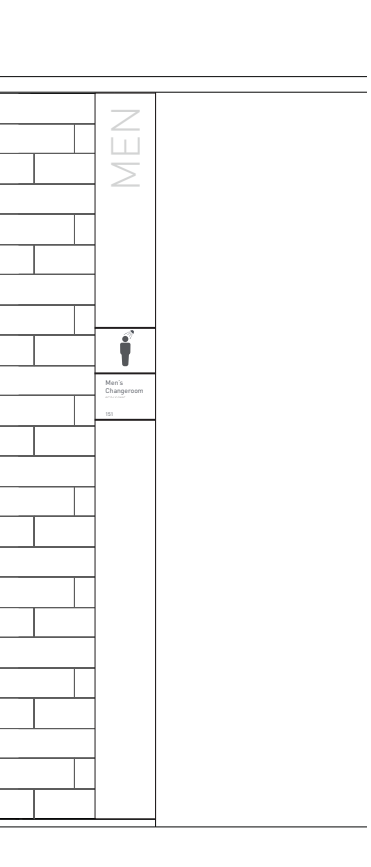
R3.1 ELEVATION (TYP) 1:25



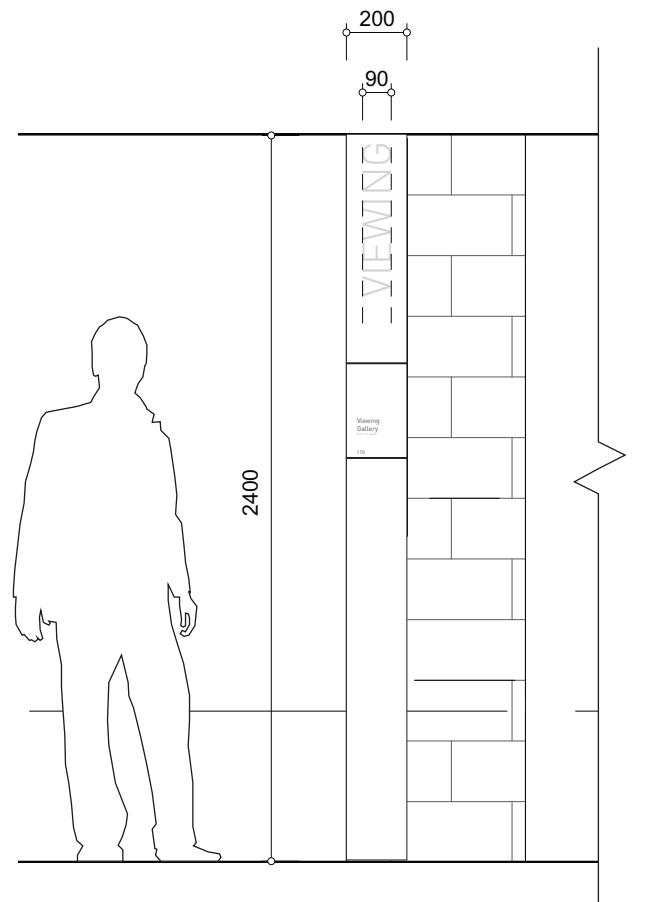
R3.2 ELEVATION (TYP) 1:25



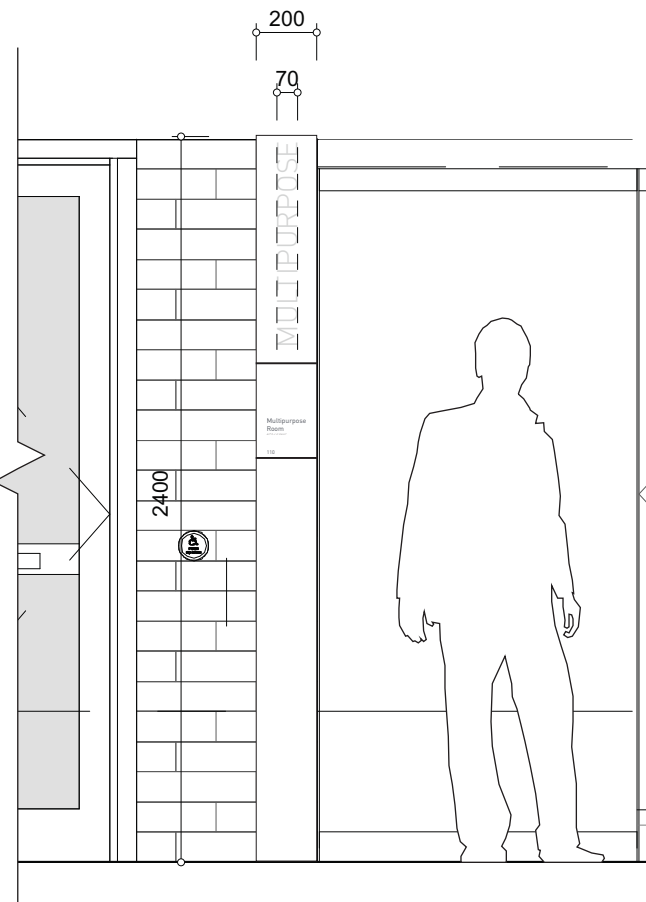
R3.3 ELEVATION (TYP) 1:25



R3.4 ELEVATION (TYP) 1:25



R3.5 ELEVATION (TYP) 1:25



R3.6 ELEVATION (TYP) 1:25

Revisions and Issues table with columns for Rev, Description, and Date.

MJMA
maclean jaunkins miller architects
425 adelade street west level 6
toronto ontario m5v 3c1
416 593 6796
www.mjmachitects.com

TEAL Architects + Planners
1600 Halls Street, Suite 1101
Halifax, Nova Scotia B3J 1Y7
www.tealarchitects.com

CAMPBELL COMEAU ENGINEERING LTD.
STRUCTURAL ENGINEERS
2710 GILBERT STREET, SUITE 110
HALIFAX NS, B3K 4K6
T: 902 429 3464 F: 902 444 3009

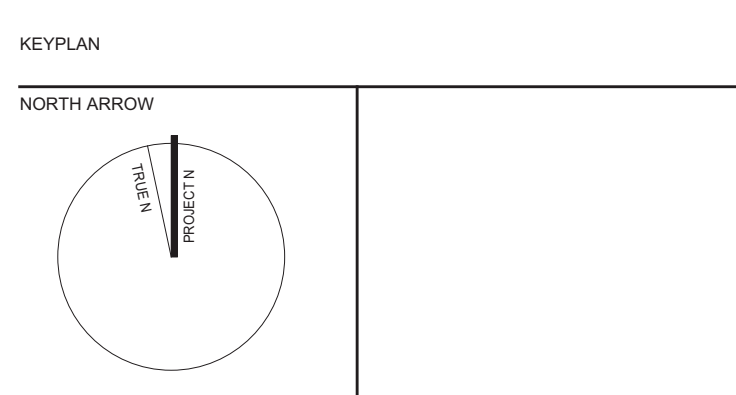
Smith + Andersen
ELECTRICAL ENGINEERS
500-4211 Yonge Street
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Smith + Andersen
ELECTRICAL ENGINEERS
1989 Upper Water Street, Suite 1905
Halifax, Nova Scotia B3J 3P7
T: 902 440 0881 F: 416 467 9104

Shum Consulting
CIVIL ENGINEERS
Riverview, 1355 Bedford Highway
Bedford, Nova Scotia B4A 1C5
T: 902 855 5560 F: 902 855 5574

EAST HANTS
We live it!

Municipality of East Hants
Parks, Recreation and Culture
Lloyd E. Mahood Centre
15 Commerce Court
Bedford, Nova Scotia, B2S 3K5
T: 902 883-7088



PROJECT TITLE
East Hants Aquatic Centre
Commerce Court, Etnahale, NS

DRAWING TITLE
INTERIOR SIGNAGE -
LOCATION PLANS

SCALE
As Noted
DATE
2018-03-01
PROJECT NUMBER
1609
DRAWING NUMBER

A951

G

LINE STRUCTURAL
CONCRETE FOUNDATION
WALL BELOW

Gx

INSULATED HOLLOW METAL DOOR
INSULATED HOLLOW METAL FRAME
CONT. METAL FLASHING
CONT. SEALANT AND BACKERROD

FREE DRAINING GRANULAR MATERIAL
LINE OF 600x600mm PRECAST
CONCRETE PAVER BELOW
RETAINING WALL

PM3
X1

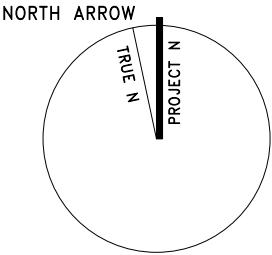
G

Gx

W1B

NOTE: REFERENCE DETAIL 7 / A111

MJMA + 



BASEMENT MECHANICAL – JAMB DETAIL
East Hants Aquatic Centre

| REV. | DESCRIPTION | DATE |
|------------------|----------------|---|
| 1 | Addendum No. 3 | 2018-03-16 |
| | | |
| | | |
| | | |
| Project No: 1609 | | Drawing No: |



Smith + Andersen

4211 Yonge Street Suite 500 Toronto Ontario M2P 2A9
416 487 8151 f 416 487 9104 smithandandersen.com

ADDENDUM

PROJECT NAME: East Hants Aquatic Centre

COMPANY: MJMA

ATTENTION: Andrew Filarski

PROJECT NO.: 17079.000.m.001

DATE: 2018-03-16

ADDENDUM NO.: M1

ISSUED BY: Syed Mateen

The following amendments are hereby made as part of the Contract Documents. The following revisions and/or additions shall be made to contract documents and the cost shall be included in the Tender Price.

1.0 SPECIFICATIONS

1.1 Section 21 05 00.00 – General Instructions for Mechanical Sections (Not re-issued)

- 1.1.1 Item 1.11.2 shall read as “Pipes transporting hot fluids shall be installed at least 150 mm (6 in.) away from pipes carrying cold fluids, unless approval from the Consultant is obtained to install services closer than 150 mm (6 in.).”

1.2 Section 21 05 29.00 – Hangers and Supports (Not re-issued)

- 1.2.1 Item 1.1.3 shall read as “Hangers, supports, anchors, guides, and restraints shall be selected where installed prior to review, shall be removed and replaced to the satisfaction of the Consultant”.
- 1.2.2 Item 3.1.26 shall be deleted.

1.3 Section 21 13 00.00 – Sprinkler Systems (Not re-issued)

- 1.3.1 The hydrant water test and summary report referred to under item 1.4.3 is included as part of this addendum.
- 1.3.2 Delete items 1.5.2 and 1.5.2.1 through 1.5.2.5.

1.4 Section 22 42 00.00 – Fixtures and Trim (Not re-issued)

- 1.4.1 Item 3.1.2 shall read as “Examine fixtures for defects. Remove and replace any fixture which, in the opinion of the Consultant, if damaged. Make necessary adjustments to ensure fixtures function as per manufacturer’s operating criteria. Clean and polish all fixtures and trim upon completion.”

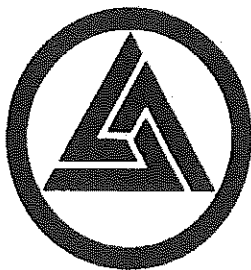
1.5 Section 23 05 93.13 – Testing and Balancing Piping systems (included herein)

- 1.5.1 Refer the attached updated specification section.
- 1.6 Section 23 05 93.23 – Testing and Balancing Air systems (included herein)**
- 1.6.1 Refer the attached updated specification section.
- 1.7 Section 23 09 00.00 – Building Automation System (Not re-issued)**
- 1.7.1 For item 1.4.1, delete address/location and contact information given in Table 1.
- 1.7.2 Delete Item 1.5.
- 1.8 Section 23 31 13.00 – Ductwork and Specialities (Not re-issued)**
- 1.8.1 Delete items 1.3, 1.3.1 and 1.3.1.1 through 1.3.1.9.
- 1.9 Section 23 11 13.00 – Oil Lines (Not re-issued)**
- 1.9.1 Item 1.1.2 shall read as “All piping installation and associated devices/appurtenances shall comply with the latest, in force version of the CSA B139 “Installation Code for Oil-Burning Equipment” and the authority having jurisdiction.”
- 2.0 DRAWINGS**
- 2.1 M300 – Level 1 Below Grade Plumbing and Drainage (included herein)**
- 2.1.1 Floor drain tag “FD” deleted for the entrance vestibule. The revisions are bubbled for coordination purposes.
- 2.2 M401 – Level 1 HVAC (included herein)**
- 2.2.1 Diffuser locations updated as per revised ceiling layout. The revisions are bubbled for coordination purposes.
- 3.0 CLARIFICATIONS**
- 3.1.1 No further clarifications at this time.

END OF MECHANICAL ADDENDUM M1

17079.000.m.001 - Addendum M1.docx

Hydrant Water Flow Test Summary Report



Life Safety Systems



☒ 9 Ralston Avenue
Dartmouth, NS
Tel: (902) 468 - 7500
Fax: (902) 468 - 3289

☐ 290 Baig Blvd Unit 5
Moncton, NB
Tel: (506) 386 - 7500
Fax: (506) 384 - 0495

☐ 78 Clyde Avenue
Mount Pearl, NL
Tel: (709) 738 - 7940
Fax: (709) 738 - 7941

General Information

Date: 07-Jul-17 Time: 9:30 AM
Customer Name: _____
Job Number: _____
Property Name: #180 Park Road
Address: Elmsdale
City: _____ Province: NS
Name of Tester (please print): Todd Dempsey
Witness Name (please print): J Pelley

Underground System Data

Underground Main type: ☐ Loop ☐ Two Way ☐ Dead End
Size of Main: 16"
Source Reliable: ☒ Yes ☐ No
If no, explain: _____

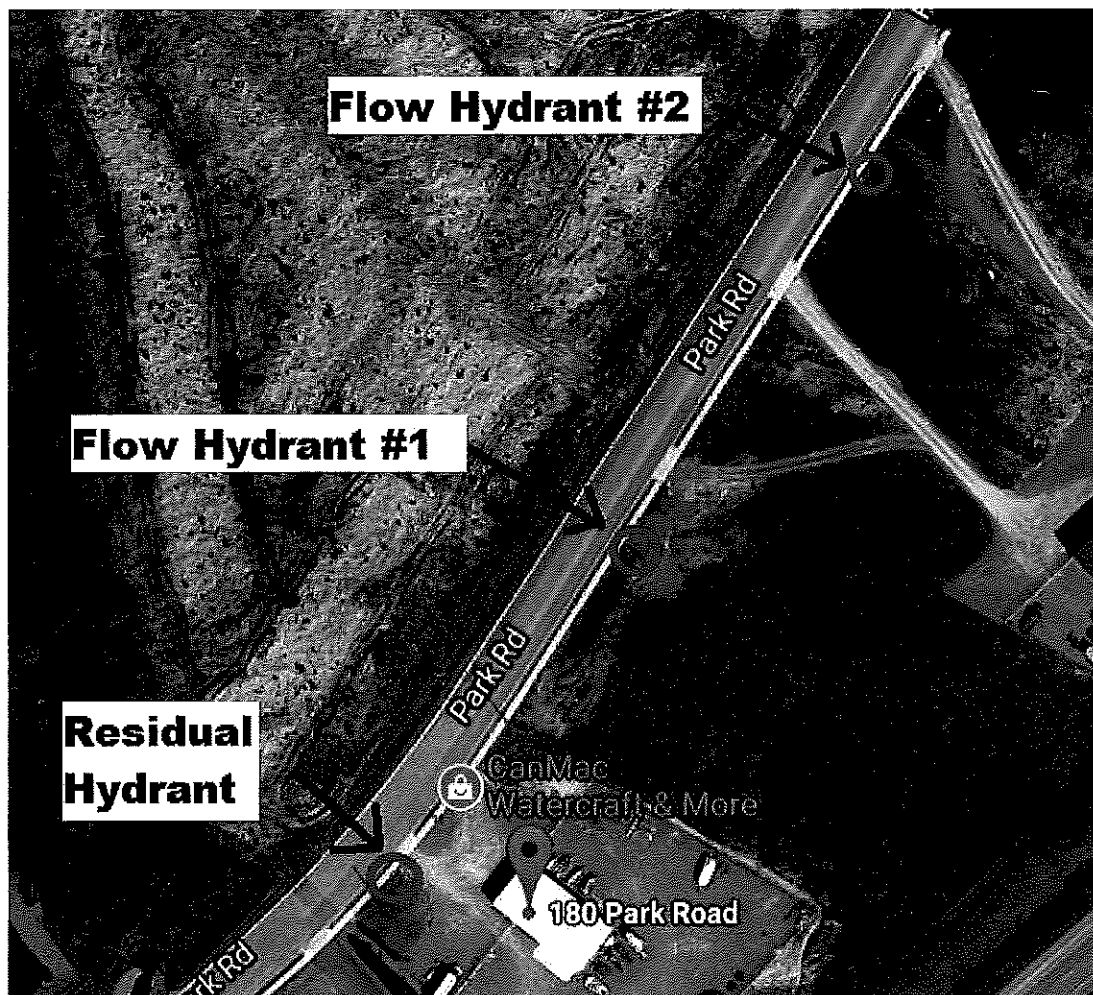
Hydrant Flow Test Data

Location of Residual Hydrant: Lot 180 Park Rd
Location of Flow Hydrant #1: Next hydrant north
Location of Flow Hydrant #2 (If applicable): 2nd hydrant north
Location of Flow Hydrant #3 (If applicable): _____
Static Pressure: 46 (psi)

| Flow Point Number 1 | | | | Residual Pressure: 24 (psi) | | |
|---------------------|-------------------|-----------------------------|---------------------|-----------------------------|----------------------------|-------------------|
| Flow Hydrant Number | Number of Outlets | Nominal Orifice Size (inch) | Pitot Reading (psi) | Theoretical Flow (gpm) | Orifice Coefficient (c =) | Actual Flow (gpm) |
| 1 | 1 | 4" | 8 | 1350 | 0.8 | 1080 |
| 2 (If Applicable) | 1 | 4" | 10 | 1510 | 0.8 | 1208 |
| 3 (If Applicable) | | | | | | |
| Total Flow: | | | | 2288 (gpm) | | |

| Flow Point Number 2 (If Applicable) | | | | Residual Pressure: 20 (psi) | | |
|-------------------------------------|-------------------|-----------------------------|---------------------|-----------------------------|----------------------------|-------------------|
| Flow Hydrant Number | Number of Outlets | Nominal Orifice Size (inch) | Pitot Reading (psi) | Theoretical Flow (gpm) | Orifice Coefficient (c =) | Actual Flow (gpm) |
| 1 | 1 | 4" | 6 | 1170 | 0.8 | 936 |
| 1 | 2 | 1-3/4" | 5 | 204 | 0.97 | 198 |
| 2 | 1 | 4" | 6 | 1170 | 0.8 | 936 |
| 2 | 2 | 1-3/4" | 7 | 242 | 0.97 | 235 |
| 2 | 3 | 1-3/4" | 5 | 204 | 0.97 | 198 |
| Total Flow: | | | | 2503 (gpm) | | |

| Hydrant Flow Test Data Summary | | | | |
|--------------------------------|--------|---------------------|---------------------|---------------------|
| | Static | Flow Point Number 1 | Flow Point Number 2 | Flow Point Number 3 |
| Total Actual Flow (gpm) | 0 | 2288 | 2503 | n/a |
| Pressure (psi) | 46 | 24 | 20 | n/a |





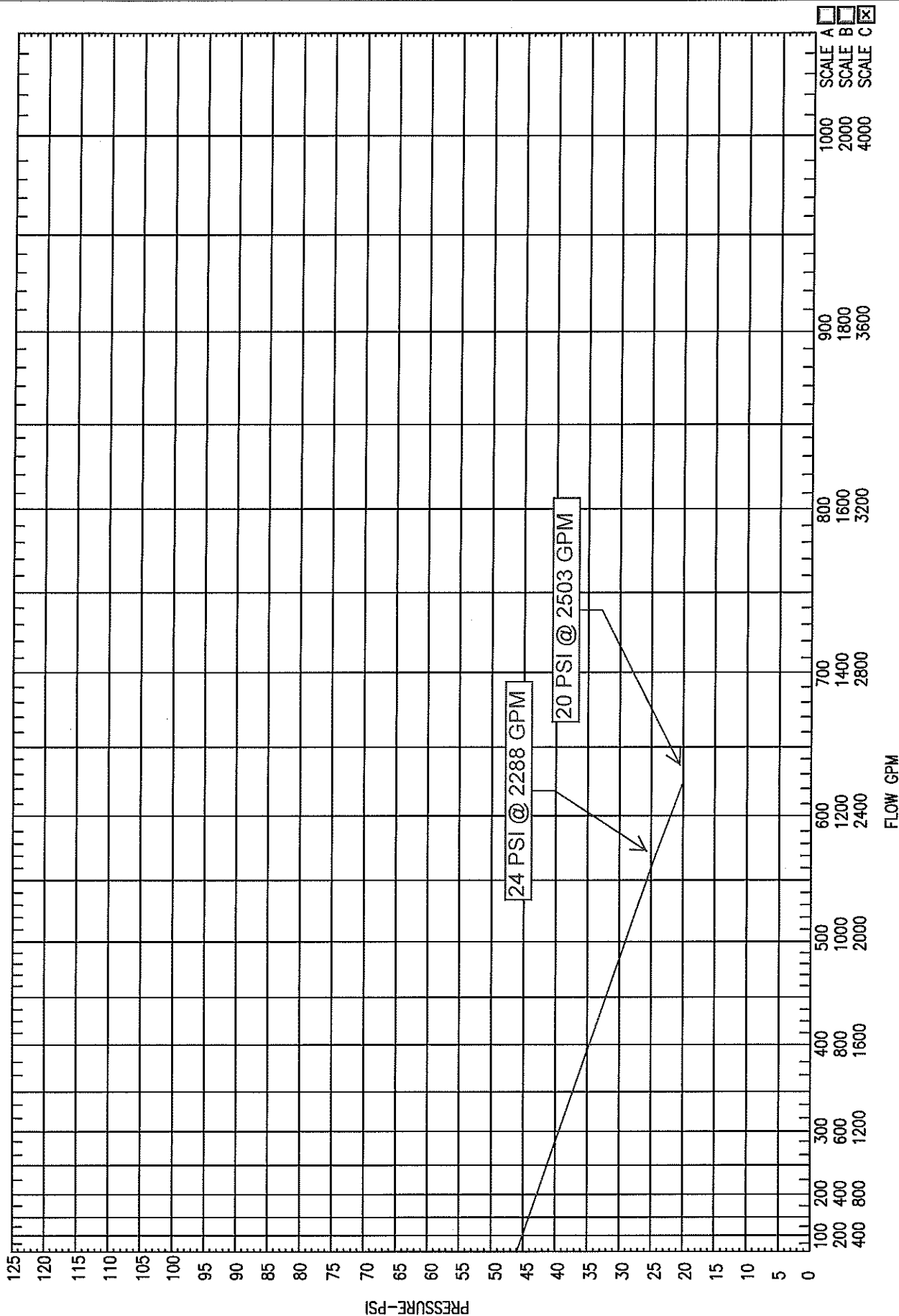
**Life Safety
Systems**

ADDRESS OF JOB SITE
TIME OF TEST
LOCATION OF STATIC HYDRANT
LOCATION OF FLOW HYDRANT (S)

1180 Park Road, Elmsdale, NS
8:50 AM
1180 Park Road
1st & 2nd hydrants north of static hydrant

TEST INFORMATION

| STATIC | FLOW #1 | FLOW #2 | FLOW | PRESSURE |
|--------|---------|---------|----------|----------|
| | | | 0 GPM | 46 PSI |
| | | | 2288 GPM | 24 PSI |
| | | | 2503 GPM | 20 PSI |



Testing and Balancing Piping Systems

PART 1 - GENERAL**1.1 Work Included**

- .1 Conform to
 - .1 Section 21 05 00.00 – GENERAL INSTRUCTIONS FOR MECHANICAL SECTIONS.
 - .2 Section 23 08 00 – Commissioning Requirements - Mechanical
- .2 This Section is split into two Sections of work, the Contractors testing and balancing and the Independent Company's testing and balancing.
- .3 The cost for the Independent Company's testing and balancing shall be included as part of the Mechanical Contract Price. Separate to the Independent Company's amount, the Mechanical Contractor shall include in its base price any required coordination, any facilitation, any meetings, any review and responses to questions, and the implementation of any reasonable requests by the independent testing and balancing company such that they can perform the scope of work described herein.
- .4 Sample of a Test Verification Sheet is provide at the end of the section and this sheet or a similar one with all pertinent information is to be filled out for all tests called for in the Specification or required by code. The sheets shall be signed by the Contractor and the Independent Company to verify that the data recorded is correct.
- .5 Leakage tests shall be carried out on sections of the work and these sections shall be identified by reference number of the test sheet and by description of the duct system. The reference identification number shall be indicated on the As-Build Drawings.
- .6 The following systems shall be tested and balanced:
 - .1 Refrigeration piping
 - .2 Boilers and heating systems
 - .3 Water treatment systems
 - .4 Life safety and fire protection systems
 - .5 Plumbing systems
- .7 The Contractor shall provide a schedule for all testing and balancing.

1.2 Related Sections

- .1 Section 01 91 13 – General Commissioning Requirements
- .2 Section 01 91 31 – Commissioning Plan
- .3 Section 01 91 41 – Commissioning Training
- .4 Section 23 08 00 – Commissioning Requirements - Mechanical

1.3 Quality Assurance

- .1 The balancing of the water and air systems shall be performed by the same balancing company.

Testing and Balancing Piping Systems

- .2 Balancing companies shall be members of A.A.B.C. or N.E.B.B.

PART 2 - PRODUCTS

2.1 Not Used

PART 3 - EXECUTION

3.1 The Contractors Testing and Balancing

- .1 Test all plumbing systems in accordance with all applicable plumbing codes.
- .2 Test all fire protection systems in accordance with all applicable N.F.P.A. codes.
- .3 Compressed air and nitrogen systems shall be tested to a minimum of 150 psig and shall be proven tight over a period of 24 hours.
- .4 Test for vacuum shall be 1-1/2 times the operating vacuum.
- .5 All other systems not covered by codes noted above shall be tested and proven tight over a period of 24 hours by a hydrostatic test. Remove vents and gauges and temporarily plug connections.
- .6 Test pressure for steam and water systems shall be:
1-1/2 times the system working pressure but not less than 1035 kPa (150 psig)
OR
The maximum working pressure of expansion joints and vibration isolators.
Repair any leaks or defects and repeat the tests to the satisfaction of the Consultant.
- .7 After completion of the testing, rough balance the water systems and ensure all coils, convertors, etc., are operating to approximately design conditions to ensure freezing conditions will not occur anywhere. Adjust the circuits by means of balancing valves.
- .8 Balance on water lines shall be obtained by inserting thermometers in thermometer wells provided for this purpose at each balancing valve and adjusting flow until all thermometers read the same appropriate system temperature.
- .9 All tests for systems shall be performed in the presence of, and test reports signed by, the Independent Company. Notify the Independent Company in writing a minimum of one week in advance of testing.
- .10 Co-ordinate with the Independent Company to ensure all necessary valves for balancing the system are installed.

Notify the Consultant in writing that this co-ordination has taken place before installation begins. If this Contractor fails to co-ordinate with the Independent Company and if failure to co-ordinate results in being unable to balance the systems, the cost of any changes required shall be paid for by the Contractor at no cost to the Owner.
- .11 Ensure that all cooling coil drain pans drain freely and that no standing water remains.
- .12 Ensure access is provided to all valves and equipment that requires servicing.

Testing and Balancing Piping Systems

- .13 The Contractor is responsible for all equipment operating to design conditions and shall trim impellers, etc., to provide the required conditions.
- .14 The Contractor shall make available staff, as required by the Independent Company, to correct any deficiencies in the mechanical systems which prevent the Independent Company from balancing the system.
- .15 The Contractor shall provide copies of all Shop Drawings requested by the Independent Company.
- .16 The Contractor referred to is the prime Mechanical Contractor.

3.2 The Independent Company's Testing and Balancing

- .1 The Mechanical Contractor shall appoint an Independent Company to measure and report.
- .2 The Independent Company shall balance the entire water system to ensure all heat exchangers, etc, are operating to design conditions. Adjust the circuits by means of the balancing valves and record balance position.
- .3 Each pump shall be checked for design, working and shut-off head conditions and any pump that varies by more than 10% from the design conditions shall have the impeller trimmed until design conditions have been met.
- .4 Flow through all heat exchangers, chillers, boilers and other such equipment shall be balanced to ensure that the pressure drop through the equipment is within 10% of the manufacturer's design conditions.

If the design conditions cannot be met by adjusting the balancing valves throughout the system, then pump impellers shall be either changed or trimmed as required.

- .5 Initial balancing of coils shall be to ensure that the pressure drops are within 10% of the manufacturers design conditions. When both the air and water systems are fully operational entering air and water and leaving air and water readings shall be taken as close as possible to the peak design conditions to ensure the coil performance meets the design conditions. Coil water working conditions shall only be taken in conjunction with the air flow working conditions for the coil.
- .6 The Independent Company shall not disconnect any control device. Furnish a list of adjusted set points. Commanding of control valves and entering of adjusted set points into the building automation system for testing and balancing purposes is performed under Section 23 09 00.00 – BUILDING AUTOMATION SYSTEM. If the Independent Company fails to co-ordinate with Section 23 09 00.00 – BUILDING AUTOMATION SYSTEM and if failure to co-ordinate results in any cost, the cost of any change required shall be paid by the Independent Company at no cost to the Owner.
- .7 The Independent Company shall witness all system tests and sign all test reports. Include one copy of all test reports in each copy of the balancing reports.

Testing and Balancing Piping Systems

- .8 Co-ordinate with the Contractor to ensure that all necessary valves for control and balancing are installed in all locations required. Notify the Consultant in writing that this co-ordination has taken place. Include in this letter any recommendations made regarding valves, locations, installations, etc. If this Independent Company fails to co-ordinate with the Contractor and if failure to co-ordinate results in being unable to balance the systems, the cost of any changes required shall be paid for by the Independent Company at no cost to the Owner.
- .9 The Independent Company is responsible for balancing the systems to obtain the design conditions, and shall repeat the balancing until the required conditions have been met.
- .10 At the time of final inspection, recheck in the presence of the Consultant random selections of data recorded in the certified report. Points or areas for recheck shall be selected by the Consultant and be approximately 10% of the report data.
- .11 A measured deviation of more than 10% between the verification reading and the reported data shall be considered as failing the verification procedure.
- .12 A failure of more than 10% of the selected verification readings shall result in rejection of the report as unacceptable.
- .13 In the event the report is rejected, rebalance all systems, submit new certified reports and make a re-inspection, all at no additional cost to the Owner.
- .14 Following final acceptance of the certified reports by the Consultant, permanently mark the settings of all valves and other adjustable devices so that balance set position can be restored if disturbed at any time. For circuit balancing valves, record the valve position by the number of turns registered on the valve and lock the valve into that position. Do not mark such devices until after final acceptance.
- .15 Provide 3 copies of the final testing and balancing reports. Reports shall be complete with index pages and index tabs, and certified by the Independent Company. All diagrams as single line representation of a Mechanical system specifically prepared for this project shall be prepared using a CAD system and shall be acceptable to Consultant.

END OF SECTION

Testing and Balancing Piping Systems

TEST VERIFICATION SHEET – PIPING

Test Number:

Date:

System:

Description and sketch of tested component

Starting test pressure

Starting test temperature

Final test pressure

Finish test temperature

Duration of test

Test performed by: (signature)

Verified by: (signature)

(printed name)

(printed name)

(company)

(company)

Test witnessed by: (signature)

Test witnessed by: (signature)

(printed name)

(printed name)

(company)

(company)

Testing and Balancing Air Systems

PART 1 - GENERAL**1.1 Work Included**

- .1 Conform to
 - .1 Section 21 05 00.00 – GENERAL INSTRUCTIONS FOR MECHANICAL SECTIONS.
 - .2 Section 23 08 00 – Commissioning Requirements - Mechanical
- .2 This Section is split into two Sections of work, the Contractors testing and balancing and the Independent Company's testing and balancing.
- .3 The cost for the Independent Company's testing and balancing shall be included as part of the Mechanical Contract Price. Separate to the Independent Company's amount, the Mechanical Contractor shall include in its base price any required coordination, any facilitation, any meetings, any review and responses to questions, and the implementation of any reasonable requests by the independent testing and balancing company such that they can perform the scope of work described herein.
- .4 Sample of a Test Verification Sheet is provide at the end of the Section and this sheet or a similar one with all pertinent information is to be filled out for all tests called for in the Specification or required by code. The sheets shall be signed by the Contractor and the Independent Company to verify that the data recorded is correct.
- .5 Leakage tests shall be carried out on Sections of the work and these Sections shall be identified by reference number of the test sheet and by description of the duct system. The reference identification number shall be indicated on the As-Built Drawings.
- .6 The following systems shall be tested and balanced:
 - .1 Air conditioning, ventilation and heating systems
 - .2 Miscellaneous ventilation or exhaust systems
 - .3 Life safety systems
 - .4 Air distribution (supply, return and exhaust)
 - .5 VRF systems
- .7 Read, fully understand and comply with all requirements of the Section 21 08 00.00 – COMMISSIONING.
- .8 The Contractor shall provide a schedule for all testing and balancing.

1.2 Related Sections

- .1 Section 01 91 13 – General Commissioning Requirements
- .2 Section 01 91 31 – Commissioning Plan
- .3 Section 01 91 41 – Commissioning Training
- .4 Section 23 08 00 – Commissioning Requirements - Mechanical

Testing and Balancing Air Systems

1.3 Quality Assurance

- .1 The balancing of the water and air systems shall be performed by the same balancing company.
- .2 Balancing companies shall be members of A.A.B.C. or N.E.B.B.

PART 2 - PRODUCTS**2.1 Not Used****PART 3 - EXECUTION****3.1 The Contractors Testing and Balancing**

- .1 Test for leakage in accordance with all SMACNA Manuals and Standards, all ductwork except downstream of variable air volume boxes or other pressure reducing devices. Seal ducts at all equipment connections and pressurize with a small blower. Leakage for medium pressure ductwork shall not exceed 10% of total duct volume in cubic feet of duct for that part of the system at a pressure of 1.5 kPa (6 in. W.G.). For example a 600 mm x 600 mm (24 in. x 24 in.) duct 30.48 m (100 ft.) long would have a maximum allowable leakage of 19 L/s (40 cfm). Low pressure ductwork shall be tested as specified for medium pressure ductwork but at a pressure of 0.87 kPa (3.5 in. W.G.). In addition seal any leaks causing noise. Test system as a whole or in parts provided all ductwork is accessible for inspection at the time of test. Provide blower, and all test equipment.
- .2 Refer to Section 23 31 13.00 – DUCTWORK AND SPECIALITIES for pressure ratings of ductwork and systems.
- .3 The entire system shall be tested for noise, tightness of joints and proper functioning of the system. Noise tests shall be made under minimum system pressure drop conditions (highest air velocities and clean filter conditions). This Section shall make all necessary alterations and repeat the tests until satisfactory operation is achieved.
- .4 All tests for systems shall be performed in the presence of, and test reports signed by, the Independent Company. Notify the Independent Company in writing a minimum of one week in advance of testing.
- .5 Adjust minimum outside air controller and adjust return air and exhaust air damper linkages to approximately design air quantities, for both maximum and minimum conditions where required, to ensure freezing conditions will not occur.
- .6 Co-ordinate with the Independent Company to ensure all necessary manual dampers and splitter dampers for balancing the systems are installed. Notify the Consultant in writing that this co-ordination has taken place before installation begins. If this Contractor fails to co-ordinate with the Independent Company and if failure to co-ordinate results in being unable to balance the systems, the cost of any changes required shall be paid for by the Contractor at no cost to the Owner.
- .7 The testing equipment shall be itemized in the test reports and shall be approved by the Independent Company and the Consultant before any tests are undertaken. Calibration of the test equipment must be confirmed and approved by the Independent Company before any tests are undertaken.

Testing and Balancing Air Systems

- .8 Ensure access is provided to all fire dampers and equipment that requires servicing.
- .9 The Contractor is responsible for all equipment operating to design conditions and shall change fan sheaves, etc., to provide the required conditions, but is not responsible for balancing the system.
- .10 The Contractor shall make the staff available, as required by the Independent Company, to correct any deficiencies in the mechanical systems which prevent the Independent Company from balancing the system.
- .11 The Contractor shall provide copies of all Shop Drawings requested by the Independent Company.
- .12 The Contractor will provide new filters, etc. required for the measurements. Costs of filters shall be paid for out of the allowance.
- .13 The Contractor referred to is the prime Mechanical Contractor.

3.2 The Independent Company's Testing and Balancing

- .1 The Mechanical Contractor shall appoint an Independent Company to measure and report.
- .2 Co-ordinate with the Contractor to ensure that all necessary manual and splitter dampers for balancing are installed in all locations required. Notify the Consultant in writing that this co-ordination has taken place. Include in this letter any recommendations made regarding dampers, locations, installation, etc. If this Independent Company fails to co-ordinate with the Contractor and if failure to co-ordinate results in being unable to balance the systems, the cost of any changes required shall be paid for by the Independent Company at no cost to the Owner.
- .3 The Independent Company shall balance the entire air systems including air volumes and control settings under maximum system pressure drop conditions (filter at replacement condition).
- .4 The Independent Company will measure, make final adjustments and report upon the air volume at each indoor air handling unit, energy recovery ventilator, miscellaneous exhaust or supply fan, variable refrigerant volume indoor unit, diffuser, register and grille. The static pressure upstream and downstream of the fan, the fan speed and the motor current.

Also to be reported upon are the air flow at outside, return and exhaust air dampers under conditions of minimum outside air, for maximum and minimum volumes and maximum outside air, exhaust air and return air.

Coil working conditions shall only be taken in conjunction with the fluid flow working conditions for the coil.
- .5 The Contractor will provide new filters, etc. required for the measurements.
- .6 Air volumes measured by the Independent Company shall be within plus or minus 5% of those shown on Drawings for diffusers, grilles, registers, variable air volume boxes and fans, at both maximum and minimum volumes shown.

Testing and Balancing Air Systems

Duct traverse readings shall be taken through the access ports provided. Where no access ports have been provided new holes shall be made as required. These holes shall be resealed after final readings with sheet metal cover plates and sealant. Duct tape is not acceptable.

Where insulation is damaged it shall be repaired including the vapour barrier in an approved manner. Duct tape is not acceptable.

- .7 The Independent Company shall not disconnect any control device. Command control devices and enter adjusted set points into the building automation system with tools and training that are furnished under Section 23 09 00.00 – BUILDING AUTOMATION SYSTEM. If the Independent Company fails to co-ordinate with Section 23 09 00.00 – BUILDING AUTOMATION SYSTEM and if failure to co-ordinate results in any cost, the cost of any change required shall be paid by the Independent Company at no cost to the Owner.
- .8 In all cases where measurements by the Independent Company show failure to comply with the Drawings and Specifications, the Contractor shall change fan sheaves, etc., as required, and new balancing measurements shall be made by the Independent Company.
- .9 Ensure all thermostats and controls are set to give specified conditions and include settings in report.
- .10 The Independent Company shall witness all system tests and sign all test reports. Include one copy of all test reports in each copy of the balancing reports.
- .11 Fans on all systems shall be set up to give the minimum discharge pressure required to overcome the resistance of the terminal device, discharge ductwork and diffusers.
- .12 The Independent Company is responsible for balancing the systems to obtain the design conditions and shall repeat the balancing until the required conditions have been met.
- .13 At the time of final inspection, recheck in the presence of the Consultant random selections of air quantities and fan data recorded in the certified report. Points or areas for recheck shall be selected by the Consultant and be approximately 10% of the report data.

At the time of verification measure space temperature and humidity in a representative number of rooms to verify performance. Tabulate these results and bind into certified report as an appendix.

A measured flow deviation of more than 10% between the verification reading and the reported data shall be considered as failing the verification procedure.

A failure of more than 10% of the selected verification readings shall result in rejection of the report as unacceptable.

In the event the report is rejected, rebalance all systems, submit new certified reports and make a reinspection, all at no additional cost to the Owner.

- .14 Following final acceptance of the certified reports by the Consultant, permanently mark the settings of all valves, dampers, splitters and other adjustable devices so that balance set position can be restored if disturbed at any time. Do not mark such devices until after final acceptance.

Testing and Balancing Air Systems

- .15 Provide three copies of the final testing and balancing reports. Reports shall be complete with index pages and index tabs, and certified by the Independent Company. Any diagram as single line representation of a Mechanical System specifically prepared for this project shall be prepared using a CAD system and shall be acceptable to the Consultant.

Submit a sample to the Consultant for review.

END OF SECTION

Testing and Balancing Air Systems

TEST VERIFICATION SHEET – DUCTWORK

Test Number:

Date:

System:

Description and sketch of tested component

Test pressure

Volume of ductwork under test

Duct Leakage (cfm)

Allowable duct leakage (cfm)

Duration of test

Test performed by: (signature)

Verified by: (signature)

(printed name)

(printed name)

(company)

(company)

Test witnessed by: (signature)

Test witnessed by: (signature)

(printed name)

(printed name)

(company)

(company)

[illegible]

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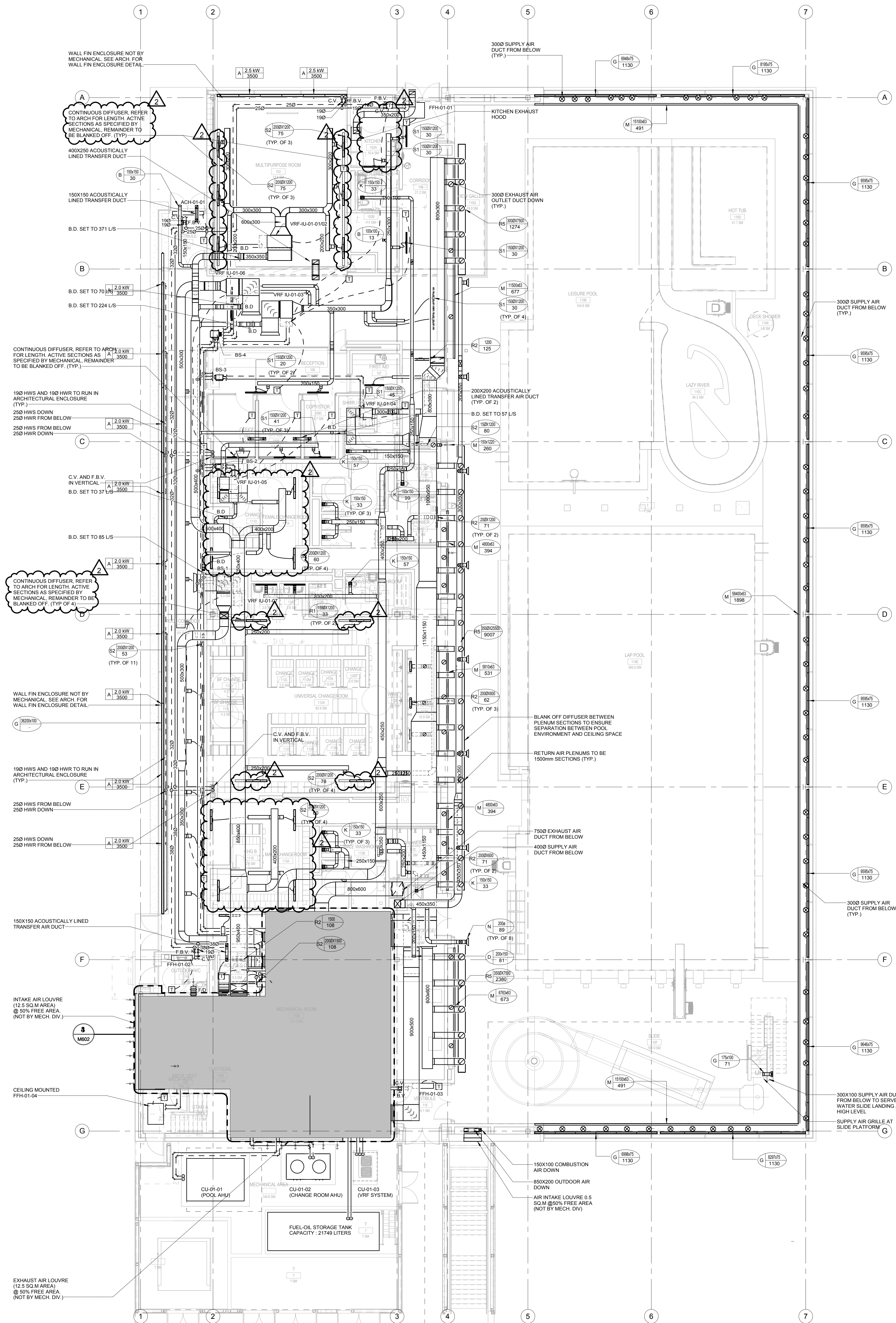
SCALE

SCALE
1 : 100

DATE
2018-03-01

PROJECT NUMBER
17079

DRAWING NUMBER



GENERAL NOTES

1. DO NOT SCALE DRAWINGS. THE LOCATIONS OF ALL ITEMS SHOWN ON THE DRAWINGS OR SPECIFIED THAT ARE NOT DEFINITELY FIXED BY DIMENSIONS ARE APPROXIMATE ONLY. THE EXACT LOCATIONS NECESSARY TO SECURE THE BEST CONDITIONS AND RESULTS MUST BE DETERMINED BY THE SITE CONDITIONS. REVIEW ALL REVISIONS WITH THE CONSULTANT.
2. FLOOR PLANS SHALL BE READ IN CONJUNCTION WITH SCHEMATICS. INFORMATION SHOWN ON FLOOR PLANS SHALL BE ASSUMED TO BE ACCURATE UNLESS OTHERWISE NOTED. SCHEMATIC AND VICE-VERSA TO PROVIDE A COMPLETE AND OPERATIONAL SYSTEM.
3. VERIFY STRUCTURAL INTEGRITY OF ALL TEMPORARY AND PERMANENT OPENINGS. ADDITIONAL DRILLING TO ENSURE STRUCTURAL INTEGRITY SHALL BE INCLUDED UNDER THIS CONTRACT.

HVAC NOTES:

- ALL HWS AND HVR BRANCH PIPES SHALL BE MINIMUM 10MM DIA UNLESS INDICATED OTHERWISE.
ALL HWS AND HVR MAINS FOR INTERNAL USES SHALL BE MINIMUM 150MM DIA UNLESS INDICATED OTHERWISE.
ALL TRANSFER AIR DUCTS SHALL BE 600MMX200 (W600X200) UNLESS INDICATED OTHERWISE.
ALL TRANSFER AIR DUCTS SHALL BE 1000MMX200 (W1000X200) UNLESS INDICATED OTHERWISE.
TRANSFER AIR DUCTS SHALL BE 1500MMX200 (W1500X200) UNLESS INDICATED OTHERWISE.
REFER TO ARCHITECTURAL REFLECTED CEILING PLAN FOR LOCATION OF TRANSFER AIR DUCTS.
TEMPERATURE SENSORS ARE LOCATED TO AND IN PRICING ARE TO BE RECORDED IN THE FIELD.
REFER TO SPECIFICATIONS, COORDINATE FINAL LOCATION OF SENSORS TO ARCHITECTURAL REFLECTED CEILING PLAN.
SHOW ALL RELOCATIONS OUTSIDE OF THIS RANGE SHALL BE INDICATED BY THE CONTRACTOR.
TEMPERATURE SENSORS SHALL BE NORMALLY 1200MM (48 IN) FROM THE FLOOR FINISHED FLOOR SURFACE.
DIFFUSER DUCT RUN OUTS SHALL BE THE SAME SIZE AS THE INLET DUCT.
AIR FLOW RATES SHALL BE BALANCED EQUALLY BETWEEN ALL DIFFUSERS.
SHOW THE ASSOCIATED VAV BOX.
ALL DIFFUSERS MUST BE BALANCED TO THE CLEARANCE TO THE UNDERSIDE OF PIPES, DUCTS, CONDUITS, SUSPENDED CEILING, AND THROUGHOUT THE SPACE.
IN MECHANICAL ROOMS:
ALL DIFFUSERS ARE TO BE OVERHEAD, THOUGHT THE UNDERSIDE OF THE STRUCTURE WITH SUFFICIENT ROOM FOR INSULATION UNLESS OTHERWISE NOTED.
CONTRACTOR TO VERIFY STRUCTURAL INTEGRITY OF SUSPENDED CEILING.
ALL DIFFUSERS TO BE INSTALLED IN THE INTERIOR SHALL BE INCLUDED UNDER THIS CONTRACT.
CONTRACTOR TO VERIFY STRUCTURAL INTEGRITY OF WALL AND SPOWEL EXHAUST SYSTEMS.

Bidders's Questions & Responses

1. BIDDER'S QUESTIONS & RESPONSES

1.1 Landscape

.1 Question:

Splash Pad - Section 13 11 12, Item 2.6 Play Products;

.1 Ground Geyser VOR-301

.2 Wall Spray VOR-302

"Regarding the above two play products, they are listed in the specifications but not shown in the splashpad drawing (SPL100). I have found the Ground Geyser VOR-301 in drawing L504 but I cannot find the VOR-302 Wall Spray. Please identify if these items are to be included as splash pad play products and kindly assist in their location identification."

Response:

Question addressed in Addendum No. 3

1.2 Architectural

.1 Question:

"A sign company wrote to a GC: We are still pondering how to deal with the warranty times. Some of the quantities in the sign schedule are wrong but I can work them out."

"In the meantime, could you inquire about this:

- Sign Type X1 – Channel Letters on a raceway "Sponsor to be determined"*
- Do I just bid on the letters "AQUATIC CENTRE" with no logo?"*

Response:

Type X1: Channel Letters on Raceway; "AQUATIC CENTRE" lettering and raceway are in Contract; "ILLUMINATED SPONSOR LOGO" is Not in Contract (NIC); Refer to specifications for signage warranty requirements;

Additional items addressed in Addendum No. 3

.2 Question:

"I have also noticed that the Reflected Ceiling Plan in the original tender documents and the addendum does not properly indicate the ceiling types. The ceiling plan partially indicates the ceiling types for a fraction of the rooms. There is no legend given and only certain rooms have indication right on the drawing. "

Response:

No revised reflected ceiling plan is required. Refer to A150 - RCP and Typ. Ceiling Details. Ceiling finish and elevation tags are typically indicated. RCP is to be read in conjunction with A800 - Room Finish Schedule and Specification.

END OF BIDDER'S QUESTIONS & RESPONSES